



*PhD Thesis*

**ESSAYS**  
**On the Role of**  
**Knowledge, R&D, and Technology-Based Firms**  
**in the Evolution of Socio-Techno-Economic System**

by

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***Abstract***

Technological change is a central topic in the field of economics and management of innovation. The aggregate technological change that manifests in transformative changes in the structure of socio-techno-economic system (STES) is particularly important due to the scope and magnitude of its impact. Identifying the locus of transformative technological change (TTC) and determining its direction is an important problem from the perspective of public policy as well as business strategy. Following Peter Drucker's insights, this PhD thesis proposes that this problem can be solved by shifting the focus of scientific inquiry from the product space to the knowledge space. It posits that knowledge as the DNA and ideas as the genes determine the evolution of STES and that structural change in this system follows the structural change in the universe of knowledge that is broadly organized in two domains, science and technology. It argues that the proposed change in the focus of inquiry will help depict the TTC more clearly and increase the prospects of predicting it. Employing the trans-disciplinary approach, the four empirical essays comprising this thesis explore the dynamics of knowledge production by analyzing the structure of knowledge domains on the one hand and motivations and conduct of the knowledge producers on the other, with a focus on technology-based firms (TBFs). It indicates that while inter-disciplinarity, multi-disciplinarity, and trans-disciplinarity are often advocated for the advancement of knowledge, these may actually be much more constrained in practice than usually expected. It proposes that knowledge-based perspective of technology may be more helpful to understand TTC than the artifact-based view of technology. Moreover, it proposes a technological ecosystem approach that can provide an integrated view of the product space and the knowledge space. Using this approach, it identifies three episodes of TTC during the 20th century. Furthermore, based on the analysis of changes in the technological profiles of TBFs and the impact of their technological mergers and acquisitions (M&As) on their inventive output, it challenges the prevailing assumption that exploitation and exploration are two mutually exhaustive facets of organizational search. It suggests that excursion is another important but neglected facet of organizational search that is distinct from exploration. Finally, it indicates the need for an integrated global intelligence system in order to monitor changes in the universe of knowledge, help detect and depict TTC, and possibly predict it.

***Public Defence***

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