



NORTH-HOLLAND

Technological Forecasting & Social Change
69 (2002) 129–152

**Technological
Forecasting and
Social Change**

Managerial determinants of industrial R&D performance An analysis of the global chemicals/materials industry[☆]

Edward B. Roberts^{a,*}, Paulo Roberto Bellotti^b

^a*Alfred P. Sloan School of Management, Massachusetts Institute of Technology E52-535, 50 Memorial Drive, Cambridge, MA 02142-1347, USA*

^b*Rabobank International, Sao Paolo, Brazil*

Received 31 July 2000; received in revised form 31 May 2001; accepted 1 June 2001

Abstract

A general framework has been proposed for analyzing the impact of various managerial strategies on the overall outcomes of a firm's research and development (R&D) efforts. It suggests that three elements are critical: posture and direction, systems, and adjustment processes. The framework led to the development of a series of 20 hypotheses regarding managerial practice. These hypotheses were tested using data gathered from 29 chemicals/materials firms as part of a global assessment of strategic management of technology. Multifaceted measures of R&D impact were evaluated: (i) an index of R&D performance, (ii) time from concept to realization of product and process innovation, and (iii) satisfaction of three different stakeholders of the firm's R&D undertakings. Important differences were indicated among the strategies that most affect each performance measure, although the use of multifunctional teams and the corporate-level development and acceptance of technology strategy mechanisms were significant factors across the board. The results support the framework in that key contributors to R&D outcomes were found in managerial approaches that relate to each of the three elements. © 2002 Elsevier Science Inc. All rights reserved.

Keywords: R&D performance; Chemicals/materials industry; Technology strategy

[☆] The authors express their sincere appreciation for financial support of the research underlying this article to PA Consulting Group, the Massachusetts Institute of Technology (MIT) Industrial Liaison Program, and the MIT International Center for Research on the Management of Technology.

* Corresponding author. Tel.: +1-617-253-4934; fax: +1-617-253-2660.

E-mail address: eroberts@mit.edu (E.B. Roberts).

1. The technological innovation process

Adler et al. [1] have proposed a general framework for analyzing the process of technological innovation in organizations. These authors argue that three elements emerge repeatedly as indicators of sustained technical accomplishment and business success: posture and direction, systems,¹ and adjustment processes. Fig. 1 illustrates their framework. Rather than taking it as a definitive standard, we use the framework synopsis below as an instrument to assess the process of technology management in the global chemicals/materials industry.

1.1. Posture and direction

Posture and direction of the research and development (R&D) function comprise the formulation of a technological mission and strategy, the communication to and acceptance of this mission and strategy by the whole organization, and the compatibility between technology strategy and overall corporate-level strategy. Underlying the acceptance of the technology strategy by the whole organization is the issue of how the culture of the organization perceives and shapes the technology strategy process.

1.2. Systems

Systems involve all the structures that are required to support the technological innovation process. They can be grouped into three other categories: structures, roles, and linkages.

Structures are the result of the formal organization of assets, resources, and responsibilities. As examples, structures involve: the organization of technology resources at the corporate and business unit levels; the allocation of funds across technical functions (research, development, and engineering); the use of multifunctional teams; the configurations used to move products from concept to implementation; the decision-making forums; and R&D facilities and equipment.

Those structures are the formal mechanisms that help to shape the pattern of communication in the R&D process. Management, however, can exert a more extensive and direct control over the volume, content, and direction of information flows depending on its roles in adapting the various administrative systems, hierarchical channels, and informal relationships. Important roles in influencing the R&D process include: the degree of involvement of the Chief Executive Officer (CEO), the participation of the Chief Technology Officer (CTO) in corporate strategy formulation, and the participation of the marketing executive in the technology strategy process.

¹ The authors call this second element “policies.” We prefer to call it “systems” to avoid any confusion that may arise with the policy/strategy options developed in this paper, which apply to all three elements of strategic management of technology.

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات