A Knowledge Based View of Technological Innovation
Model Testing and Theory Building

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ABSTRACT

The role of technological innovations in enhancing national and corporate competitiveness in the contemporary world has been unequivocally acknowledged. Yet, management scholarship in this filed remains fractured and inconclusive. This dissertation study is an effort to integrate three streams of literature that have examined the roles of communication within innovation teams, boundary spanning behavior, and technological knowledge in innovativeness.

Based on literature survey, a model of technological innovation was proposed where a product is viewed as embodying components of technological knowledge that are integrated so that they function synergistically. An innovation occurs through one or both of two processes. The first process consists of creating new knowledge through interactions between innovators within a project team. This process is triggered when individual innovators in a team propose changes to the components that they are working on, and these changes require concomitant changes in other components. When matching solutions are found, it not only changes the product, but also creates new knowledge. The second process consists of bringing in domain specific knowledge by team members through boundary spanning behavior. This knowledge increases their familiarity with knowledge required for the task, increases their task familiarity, and enables them to change the components they are responsible for. Certain team and organizational variables such as support from the organization, clarity of goals, and prevailing

atmosphere in the team, affect these two processes. This model of technological innovations was tested in this study.

Using single respondent survey-based methodology, data was collected from scientists and engineers in twenty-one R&D laboratories and organizations. Innovativeness was measured as the perceived Newness of the output. Individual paths in the model were tested using linear regression and structural equation modeling. Following the classification found in literature, the model was tested for a part of the sample that reported projects on basic and applied research (n = 81), and then for the entire sample that also included projects that were of technical problem solving nature (n = 100).

Results matched the hypothesized relationships for basic and applied research projects. They showed that that Knowledge Creation by the team and Component Change by individual members significantly predicted about 60% of the perception of Newness. Communication within the team predicted Knowledge Creation while Task Familiarity of individual team members negatively affected Component Change. Knowledge Familiarity positively predicted Task Familiarity, being in turn predicted by Boundary Spanning. Knowledge Familiarity adversely affected Communication. Among the contextual variables, Organizational Support and Goal Clarity positively predicted Boundary Spanning and Communication. While Group Atmosphere also predicted Communication, Goal Clarity positively predicted Knowledge Familiarity. When Technical Problem Solving projects were included in the model, only Knowledge Creation was found to significantly predict Newness. The other significant variables were Communication, Group Atmosphere and Goal Clarity. The limitations of this study, implications for future research and for the management of R&D are discussed.