Chapter 68
Performance Measurement of Technology Ventures by Science and Technology Institutions

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ABSTRACT

Science and technology institutions are established by governments to promote advancement of science and technology in support of their social economic developments. The purpose of this study is to deliberate a framework for monitoring and assessment of technology ventures exploiting disruptive technologies from the standpoint of a science and technology institution. This framework, harnessing both internal resources and externalities, aims to enhance the role of institutional stakeholders in governing and nurturing technology ventures. This approach stresses the dynamics between resource management and the external landscapes as critical considerations in performance measurement and management of technology ventures. Such dynamic interaction between a science and technology institution and a cluster of technology ventures under its supervision is expected to evolve over time with frequent reassessments of its technology foresight.

INTRODUCTION

Developing and transitional economies are keen to advance their science and technology in augmenting social and economic progress so as to catch up with developed economies. While the concept of national innovation system gains significant interest among emerging economies, institutions for science and technological innovation have been established to nurture the growth and expansion of technology

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ventures (Freeman, 1995). Since the early 1980s, institutions in the USA, UK, Germany, France, and Japan have been established to stimulate their countries' economic development through technological innovation and advancements of their emerging industries. Local universities have been involved as well. For instance, Massachusetts Institute of Technology (MIT) in the U.S. developed its Industrial Liaison Program in 1948 (Liu & Jiang, 2001). In China, the University-Industry Cooperation Committee of Tsinghua University (UICCTU) was established in 1995, providing various collaborative services for the member companies including IBM, Motorola, Hitachi, and NEC (Liu & Jiang, 2001).

In recent decades, an increasing number of science and technology institutions (STIs) have been founded to pursue the development of high technology companies in partnership with enterprises with the aim of undertaking joint projects for the assessment of new technology ventures (De Coster & Butler, 2003). The growing importance of technological innovation in national economic development has been increasingly recognized. China, as a transitional economy, has stepped up its Research and Development (R&D) expenditures and advocates institutional collaboration with the private sector for innovation performance (Boeing, Mueller, & Sandner, 2016; Kafouros, Wang, Piperopoulos, & Zhang, 2016). Hong Kong, China's special administrative region, established its Innovation and Technology Bureau in early 2016 as an effort of the government to foster innovation and technology industry in collaboration with local universities and its Science Park.

However, challenges remain significant in performance measurement and management for STIs' effective development, given the intention to reduce the rate of failures among early-stage ventures. Prior studies looked into issues with managing performance of technology ventures (Ganotakis & Love, 2012; Li & Atuahene-Gima, 2001). These studies that focus on specific dynamics of growth and development from the standpoint of resources allocation process did not fully examine pertinent externalities. Externalities, such as market competitions, applications, and commercialization of emerging disruptive technologies, would further complicate the environment and potential success of new technology ventures.

This chapter explores the dynamics between resources management and external landscapes as critical consideration in performance measurement and management of technology ventures. Based on an interdisciplinary literature review, a pertinent framework is developed with a set of monitoring areas and success indicators. The authors argue that STIs would have to utilize their expertise in specific clusters as intangible resources to assess product development and innovation capabilities as competitive strengths among the ventures. However, there could be limitation to the efficacy of a top-down, mechanical planning and control approach adopted by STIs to facilitate the innovative development of an emerging technology sector, given the constant dynamics of external markets.

BACKGROUND

Technology Monitoring and Assessment by STIs in Emerging Economies

STIs require a systematic corporate approach to monitor and assess the ongoing development of science and technology in order to capture the next big waves. At a country level, the concept of national innovation system is supported by the use of technology foresight techniques to strengthen its effectiveness among developed countries (Martin & Johnston, 1999). The use of a national innovation system is also advocated for the promotion and formation of partnership for effective technology development within