

Contribution Details

Submission Type / Conference Track: Theme 6: Radical and Systemic Innovation

Mechanisms for the integration between Research and Development: a literature review

453

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Short CV of Presenting Author:

Mr. Maranzato is currently researcher and PhD student of the graduate program in Production Engineering of the Polytechnic School of the University of São Paulo, within the Innovation Management Laboratory, with the project related to the interface between Research and Development with the expected date of completion in June/21. In the industry, he has more than 15 years of experience in different fields of innovation, and in the last 5 years dedicated to the innovation process and portfolio management.

Theme 6: Radical and systemic innovation: 6.3 - The Management of Uncertainties in Innovation Activities

20 pages

Abstract

Context

This study was motivated by observing a real problem faced by an organization where new technologies provided by the Research department were not fully implemented in the new products carried out by the Development department. This inter-departmental integration capability is a critical step in the implementation of radical innovations.

Literature

The studies on Research and Development integration provide some models to deal with the challenges that emerge between these areas interface. These models are mostly based on a few qualitative studies, what limits their generalization. In addition, they were developed through different levels of analysis, what limits their comparison. Nevertheless, they bring important contribution to build a consolidated framework. White (1977) studying a medical device company, emphasized the importance of having an overlap phase between technology development and its application in new products. Cohen, Keller and Streeter (1979) listed primary (e.g. understanding of technology growth potential) and secondary factors (e.g. involvement of leadership) in the integration of 18 projects at IBM. Iansiti (1995) studying mainframe industry relates the importance of a dedicated group for the intra-firm technology transfer. Nobelius (2004) highlights three elements in his study in an automobile company: Strategic and operational synchronization, Transfer scope and Transfer scope.

Literature Gap

The models reported bring an important aspect of the integration, but none presents a broader view with a consolidated list of the mechanisms. To cover this gap, we conducted a systematic review of the literature and compared the models to present a framework with these mechanisms.

Research Questions

Which are the mechanisms of the integration between Research and Development that could reduce uncertainties in the implementation of new technologies and radical innovations?

How could these mechanisms be organized to provide a framework for integration between Research and Development that are detailed and concise at the same time?

Methodology

A systematic literature review was conducted in May/2018 updated in January/2019, using Scopus® database. The terms used in the search were refined until we achieve a number of articles feasible to be managed by our research group. The next step was to read title-keywords-abstract and eliminate those without fit with our aim. Then, we proceed to full paper reading and other papers from backward searching (snowball technique) were identified. Other papers already known by the group were added in the set of references. Through content analysis was possible to list and categorize the mechanisms.

Empirical Material

At the end of the search part of the literature review process, 236 papers were selected and after title-keywords-abstract reading, 150 papers were considered to full paper reading, selecting 86 papers with fit to our aim. Also, through backward searching (snowball technique) these papers, were possible to add 23 references. As a final step, 9 papers known by our research group not identified in the previous steps were added, resulting in 118 papers that had their content analyzed and categorized.

Even being the focus on internal integration (intra-firm), in this process of literature review, the integration mechanisms for external relationship (e.g. University-Company, Supplier-Client) were also considered with the intention to find mechanisms not studied/reported in one type of interface (internal or external) be helpful to the other.

Results

These study consolidated three groups of mechanisms for integrating Research and Development, which are: technology, organizational design, and individual.

In total, 27 mechanisms were identified. Twenty-three that were relevant for both internal and external interfaces were classified in these three groups, as detailed below:

- The technology group: equivocality; market and consumer orientation; scope, specifications and prototypes; timing synchronization; and technology fit.
- The organizational design group: cross-functionality; definition of roles, responsibilities and targets/objectives; geographical distance; processes and governance; technology transfer group; technology and strategic planning; allocation and job rotation; project management; culture; funding; rewards and incentives; knowledge management; integrative role.
- The individual group: communication; networking; senior leadership commitment; motivation; prevention of "not invented here syndrome".

A visual model will be provided in the full paper to illustrate these groups and mechanisms.

The other four mechanisms were considered just relevant for the external interface. They are: provision of technical services or consultancy; partnership formats (e.g. joint-ventures); contracts establishment; intellectual property agreements and policies.

Contribution to Scholarship

We achieved a consolidated view of the integration mechanism between Research and Development that was synthesized in an illustrative model. This view combined previous models' perspectives that were compared to result in the group of mechanisms proposed, an unprecedented consolidated view about this problem of integration. Future researches could be produced utilizing this model, for instance, identify which group is more relevant depending on the characteristics/contingencies of each new technology to be applied in new products and radical innovations.

Contribution to Practice

Proposing a model that presents a set of mechanisms divide into groups, managers in the industry could use this model to evaluate their in-house practices and change their procedures and processes, or even their organizational design, to improve the application of new technologies into new products. Also, considering the application to external interfaces, changes in the relationship of universities-companies, supplier-client, etc, could also be improved.

Fitness

This research contributes to bridging the gap between the players in the field of new technologies and radical innovation implementation. The focus was to cover the intra-firm gap between Research and Development with a broader model of integration mechanisms, however, the model proposed also could be applied to external interfaces.

Bibliography

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Nobelius, D. (2004). Linking product development to applied research: transfer experiences from an automotive company. *Technovation*, 24(4), 321-334.

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Remarks / Messages

Remark/Message from the Authors:

We are very excited to submit this abstract and share in the conference the full paper of our research, where we expect to have important suggestions from our colleagues. The results have implications for theory through the consolidation of the mechanisms of the integration between research and development and for practice by providing a framework to reduce the uncertainties in the application of new technologies in new products.

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Session Details

19-PM1-04: ST6.3 - The Management of Uncertainties in Innovation Activities

Time: Wednesday, 19/Jun/2019: 1:00pm - 2:30pm

Location: Amphi Poisson

Session Chair: Leonardo Augusto De Vasconcelos Gomes, Universidade de Sao Paulo

Session Chair: Mario Sergio Salerno, University of São Paulo, Polytechnic School