Conceptualising the Theory of Absorptive Capacity with Team Diversity

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ABSTRACT

This paper examines the role of absorptive capacity and team diversity and proposes an integrative model of the university research team that incorporates relevant insights from knowledge diversity and team diversity. Within this context, the authors discussed a conceptual model that shows theory-derived relationships between the components of absorptive capacity that consists of knowledge recognition, knowledge assimilation, and knowledge application with various aspects of diversity. The proposed results indicate that the ability of a research team to recognize the value of new, external information, assimilate it and apply it to research outputs is critical to its output capabilities. The outcomes consist of Process Performance and Product Performance which reflected that the diversity knowledge has been diffused and applied in the research domains. This paper helps to promote a better understanding of absorptive capacity and delineate the critical importance of team diversity for research team's success.

Keywords: Absorptive capacity, team diversity, and knowledge diversity

INTRODUCTION

There is a prevailing research culture in many universities either locally or internationally. The culture insists on isolated, individual work, particularly when working towards a research project. This individuality arises from the mathematical

history of algorithmic computer science research (Gibson, 2005). Unlike many academic areas, research in most social sciences and humanity requires a breadth of understanding across many academic research areas, and applied theory may act as a concrete foundation for further research, and human factors are paramount.

Purpose

This conceptual paper rejects this individualist culture. It is viewed a future-

oriented research team must obtain both breadth and depth of talent. This breadth combined with limited resources means we must choose a research topic wisely so it benefits both the individual and the group. Thus, a systematic approach must be taken to define research areas and there will be a thought leader for each area. Areas interact so synergy is achieved, and are constrained to critical issues in order to encourage active and committed input from the team. An area leader is responsible for academic leadership and exploring inter-area synergy. Publications are expected to be co-authored.

From a research standpoint, this raises the issue of how to assess academic contributions in an environment where the thought leaders' ideas in an area may undergo significant revision or indeed lead to novel contributions from within the team. This paper explores the concept of absorptive capacity with team diversity to promote effective academic research.

In this paper, it is argued that the ability of a research team to recognize the value of new, external information, assimilate it, and apply it to research outputs which is critical to its output capabilities. This capability is labeled as a research team's absorptive capacity and it is largely suggested as a function of the team's level of prior related knowledge. The discussion focuses on the team's absorptive capacity including, in particular, prior related knowledge and diversity of its background. In another word, research teams need to emphasize and more effectively exploit knowledge-based resources that already exist within the team

(Damodaran & Olphert, 2000; Davenport & Prusak, 1998) before exploiting the external knowledge.

What is Absorptive Capacity?

According to Cohen and Levinthal (1990), the firm's ability to absorb new knowledge and practices is largely dependent upon the prior related knowledge stock. Its absorptive capacity consists of its abilities "to recognize the value of new information, assimilate it, and apply it to commercial ends" or "to evaluate and utilize outside knowledge" (Cohen & Levinthal, 1990, p.128). As absorptive capacity is based on the firm's prior knowledge, it could be seen as an accumulated, knowledge-based asset stock. Our reconceptualization of this particular model focuses on the learning of external knowledge that allows the university to develop research domain with a highly diverse industry base. Learning tends to be a path-dependent activity in the sense that new knowledge acquisition is largely determined by the existing knowledge base, on both individual researcher as well as the entire research team. Accumulated prior knowledge enhances the ability to assimilate knowledge related to the existing knowledge base. In that sense, university that has a large knowledge base is well equipped to understand new scientific knowledge and its potential to embark on bigger research project. Similarly, it is argued that a university's diversity knowledge (or its familiarity with and prior knowledge of a highly diverse industry base) antecedes its ability to recognize the value of this

diversity knowledge, assimilate it, and apply it so that research development and research publication can be realized. This model suggests that team diversity influences a university research team's ability to develop absorptive capacity.

Components of Team Diversity

Scholars have studied diversity in terms of geographic markets, technology, culture, identity groups, functional expertise, educational level and industry tenure and experience (Hamilton, 2004; Chowdhury, 2005). Among the common themes that have received the most attention in the literature are international diversification, group dynamics and strategic decision-making (Hamilton, 2004). Nonetheless, the research from each of these streams tends to support the same conclusions which the team diversity tends to lead to increases in perspectives, cognitive resources, and problem solving approaches that improve decision-making and to problems with informal communication and social integration at the same time.

Team diversity is defined as "any attribute that people use to tell themselves that another person is different" (Jehn, 1999). The definition of demography is traditionally conceptualized in terms of visible differences in age, gender, and race. Individuals may also differ on less visible characteristics such as level of education, tenure with the company or functional background (William & O'Reilly, 1998; Jehn & Katerina, 2004). Decision-making researchers consider diversity as differences

in experience and knowledge (Tensaki & Boland, 1996). It is important to note that difference in group composition is an important issue in Information System research; some of which has focused on gender, age mix, or personality profiles (Pollock, 2009). Jehn (1999) categorized team diversity into three types, namely, informational diversity (ID), social category diversity (SD), and value diversity (VD). Informational diversity (ID) refers to the variation in knowledge base and perspective that members bring to the software team. Social diversity (SD) is the explicit difference among team members in social category membership, such as gender, age, and ethic. Value Diversity (VD) means that members differ in terms of what they think the real task, goal, target, or mission should be.

Nonaka and Takeuchi (1995) indicated that teams whose members had heterogeneous education backgrounds seemed to have better performance because the diversity of knowledge would facilitate information exchange and communication from different viewpoints. Tenkasi and Boland (1996) used the term "knowledge diversity" instead of informational diversity, and noted that the domain experts in a knowledge-intensive firm must develop their perspectives, understandings, and knowledge base separately. Only a few researchers have investigated how the minority status or diversity of team members relates to knowledge sharing. Ojha (2005) showed that team members who considered themselves a minority based on gender,

marital status, or education were less likely to share knowledge with team members. Sawng *et al.* (2006) found that R&D teams in large organizations with high female-male ratios were more likely to engage in knowledge sharing. In fact, there are a few studies showing the importance of heterogeneous team contributing to knowledge sharing (Phillips, Mannix, Neale & Gruenfeld, 2004; Thomas-Hunt, Ogden & Neale, 2003).

The Importance of Diversity Knowledge

According to resource-based theory, knowledge is strategically the most important resource of the firm. However, Cohen and Levinthal (1990) suggest that a firm's performance or ability to sustain a competitive advantage is not strictly based on its ability to obtain knowledge but a function of its prior possession of relevant knowledge. In other words, for a firm to fully capitalize on new knowledge, there must be some relatedness between the new knowledge it obtains and its existing knowledge stock.

Earlier in this paper, diversity knowledge is defined as a research team's familiarity with and prior knowledge of a highly diverse industry base. A reversal of the argument would suggest that research teams with a high level of diversified knowledge will have the appropriate contextual knowledge (i.e. familiarity) necessary to make the new knowledge acquired from such domains fully intelligible.

The Social Learning Theory proposed by Albert Bandura (1977) postulates that learning occurs within a social context, people learn by observing the actions of others within that context, and people learn most from those with whom they identify. The implication is that because the learning of staff in diversified research team has likely taken place within the social context of racial, ethnic, and cultural diversity, they should already possess diversity knowledge. Moreover, because they have learned from those with whom they identify (their own or other culturally diverse groups) they possess enough familiarity to render any new knowledge acquired from specific domains with a highly diverse industry base. Arguments also suggest that research team with a high level of diversity will have a knowledge base that is sufficiently adapted to the newly acquired knowledge from such domains, thereby facilitating the absorption process.

Thus, it is broadly agreed that a diverse work group that has diversified knowledge will generate a wider pool of ideas and identify non-traditional constructs that can lead to new knowledge (Ancona & Bresman, 2007; Cavarretta, 2008).

Recognizing the Value of Diversity Knowledge

Research team's effectiveness can be measured through team performance. Some indicators could be based on acknowledgment and attribution of team leadership and the resulting publications. Other metrics could be the industry involvement and case studies. The team leader is expected to recognize the value of

diversity knowledge in order to seek ways to acquire it. Therefore, it is suggested that the research team work on an area the leader is responsible for but is expected to welcome contributions and insights from other team members. There is synergy between areas, and it is expected robust contribution both from within and across areas. Eventually, this will lead to many co-authored papers. New avenues for research will be explored based on existing overseas and local approaches.

Although a research team with a high level of team diversity is proposed by previous authors as being in a strategic position to take advantage of diversity knowledge, being a research team leader, he or she does not guarantee that diversity knowledge will be viewed as being valuable to the team. Indeed, recognizing the value of knowledge is not automatic but needs to be fostered to allow the absorption process to begin. Therefore, being a research team leader, he or she plays a key role in judging the potential and thus valuing of new knowledge as well as recognizing the value of diversity knowledge.

Assimilating Diversity Knowledge

Cohen and Levinthal (1990) proposed assimilation as the processes that allows firms to analyze, interpret and understand the knowledge obtained from external sources, and occurs as new knowledge is integrated into existing cognitive structures. Knowledge sharing is argued to be the fundamental activity that initiates knowledge assimilation within the firm. Knowledge is

viewed as being a personal activity because it is embedded in individuals, and that knowledge assimilation via knowledge sharing is about making the embedded knowledge flow smoothly within the team. It has been noted that the personal nature of knowledge increases the need for motivation in sharing knowledge to facilitate the assimilation process. This motivation comes in the form of research team leader's ability and willingness to cultivate a climate that is conducive to knowledge sharing within the team.

As noted earlier, a climate conducive to knowledge sharing is necessary to initiate the assimilation process. In research team with diversity, it has been suggested that a positive climate (such as a high degree of tolerance towards mistake and acceptance of racial, ethnic and cultural differences) is conducive to knowledge sharing and thus to the knowledge assimilation process (Bock *et al*., 2005). However, motivation and commitment on the part of a team leader are necessary to create and sustain a positive diversity climate.

More importantly, research team members in this new area will be naïve, undergoing a steep learning curve, and exploring many wrong paths. Thus, it is important to have the freedom to move quickly as well as adopt and discard approaches rapidly. Learning progresses best by taking standpoints and testing ideas. In the initial stage, papers should be written only for compliance purposes and as an exercise. It is likely that many papers will later be contradicted as mistakes are

discovered. Later research will be built on the foundation of strong applied knowledge of theory. This research gets us to the leading edge with the tools and experiences required to structure approaches, assess significance, and understand external contributions. At this point, papers should be significant, ready for publishable in leading journals, and of interest to practitioners.

Forming research alliances will enhance the process of assimilating diversity knowledge. It is important to form alliances with complementary research groups that assist us in terms of process research, decision systems and the application domain (Gibson, 2005). Process systems tell us when to take an action or decision, what information exists at this point, and the information flow. It acts as the system integration. Decision support systems tell us how to make choices, apply rules, and negotiate optimal outcomes among independent agents within the context of process. Finally, application domain is to evaluate and exercise process and decision systems. New and existing knowledge is integrated and assimilated within the research team.

Despite the advantages mentioned above, there are multinational organizations and international subsidiaries involving employees with different national cultures and languages which can pose challenges for knowledge sharing (Ford & Chan, 2003; Minbaeva, 2007). Chow *et al*. (2000) discovered that the participants from the Chinese culture tended to share information for the good of the organization, even when

sharing was potentially and personally disadvantageous. In addition, Chow *et al*. (2000) found that Chinese participants were less likely than American participants to share their own experience with someone considered as "out-group" members.

Applying Diversity Knowledge

Applying external knowledge has been described as a firm's ability to diffuse knowledge, integrate it with the firm's activities, and generate new knowledge from it. Within the research team context, the component of absorptive capacity is measured by team performance. The concept of "Inputs-Process-Outputs" to explore the key factors for group effectiveness was proposed by Gladstein (1984). More specifically, Henderson (1988) considered team performance by productive efficiency, effectiveness, and timeliness. Efficiency is the ratio of output to input, and effectiveness is the quality of work produced. In the context of project teams, efficiency is a subjective measure of team operations, and the team's adherence to allocated resources. Effectiveness is measured by the quality of work produced and the interaction with people outside the team. However, some researchers argue that it is inadequate to only use productivity to represent performance, especially in knowledge-driven processes (Nissen *et al*., 2000). Therefore, a popular model for analysing group performance proposes three phases for measuring team performance, namely, input, group process, and output. The group input, process, output model has been the foundation in the study

of groups for forty years (McGrath, 1964, cited in Corey *et al*., 2010).

Group input factors include group size, group composition and the KSAs (knowledge, skills and ability) of the group members. These factors combine to influence the decision making process. Though group composition can incorporate many variables of interest, including diversity, but diversity has been operationalized as many characteristics in groups research. Variables have included heterogeneity of experience, heterogeneity of decision, and differences in gender, race and age.

A great deal of research exists has described the limits of group process and process losses (Health & Gonzalez, 1995; Nissen *et al*., 2000). Other researchers have suggested that group process leads to process gains (Bedard & Maroney, 2000). Lastly, Nidumolu (1995) argued that output performance should be observed in two key aspects, namely, process performance and product performance. Process performance is a performance metric for the software development process and can be described by the (1) learning that occurs during the course of the project, (2) the degree to which management controls the project, and (3) the quality of the interactions between the IS team and users during the development process. Product performance is a performance metric that captures the performance of the finished product and can be described by the (1) technical performance of the software, (2) the degree to which the software conforms to user needs, and (3) the degree to which the software is flexible in

supporting new products and changing user needs (Nidumolu, 1995; Na *et al*., 2004). In short, Process Performance (PP) measures how well the software development process was undertaken. Product performance (PO) measures the resulting product actually delivered by the project. These two key features of performance were incorporated into the current study.

In this study, Process Performance (PP) was examined through the formation of our research team. The team may consist of a research leader. Supporting this team are a few research assistants. This gives a total of ten people working on interlinked research. An alliance was established as a part of the Process Performance. The Process Performance includes the following: (1) learning that occurs during the process of the project, (2) the degree to which research leader manages the project, and (3) the quality of the interactions between the research team members. On the other hand, the Product Performance (PO) measures the output of the written papers outlining the strategic direction, research areas, and research synergy. The two outcomes (namely, PP and PO) which reflect diversity knowledge have been diffused and applied in many different industry domains.

Researchers are usually given vague encouragement to achieve something "significant" or have "high quality publications" without any precise explanation of what it means. Purdue University Computer Science Department (2009) has developed a guide to its junior researchers by proposing a few measures:

i. Journal paper approach – measures the total number of papers published. A researcher who generates a new idea writes a paper which is then reviewed by peers and eventually published in an archive journal. Thus, the number of papers is a measure of productivity.

ii. Rate of publication approach – measures the ratio of the total papers published to the time in which they were published. Paper count is insufficient because it does not measure productivity. Someone may take a lifetime to publish 10 papers whereas others may publish 10 papers in one year.

iii. Weighted publication approach – measures the sum of the weights assigned to published papers, because some papers represent more intellectual achievement than the others.

iv. Direct funding approach – measures the total amount of the grant funds acquired by a researcher.

v. Bottom line approach – measures the profit generated by patents or products that result from the research.

DISCUSSION AND FUTURE DIRECTIONS

The journey to becoming a university with strong research team is clearly not easy to achieve. This paper contributes to research team composition by increasing our conceptual understanding of how team diversity is incorporated with absorptive capacity to produce team effectiveness. In this study, the authors have presented a framework (Fig. 1) to exploring the relationship between team diversity with three dimensions of absorptive capacity. In addition, the three stages of absorptive capacity have also been differentiated while their respective relationships with team diversity have also been demonstrated. What is implied in the proposed model is that racially, ethnically, and culturally diverse staff have familiarity with and prior
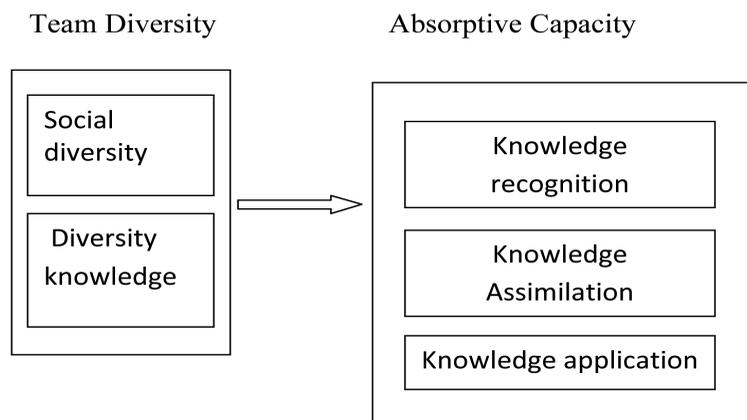
Fig. 1: A Conceptual Framework

knowledge of a highly diverse knowledge base. Thus, a question to be answered by future research is, 'What is percentage of a research's total team force that has to come from another country for it to be considered diversity?' An associated issue raised concerns over the proportion of these diverse groups that actually have familiarity with and prior knowledge of the industry domains with a highly diverse knowledge base. Hence, how are we going to measure knowledge diversity, whether it is large enough to affect the team's ability to assimilate and apply it to the extent suggested in the conceptual model proposed in this study?

The results of this discussion provide a direction for creating and managing diverse research teams to enhance team performance. Research leaders can enhance team performance by leveraging members' knowledge differences and managing diversified team carefully if the team members have very different values. This paper has apparently helped to promote a better understanding of absorptive capacity and to delineate the critical importance of team diversity for research team success.

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