Harnessing The Link Between Knowledge Teams And Creativity: A Review

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ABSTRACT:

This review aims to explore the unique connection between knowledge teams and creativity in new product development (NPD). In this review, findings from the literature are used to understand how knowledge teams can be associated with creativity in NPD. The findings reveal that the link between knowledge teams and creativity can be explained in four different factors which include flexible leadership, cross-functional creativity, collaborative creativity and cross-functional knowledge sharing. From the four factors, it appears that cross-functional and collaborative creativity are the two most dominant factors that noticeably link knowledge teams with creativity in NPD, as far as this literature review is concerned. The findings are somehow inconclusive and require empirical tests to be authenticated. However, this review creates a theoretical relevance that transcends NPD performance and encourages leaders to work together on flexible leadership strategies, tactics, innovation and improvements through knowledge teams. Leaders can use this review as a guideline to create platforms for extensive knowledge sharing and knowledge creation.

Keywords*: Creativity, Knowledge teams, Product development, Review*

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1. Introduction

In new product development (NPD), the workload of a project is traditionally divided among functional teams (marketing, manufacturing, research and development) that are separated from each other (Cordero et al., 1998). In order to ensure synergy in NPD, knowledge teams are created to provide an avenue to express concerns and a mechanism to capture knowledge (Koufteros et al., 2001). Knowledge teams also work on the multiple aspects of a new product simultaneously, allowing control and responsibility to be shared among functions, and development activities to run concurrently (Swink et al., 1996). Diversity among functions can contribute to the NPD process appropriately since representatives of these functions have different task responsibilities (Susman and Ray, 1999). Greater diversities will lead to greater challenges in combining functions for the achievement of a common goal. Therefore, knowledge teams must be reinforced by supportive organizational policies and practices if they are to be entirely useful for NPD (Susman and Ray, 1999).

However, the prevailing importance of creativity in NPD also requires immediate attention due to the intense competition for product superiority and competitive advantage in the market (Leenders et al., 2002). Since many researchers have found consensus that effective implementation of knowledge teams is critical to NPD success as well (Larson and Gobeli, 1989; Ancona and Caldwell, 1992; Cooper and Kleinschmidt, 1995; Jassawalla and Sashittal, 2000; Sethi, 2000; Keller, 2001; Sethi et al., 2001; Valle and Avella, 2003; Boyle et al., 2006), it is of interest for researchers to review and understand the association between knowledge teams and creativity from an NPD perspective. Therefore, the research question for this review can be proposed as: *"How can knowledge teams be related to creativity in NPD?"*

2. Literature Review

The literature review is divided into two parts which include creativity and knowledge teams. Previous research on their relations to NPD will also be included in the subsequent sections followed by a conceptual relation between knowledge teams and creativity in NPD.

2.1. Creativity

The key determinant in NPD performance has to be creativity since existing knowledge may sometimes be insufficient to fulfill the essential novel conditions for product superiority (Leenders et al., 2002). Stevens et al. (1999) suggest that creativity is very important for NPD since it may not be feasible to commercialize a preliminary concept that still requires substantial reshaping.

Goel and Singh (1998) posit that creativity is associated with the feasibility of idea invention, uniqueness, talent and envisioned understanding. Understanding creativity in NPD is of overriding significance, principally in a technologically advanced company where creativity is a main resource (Tu, 2009).

A less structured environment, where there is flexibility in working hours for example, may contribute to the development of creativity and innovation (Balbontin et al., 2000). On the other hand, ill-informed involvements may also inflict negative outcomes on creativity, and eventually on product superiority and NPD performance (Bonner et al., 2002).

Olson et al. (2001) believe that focusing too much attention on operational issues and feasibility at a too early stage of a project may constrain the conceptual flexibility and creativity among the team members involved. Through the creativity of team members, projects that involve radical innovations can lead to the production of commercialized products (Garcia and Calantone, 2002). According to Thiry (2002), a decision-making process relies more on the common sense and intuition achieved through creativity rather than rational planning and structured execution.

Reilly et al. (2002) suggest that if tasks are more abstract, project team members may require a level of creativity that is above the average. In highly equivocal working environments, major and time consuming projects may require a level of creativity competitive enough to design complex, difficult and novel products (Kazanjian et al., 2000). An organization that depends on innovation may be willing to risk more on creativity. This directly and indirectly encourages employees to make more new decisions and explore new areas of interests in their work (Augusto and Coelho, 2009).

2.2. Creativity And Innovation

Arguments and discussions on creativity and innovation are often complex because the definitions of these two terms are frequently confused with one another. Creativity is the competence to conceive something as unique whereas innovation is the implementation of something new (Sloane, 2010).

Many firms are more contented with applying innovation in their processes rather than creativity because innovation is less risky and builds on already established products or processes (Herrmann, 1999). Although innovation makes creativity practical and efficient, without creativity there is no product/concept that needs implementation (Sajid, 2011).

Creativity does not depend on innovation while innovation highly depends on creativity (Herrmann, 1999; Sajid, 2011). According to McLean (2005) innovation can be illustrated as an engine with no fuel since there is no creativity to feed the innovation pipeline.

Creativity is more important than innovation in NPD because the innovation of a product must exist at least in a concept stage since it is not possible to innovate anything that does not exist (Mostert, 2008; Sajid, 2011). The aforementioned citations provide researchers with some justifications to emphasize on creativity more than innovation in NPD for their studies.

2.3. Knowledge Teams

Knowledge teams can be defined as groups of workers that carry out mutually dependent knowledge work and are cooperatively accountable for a product or service (Mohrman et al., 1995). Knowledge teams incorporate developments through organizational and information management processes to encourage a directorial and leadership-driven environment (Abdalla, 1999). Ma et al. (2008) stress that the work of knowledge teams involves hi-tech processes and collaborations from multidisciplinary and multi-organizational teams across NPD functions.

Knowledge teams can consist of employees with various potentials, disciplines and principles, who collectively work on a mixture of duties towards achieving a common goal (Haque et al., 2000). For instance, in the equivocal environments of engineering firms, complex projects often call for the participation of various experts who possess extensive knowledge on fundamental design work (Chen and Lin, 2004). In short, knowledge teams can prove useful in engineering firms by gathering collective information in different functioning sections to develop feasible designs.

The diversity in knowledge teams is appropriate for NPD since members of each team have various sets of activities and responsibilities (Susman and Ray, 1999). Cordero et al. (1998) found that knowledge workers that work in teams appear to have a higher level of job satisfaction compared to those that work individually. They then concluded that working in knowledge teams raises the level of job satisfaction for knowledge workers. Wang et al. (2003, p. 880) suggest that when designers from various disciplines are to be selected to work together as a team, five key necessities should be taken into consideration:

- Select a designer that has handled tasks resembling the current tasks of the project.
- Select a designer that possesses suitable technical and management skills to undertake the existing tasks of the project.
- Satisfy the task necessities according to the amount of workload given.
- Maximize the effectiveness and usefulness of the selected designer.
- Select a designer that collaborates and coordinates well.

Knowledge teams offer opportunities for employees to express queries for improved learning prospects (Koufteros et al., 2001). A knowledge team can be formed at an early phase of NPD, with the involvement of upstream and downstream taskforces, to enhance the rate of knowledge accumulation for enhanced effectiveness in the development process (Yassine et al., 1999).

The basis in deploying an effective knowledge team involves competitive teamwork among functions where specialists are required to be interdependent in managing their processes (Portioli-Staudacher et al., 2003). Multifunctional teams are often set up to involve vigorous communication and collaboration (Haque et al., 2000). Valle and Vazquez-Bustelo (2009) believe that there are advantages when employees

improve their motivation and communication abilities among teams by using knowledge on multidisciplinary skills.

In knowledge teams, professionals use expert systems such as computer-aided software to unravel obscure difficulties and produce a variety of designs (Gonnet et al., 2007). According to Starbek and Grum (2002, p. 420), knowledge teams should be formed for the improvement of NPD performance, with the achievement of the following objectives:

- Efficient allocation in capacity and responsibility
- Fast decision-making
- Able to classify functions under categories of developed products

Teamwork is a vital component in knowledge teams and is normally important to be cultivated at the very beginning of the NPD process (Wang et al., 2003). Valle and Vazquez-Bustelo (2009) commend that nurturing teamwork in knowledge teams requires the prompt involvements, open interactions and keenness in knowledge sharing from each team member. Besides that, close relations among members are also a must in order for members to compliment each others' strengths and achieve team objectives as a whole.

When knowledge workers can efficiently collaborate with each other, productive dialogues and discussions can be generated with an emphasis on solving complex or ambiguous problems (Koufteros et al., 2001). Starbek and Grum (2002) posit that knowledge teams do not only consist of experts from various departments in an organization but also participants from selected suppliers and customers. Abdalla (1999) suggests that the practice of knowledge teams in NPD require the support, cooperation and focus of all team members in each NPD process. According to Prasad (1996, p. 276), the following factors should be taken into account when forming a competitive knowledge team:

- Flexibility
- Continuous cooperation
- Goal-driven responsibility
- Knowledge sharing
- Communication
- Negotiation capability
- Synergy capability
- Mutual understanding
- Continuous improvement
- Work efficiency

In knowledge teams, teamwork competence and working relationships amongst members can reliably influence a team's performance since they are also vital ingredients for a successful project performance (Chen and Lin, 2004). Knowledge teams in NPD are closely associated with superior cost performance, flexible manufacturing and reduced product development timelines (Scott-Young and Samson, 2008). One of the resourceful methods in reducing the time that NPD processes take is to decrease the frequency of modifications, clearly define tasks and constantly motivate team members (O'Sullivan, 2003).

Cordero et al. (1998) suggest that knowledge workers who work in teams tend to interact more with other functions and gain more teamwork experiences compared to knowledge workers who work individually. However, Susman and Ray (1999) argue that when the divergence amongst functions increase, the obstacles in integrating the ideas of the functions increase as well. As a result, the objectives of the project may not be fulfilled and the team's journey to achieve their general goal may just come to an end. Haque et al. (2003) believe that the key barrier to the successful employment of knowledge teams in NPD often was the poor participation and commitment among team members, predominantly the members of major product development teams.

3. Findings and Discussion

According to the literature in the preceding sections, a conceptual relation between knowledge teams and creativity in NPD can be formed. The findings reveal that the association between knowledge teams and creativity can be explained through four factors which include flexible leadership, cross-functional creativity, cross-functional knowledge sharing and collaborative creativity.

3.1. Flexible Leadership

In a less structured environment, nurturing creativity among employees somehow requires more leaders to not only supervise but also encourage and acknowledge the creativity of their employees (Abdalla, 1999; Balbontin et al., 2000; Augusto and Coelho, 2009). However, a greater variety of disciplines among knowledge workers may lead to greater leadership challenges in team performance management (Susman and Ray, 1999). It is important that the selected leader for a knowledge team is efficiently trained in various leadership styles when leading these multidisciplinary teams. In other words, the leader of a knowledge team needs to take charge not only as a capacity of a knowledge worker, but also as a capacity of a flexible leader.

Perhaps it is generally common for technical team members to be more structured and rigid in their approach when dealing with project objectives. Somehow, technically-oriented employees or industrial planners appear to be more straight-forward, structured and analytical in the daily work. However, team members who are from the product development sections tend to be more creative and innovative in their approach due to the nature of their work. The team leader needs to not only synergize with both the technical rigidity and natural creativity of various team members, but also work towards breaking the fixed mold of the natural characters in the team members. For example, manufacturing personnel who appear to be more structured in their work need to be guided in a way that enhances their creative and innovative aspects. On the flipside, product development personnel who appear to be more creative will require more structure and control in their work in order to compliment the other manufacturing counterparts.

Also, the leader of a knowledge team needs to cultivate a certain extent of awareness on straight-forward common-sense approaches among employees who may excessively bring the creativity in their work to a level that exceeds what is necessary. This suggestion however, requires the leader to exercise reasonable and sound judgments in their management. Although leaders are required to impose some form of control

to address the divergence, they must also give room to allow the creativity among their employees to flourish (Bonner et al., 2002; Augusto and Coelho, 2009).

Ostensibly, the aforementioned findings call for a flexible form of leadership to manage control and creativity hand in hand for effective and productive NPD performance. At the same time, flexible leadership requires influential attributes for better motivation and participation of employees in knowledge teams (Haque et al., 2003). When the success of a project is concerned, the leading role of the team leader should not be underestimated. There are perhaps no guarantees in producing quality products through a mere focus of assembling teams of specialized knowledge workers. Undoubtedly, a leader must be sufficiently knowledgeable in the wide spectrum of leadership and managerial styles to effectively synergize with the numerous individual skills of the team members.

3.2. Cross-Functional Creativity

Knowledge teams are highly saturated with multidisciplinary team members who work together to produce creative and innovative ideas for a project (Haque et al., 2000; Garcia and Calantone, 2002; Starbek and Grum, 2002; Ma et al., 2008). Similar to the English proverb, ‘two heads are better than one’, this scenario implies that a cross-functional collaboration in projects will stand a better chance in producing more creative and easily commercialized products (Garcia and Calantone, 2002, p. 127). Perhaps the purpose of the assembling a knowledge team is not merely to produce a new product molded by several teams, but also for each member to discuss, question and, to an extent, professionally challenge ideas from various teams. It would be more beneficial than the standard brainstorming sessions that most companies employ for open discussions.

The team leader needs to command and lead these inquisitive discussions in an environment where any team member would be motivated to question and challenge ideas, regardless of whether they are experts in the area or not. The openness of this method ensures that the proposed ideas are more justified. Also, the increased level of cross-functional collaboration in complex projects allows for improved job satisfaction, innovation, diligence and confidence among team members (Cordero et al., 1998; Goel and Singh, 1998; Kazanjian et al., 2000; Reilly et al., 2002; O'Sullivan, 2003; Chen and Lin, 2004). The aforementioned explanations can be summarized in a single conceptual factor, which is cross-functional creativity.

3.3. Cross-Functional Knowledge Sharing

Seeing as creativity in NPD relies on new knowledge rather than existing knowledge, it would be of interest for knowledge teams to continuously learn and exchange information among each other (Koufteros et al., 2001; Leenders et al., 2002). This will undoubtedly enrich the development and scope of NPD knowledge and expertise. NPD is one of the most knowledge intensive processes and is by itself constantly creating new knowledge. In the process of carrying out knowledge sharing during NPD, organizations have to face the varying conditions of corporate culture, workflow processes and the integration of team members’ knowledge.

Organizations also need to increase the usage of information technology in order to help the problem regarding the flow of information. Therefore, the effective management of knowledge sharing processes is essential for the success of knowledge teams. It is of vital significance for management to share the information and know-how necessary for the execution of knowledge teams. The principle behind any knowledge team is that the opportunities for sharing information and cross-fertilization of ideas among people from different functional areas are indispensable. This is particularly true for knowledge teams responsible for developing innovative products, services and new technologies.

Also, the platform for knowledge sharing through computer-aided design systems has to be made available at all levels of the involved knowledge team in order to cultivate a creative knowledge sharing environment (Gonnet et al., 2007; Tu, 2009). Knowledge sharing can be enhanced and supported through applications of advance information technology tools to create an infrastructure that supports the timing, scope and efficiency of the underlying knowledge management processes such as creation, storage, retrieval, transfer and application. Knowledge management systems should encourage dialogues between individuals rather than just point to repositories.

Since it is impossible to capture all expertise in databases, technology must be manipulated towards the goal of promoting communication. The quality of the information technology tools which is measured in terms of response time, reliability and ease of use is very important for the implementation of knowledge management systems. An easy-to-use, easy-to-access, responsive and reliable system will enhance the process and outcomes of end users' knowledge creation, sharing and utilization. Therefore, cross-functional knowledge sharing somehow plays a role in the development of creativity among knowledge teams in NPD.

3.4. Collaborative Creativity

Knowledge teams that collaborate for NPD projects at an early stage tend to promote creativity since the interactions among functions require vigorous communication, idea generation and functional cooperation among team members (Stevens et al., 1999; Yassine et al., 1999; Haque et al., 2000; Wang et al., 2003; Valle and Vazquez-Bustelo, 2009). To facilitate this matter, managers, engineers, market executives and purchasers are required to brainstorm on processes, events and solutions while involving all functional levels of the knowledge team for a more definitive project success.

Additionally, a positive collaboration among knowledge teams is critical to ensure that there is allowance for creative idea contributions at an early stage of the NPD process even though the operational concerns and project planning should not be disregarded (Abdalla, 1999; Koufteros et al., 2001; Olson et al., 2001; Thiry, 2002; Chen and Lin, 2004). This particular matter will require strong teamwork competence amongst different functions of various disciplines and departmental goals.

In a nutshell, the concept of collaborative creativity becomes important when knowledge teams and creativity in NPD are concerned. Table 1 presents the literature support concerning the connection between knowledge teams and creativity. In Table 1, the conceptual factors along with their explanations are presented in order to distinguish a clearer view on how knowledge teams can be linked to creativity in NPD.

Table 1: Literature Support On The Connection Between Knowledge Teams And Creativity

xplanation	Literature Support	
	Knowledge teams	**Creativity**
exible leaders can manage ntrol and creativity hand in nd to develop creative owledge teams.	(Abdalla, 1999), (Susman and Ray, 1999), (Haque et al., 2003)	(Balbontin et al., 2000), (Bonner et al., 2002), (Augusto and Coelho, 2009)
ultidisciplinary team members e more capable of generating	(Ma et al., 2008), (Haque et al., 2000), (Chen and Lin, 2004), (Susman and	(Goel and Singh, 1998), (Reilly et al., 2002), (Kazanjian et

ore new, innovative and eative ideas.	Ray, 1999), (Cordero et al., 1998), (Portioli-Staudacher et al., 2003), (Starbek and Grum, 2002), (O'Sullivan, 2003)	al., 2000), (Garcia and Calantone, 2002),
ynamic communication among am members from various nctions and levels encourages owledge sharing and creation.	(Koufteros et al., 2001), (Gonnet et al., 2007)	(Tu, 2009), (Leenders et al., 2002)
rly involvement among team embers in knowledge teams riches creativity through ainstorming activities, idea neration and teamwork mpetence.	(Yassine et al., 1999), (Valle and Vazquez-Bustelo, 2009), (Wang et al., 2003), (Koufteros et al., 2001), (Abdalla, 1999), (Chen and Lin, 2004), (Haque et al., 2000)	(Stevens et al., 1999), (Olson et al., 2001), (Thiry, 2002)

4. Conclusion And Directions For Future Research

Based on the findings and discussions in the preceding section, it can be summarized that the link between knowledge teams and creativity can be elucidated in four different factors which include flexible leadership, cross-functional creativity, collaborative creativity and cross-functional knowledge sharing. Out of these four factors, it appears that cross-functional and collaborative creativity are the two most dominant factors that noticeably link knowledge teams with creativity in NPD, as far as this literature review is concerned. This is somehow not surprising as cross-functional and collaborative creativity are factors that facilitate exceptionally structured team members to be more flexible and exceedingly creative team members to be more organized. As a result, an improved synergy between both levels of creativity is born among knowledge teams.

In summary, managers, engineers and various employees involved in NPD should work together to promote more platforms that can harness collaborative and cross-functional activities for extensive knowledge sharing and knowledge creation. By executing this, cross-functional relations and teamwork among knowledge teams can be improved, allowing for more direct or indirect advancements in creativity.

Harnessing awareness is also important because the practice of avoiding the exchange of knowledge, which may be vital to NPD success, appears to be but a natural human reaction. Team members who very openly declare a potential aspect of improvement in a product may sometimes be viewed as portraying an overreacted response in the situation. Thus, the awareness of potential knowledge sharing benefits should be cultivated among the employees (both existing team members and potential team members) in order to draw out more potential ideas and knowledge from employees.

Apart from that, management should also emphasize on flexible leadership strategies, tactics, innovation and improvements in order to encourage an organized and creative environment for knowledge teams. For example, training programs should be held in organizations to help knowledge workers of various departments understand the projects, organization and themselves as a whole. Communication platforms, follow-up meetings and motivational talks for projects should be held regularly in order to form competitive knowledge teams that can help progress the creativity in NPD performance.

A few suggestions are proposed to further the work in this area. One of them is to conduct extensive qualitative or quantitative empirical tests on the conceptual factors of knowledge teams and creativity in order to determine their influence in NPD performance. Interviews or surveys may be employed to obtain insights and data from various organizations. Apart from that, it would be of interest to use secondary data from various organizational databases such as sales performance, production performance, customer satisfaction or development costs in order to determine the impacts of knowledge teams on organizational NPD performance. In brief, studies are still needed in areas regarding the promoting or impeding roles of knowledge teams in various organizations. The challenges faced in employing knowledge teams in engineering projects of various disciplines should also be further researched upon.

Overall, this review was able to identify the factors that distinguish the connection between knowledge teams and creativity in NPD. In this review, cross-functional creativity and collaborative creativity are conceptually found be the underlying factors in NPD that deserve the attention of knowledge workers who consider creativity as a key competitive advantage in their company. These findings, however, do not simply mean that other factors in an organization can be given less emphasis upon, let alone be neglected. The findings in this review are also far from being conclusive and will still require adequate empirical testing to be further authenticated.

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