

TEAM INNOVATION CAPABILITY AMONGST ACADEMIC RESEARCH TEAMS

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Abstract

Innovation capability has been studied either at individual-level or organizational-level, but not so much at the team-level. Especially, 'team-level' innovation capability has not been awarded the necessary attention it deserves, even though academicians as well as practitioners believe that teams are a better way to utilize employee talents. An academic research setting provides an excellent context to examine the way teams define their tasks and pursue their goals which may or may not be driven, purely by commercial interests. This paper examines the combined impact of 'focus of the research teams towards innovation' and 'intensity of research team's efforts towards innovation' on the dependent variable: 'team-level' innovation capability of academic research teams.

An online-questionnaire consisting of 85 questions was designed to seek responses from research teams operating in some of the most 'elite' universities in India pursuing cutting-edge 'fundamental' as well as 'applied' research. Exploratory Factor Analysis was performed on the data-set consisting of responses from 161 researchers belonging to 26 academic research teams. Results reveal that the dependent variable 'innovation capability' is being split into two factors, independent (orthogonal) to each other implying that academic research organizations should pay equal attention to 'manifestation' as well as 'customer-orientation' during the development (innovation) phase by assembling highly-focused teams with passion, commitment and involvement towards innovation activities. Research teams should also be focused internally (self-awareness) as well as externally, by being aware about what other research teams are currently pursuing.

Introduction

Today, 'Innovation' is considered to be one of the most critical components of a business strategy, especially for technology-driven organizations. Leading organizations around the globe, invest a significant amount of their time, money and energy in developing (innovation) capabilities which can help them achieve a long-term sustainable competitive advantage over their competitors. But due to market forces, the time for developing and diffusing innovations into the markets are continuously shrinking. This puts a lot of pressure on technology-driven organizations and the research teams to quickly develop innovative products which also achieve commercial success. One way to overcome this problem of 'shrinking development time' without compromising on the quality, is to collaborate with academia through joint research projects. This concept has also been endorsed by the Triple-helix model (Etzkowitz & Leydesdorff, 1998) industry-academia-government partnerships which allow governments and organizations to invest in fundamental as well as applied research which may lead to future innovations and hence, growth. We wish to understand factors that impact the innovation capability of such (academic) research teams which have been historically considered as the 'genesis' of technology-based innovations.

Extant literature on academic research teams and their innovation capability suffers from a gamut of lacunas like incoherent definitions, improper conceptualization and dearth of conceptual models to explain the fundamentals. Especially, innovation capability has been studied extensively at the individual-level or organizational-level, but not so much at the team-level. Unfortunately, 'team-level' innovation capability has not been awarded the attention it deserves, even though practitioners as well as academicians believe that teams are a better way to utilize employee talents. Today, an academic research setting provides an excellent context to examine the way teams define their tasks and pursue their goals which may or may not be driven, purely by commercial interests. We are interested in examining the impact of factors such as 'focus' and 'intensity' of the efforts of the research teams towards innovation and how they influence 'customer-orientation' during development phase and 'manifestation' of innovation capabilities of research teams.

Team-level Innovation Capability

We define ‘team-level innovation capability’ as the team’s ability to transform their collective knowledge and resources into new value propositions (products, processes, services) for the benefit of the innovating organization through proper customer-orientation and manifestation of its capabilities. The strategic significance of “customer-oriented innovation” has been appreciated by various scholarships like strategic management, marketing, technology and innovation management. Kandampully (2002b) posited that the best way to ensure market success is through ‘continuous’ innovation in co-ordination with its end-users. Gressgård (2011) believes that success in the new product development process significantly relies on “efficient and effective” exploitation of customer inputs. Customer-orientation enables research (academic/industrial) teams to understand the real pain-points of the end-users and helps in redefining the new value-offerings.

Manifestation of innovation capability by academic research teams plays a critical role in translating research from academic labs to the market. It carries the potential to revolutionize the way things have been done, questions the existing ways to make them better. This may lead to new avenues of fundamental as well as applied research, paper and patent publishing and even new product development. Manifestation (of such innovative capabilities) can then be used as a tactic to demonstrate ‘power’ or ‘superiority’ over competitors; eventually leading to long-term market dominance. In fact, manifestation of customer-centric innovation capabilities may just be the secret recipe for long-term sustainable competitive advantage for world-class technology-driven organizations, irrespective of their academic or industrial nature.

Lee et al (2003) suggested that ‘mental focus’ plays a pivot role in goal-striving process whereas Boksem et al. (2005) propose that ‘mental fatigue’ results in reduction of goal-directed attention. Folkes & Matta (2004) believe that disparity in ‘mental attention’ leads to ‘mental contamination’. In an organizational setting, we wish to conceptualize ‘focus towards innovation’ as a team-level construct influencing the overall performance of the academic research team. Goleman (2013) believes that ‘focus’ is an ability to filter out (undesirable) distractions and concentrate on one chosen thing. Teams that are successfully able to maintain a ‘healthy balance’ between internal and external awareness are better prepared to adapt themselves to dynamically changing situations around themselves. A ‘focused team’ is the one that is able to master (1) Inner focus: focusing within itself (2) Other focus: focusing on other teams in the same organization (3) Outer focus: focusing on teams outside their organization. The ability of the team to generate high levels of inner focus, other focus, and outer focus towards developing innovations can be defined as ‘team-level focus towards innovation’.

Innovation intensity of a team is, “the ability of a team to generate high levels of passion, commitment and involvement towards innovation-related activities”. The strength of feelings or attitude towards innovation is justified by “passion” whereas, seriousness in innovation-related activities is justified by “commitment” and “involvement”. Vallerand et al (2003) defined ‘passion’ as a strong inclination directed towards a self-defining activity which a ‘person’ likes, values and possesses the willingness to invest one’s time and energy. Lee & Kelley (2008) investigated the impact of selecting project-leaders with a passion for innovation on entrepreneurial resource deployment. Ramadani & Gerguri (2011) believe that leaders should be able to effectively balance the passion and the pain involved in developing innovations. Cooper (2011) suggests that the best leaders provide necessary resources, autonomy and time-off, to their passionate employees to develop their own innovative projects.

‘Commitment’ at the team-level, has been mostly studied as a mediating or moderating variable to explain the relationship between ambidexterity and firm innovation (Heavey et al, 2015); firm innovation and performance (Zhou et al, 2013); servant leadership and team effectiveness (Mahembe & Engelbrecht, 2010); proactive goal-generation and innovative work-behavior (Montani, 2015). ‘Involvement’ of various stake-holders like customers, suppliers, investors, management and technical teams, play a vital role in success of a product. Bessant et al (2010) suggested tools like idea management funnels to properly manage high volume of ideas in high-involvement innovation. Involvement of various stake-holders during innovation indicates the perceived relevance to that particular activity (Fuller et al, 2008). Thus, intensity of R&D teams towards innovation can be assessed by the passion, commitment and involvement of team-members in innovation-related activities.

Methodology and Data Analysis

An online-questionnaire consisting of 85 questions was designed to seek responses from research teams operating in some of the most 'elite' universities in India pursuing cutting-edge 'fundamental' as well as 'applied' research. A total of 161 researchers belonging to 26 academic research teams from government funded research labs participated in the survey. For every team, one team leader and 3 or 4 team members were asked to fill up the survey. The questionnaire checked for the respondent's "perception" about their "team" on various parameters. A five-point Likert scale was used to capture the responses provided by the researchers. Factor Analysis helped us to explain 73.42 % of the Total Variance and extract 5 components based on the size of the factor loadings as shown in the Table 5.1. A clear pattern matrix emerged with 5 components orthogonal to each other with an acceptable level of convergent validity (Average loading > 0.7 on a single factor) and discriminant validity (Zero Cross loadings). Five components that emerged are Leadership (7 items), Networks (5 items), Focus of the R&D teams towards innovation (11 items), Intensity of the efforts towards innovation (5 items) and Innovation capability (9 items).

Leadership factor consisted of aspects such as Vision (2 items), Support for innovation (3 items), and Resource Allocation (2 items) have vital importance in the academic research. Aspects associated with Leadership Vision are - Top Leaders in the organization inspiring R&D teams to "give their best" to be innovative and Leaders "empowering them to innovate, despite past failures". Support for innovation included – "Leaders execute their promises on all critical issues", "Leaders are open to listen to the voices of the employees" and "Leaders reward & recognize champions of innovation". Resource Allocation consisted of 2 items – (1) 'Leaders follow "best practices" available for "fair & transparent" resource allocation' (2) allocation of a separate "innovation fund" for new & innovative ventures.

A major factor emerging from EFA is the 'Intensity of efforts towards innovation' which is constituted of three sub-factors – passion towards innovation (2 item), commitment towards innovation (2 items) and involvement towards innovation (1 items). The item belonging to 'passion towards innovation' checks for (1) 'bonding levels' among the team members and (2) taking failures in a "sporting manner" and learning from previous mistakes. The item belonging to 'commitment towards innovation' checks for the ability of team members to go "out of the way" to help each other during difficult times and 'owning up the responsibility for failure of a task/ project'. Items belonging to 'involvement towards innovation' refer to "recognition and appreciation" by the team for contributing with innovative ideas and solutions.

Another important factor that emerged was 'Focus of the R&D teams towards innovation' with three sub-factors – Inner focus (3 items), Other focus (4 items), Outer focus (4 item). Inner focus checked for R&D team's (1) "clear vision" which guides its innovation efforts (2) 'clear understanding about its roles & responsibilities towards achieving organizational goals and (3) 'dedication towards achieving its targets'. Outer focus checked for the R&D team's (1) 'awareness about the latest news & events' (2) awareness about the about the future consequences of today's decisions (3) exploration of "new opportunities to learn & collaborate" (4) "openness to incorporate" new ideas even from other domains. Items belonging to 'Other Focus' refer to (1) 'meeting expectations of all the stakeholders', (2) 'proper co-ordination of all its work with the partnering teams' (3) 'clear communication of project deliverables with all the partnering teams' and (4) "benchmarking" itself with other teams to improve its performance.

EFA also helped us in bringing out some of the critical items in the Dependent variable – 'Innovation Capability' with 4 items loading on 'Manifestation of Innovation Capability' and 5 items on 'Customer orientation during the product (development) phase'. Aspects checking for manifestation are – (1) pioneering work done by the team (or some members) in its work-domain (2) 'appreciation by the clients for the quality of the work' (3) consistently developing innovative products and (4) receiving "awards & recognition". Items belonging to 'Customer orientation during the product (development) phase' are – creation of products in "close association" with

customers, willingness of customers to "pay more" for "extra benefits", releasing "upgraded versions" periodically, development speed "without compromising" on quality and benchmarking by competitors.

Table 5.1 Factor Loadings for Components – (Academic Researchers Teams)

	Component				
	1	2	3	4	5
My Team is aware about the latest news & events	.890				
My Team clearly communicates its project deliverables with all the partnering teams	.879				
My Team completely understands its role towards achieving organizational goals	.855				
My Team is "Open to incorporate" new ideas even from other domains	.853				
My Team has a "Clear vision" which guides its innovation efforts	.819				
My Team tries to properly co-ordinate all its work with the partnering teams	.817				
My Team is completely awareness about the future consequences of today's decisions	.780				
My Team is highly dedicated towards achieving team targets	.768				
My Team constantly explores "new opportunities to learn & collaborate"	.764				
Our competitors continuously tracks our progress and benchmarks us	.728				
My Team tries its best to meet the expectations of all its stakeholders	.724				
My Team periodically releases "upgraded versions" of its products/services		.974			
My Team believes in 'Faster Development speed "without compromising" on quality'		.947			
'Willingness of customers to "pay more" for "extra benefits"		.942			
My Team believes in 'Creation of products in "close association" with customers'		.814			
'My Team has received "awards & recognition" globally/locally		.780			
'My team believes in benchmarking its performance with competitors		.752			
My team has done 'Pioneering work' in its work-domain		.680			
My team consistently develops innovative products		.669			
Appreciation by the clients for the quality of the work		.626			
Leaders execute their promises on all critical issues			.863		
Leaders inspire R&D teams to "give their best" to be innovative			.849		
Leaders are open to listen to the voices of the employees			.841		
Leaders empower teams to innovate, despite past failures			.830		
'Leaders follow "best practices" available for "fair " resource allocation			.788		
"Leaders reward & recognize champions of innovation"			.716		
Allocation of a separate "innovation fund" for new & innovative ventures.			.712		
My Team constantly upgrades its knowledge resources				.814	
My Team shares critical knowledge/ skills through workshops				.793	
My Team acquires access to the "Specialized Knowledge"				.772	
My Team "recognizes & utilizes" the diversity of people's talents				.768	
My Team is "open to learning" from our competitors other industries				.726	
My Team 'Owns up the responsibility for failure of a task/ project'					.738
My team members to go "out of the way" to help each other during difficult times					.712
My Team takes failures in a "sporting manner" and learns from previous mistakes					.702

'Bonding levels' among the team members					.659
'Appreciation" by the team for contributing with innovative ideas					.644

Implications

This paper improves the existing literature on 'innovation capability' especially at team-level, emphasizing on the importance of customer-orientation and manifestation of capability by academic research teams. The proposed conceptual model highlights the significance of latent aspects such as team-level 'focus', 'intensity' towards innovation on innovation capability and performance of academic research teams. The importance of sub-dimensions like 'manifestation of innovation capability' and 'customer-orientation' during the innovation phase also emerge as significant while innovation capability of academic research teams. Management practices can be designed to closely link the research teams to the marketing and sales teams so that products can be developed in a customer-focused way and capabilities of the research teams can be manifested to the customers in a better way.

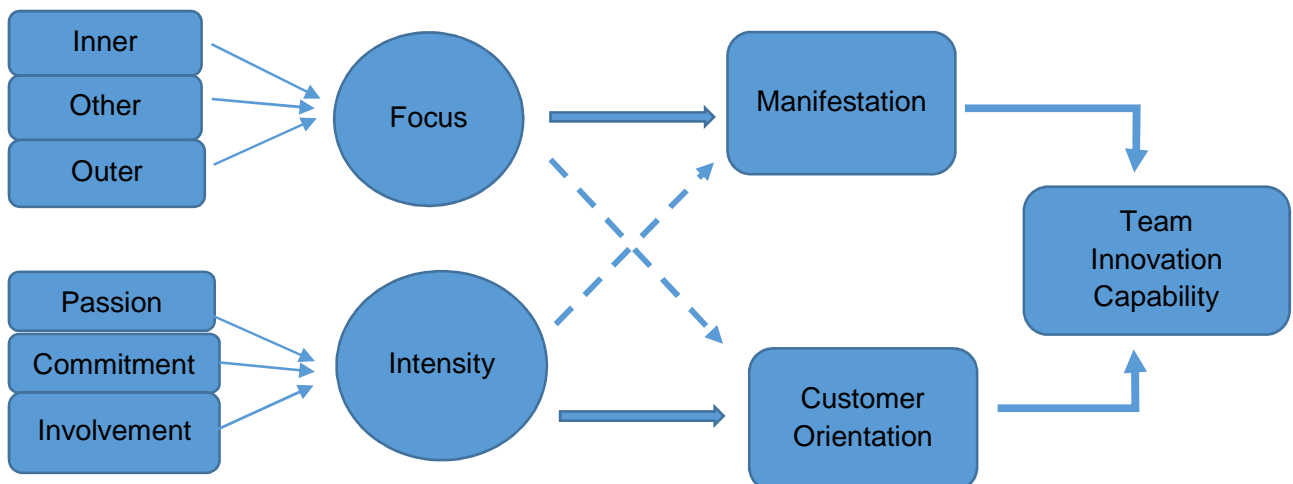
The model can help innovation-driven organizations in creating customer-focused research teams which requires visionary and supportive leadership, along with an organizational culture that facilitates risk-taking, experimentation and collective problem-solving approach. It would also help in creating an organic structure that encourages constant communication, de-centralization with minimal formal procedures to operate. Such organizations should relentlessly work towards knowledge acquisition, up-gradation and protection by collaborating with strategic partners to gain access to world-class experts and resources. This requires research teams to generate high levels of passion, commitment and dedication towards innovation along with necessary (inner) focus on themselves and (outer) awareness about their peers, competitors and the wider world to explore for potential opportunities to exploit.

Conclusion

In this paper, we have argued that innovation capability at 'team-level', seems to be understudied as compared to organizational-level and individual-level. It deserves to be explored more extensively at the team level, especially due to the emerging importance of teams in the organizational setting. The extant literature seems to suffer from several deficiencies such as incoherence of the fundamentals, conceptual models and comprehensive frameworks to clearly explain the dynamics of team-level innovation capability.

To overcome these limitations, we proposed a conceptual model explaining the unidirectional cross-level impact of organizational-level (higher-level) factors on team-level (lower-level) innovation capability through two mediating factors. Organizational-level factors are leadership, culture, structure, network and knowledge whereas team-level mediating factors are 'focus' of the teams towards innovation and 'intensity' of their efforts towards innovation. The conceptualization of these factors in a unidirectional cross-level model distinguishes our work from the existing work on innovation capability and helps us to contribute towards advancing the literature on 'team-level' innovation capability.

Fig 1 Proposed Conceptual Model



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