

The Characteristics of Technology Management: Korean Manufacturing Firms

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Abstract

As technology innovation has become a competitive weapon in the globalized era, firms are engaged in the development of new products to gain competitiveness in the marketplace. One of the main phenomena in a firm's effort to enhance technology development activities is the formation of technology strategy, i.e. the formalization of technology development activities within the firm.

This paper explores the practice and management of technology innovation in the Korean manufacturing sector. Based on a survey of over 100 manufacturing firms in Korea, it identifies the contemporary practice of technology planning, and also characterizes the types of relationships that exist among participating interest groups for technology strategy formulation within a firm.

I. Introduction

Technology strategy is a matter of choosing product goals and developing time-phased plans of action for their attainment. This involves formulating, implementing and monitoring strategic plans for new product development efforts. It is the key source of value-adding activities and competitive advantages and guides a firm's key decisions on the development and utilization of technological capabilities and resources. The importance of technology strategy has been supported by numerous empirical studies on the relationship between a firm's technology strategy and financial performance in diverse contexts [3]; [4].

As many studies have indicated, cloning foreign products based on foreign technology licensing was the major vehicle of Korean firms for development during the course of

their early industrialization period. Korean firms did not require high technological levels and, therefore, indigenous R&D investment was not a necessity in that era. However, turning to the 1990s, many Korean firms started recognizing the importance of technology and innovation to expedite smooth restructuring from the traditional production-based manufacturing to the technology-based manufacturing for sustainable growth under the current turbulent business environment. Two major reasons for this change come in the form of the emerging Chinese dominance in certain industrial sectors, and the increasing intensity of competition from the opening of the domestic market. What was equally important was that the government began to recognize that it was necessary to share with the private sector the risk of technological uncertainty, due to the rapid technological change. So by facilitating the private sector's R&D efforts on new product and process development the government supported this drive through financial assistance combined with indirect tax incentives [1], [2].

Based on a survey of over 100 manufacturing firms in Korea, this study explores the contemporary practice of technology management, and also characterizes the types of relationships that exist among participating interest groups for technology strategy formulation within a firm. Auxiliary questions are: whether the formalization of technology planning influences the overall direction and scope of technology planning, and whether the degree of participation of functional groups in the process of technology strategy formulation within a firm are different and what are the impacts of such involvement?

II. Research Methodology

To identify the questions raised, questionnaires were sent out to a random sample of 400 companies that applied to and were awarded from the Industry Base Technology Development Program. The program is the oldest government R&D program aiming to develop generic technologies for industrial competitiveness of the manufacturing sector. 110 responses were received, resulting in a response rate of 27.5%.

Utilizing SPSS, correlation analysis, one-way analysis of variance (ANOVA), t-test, and χ^2 test were all performed to test the relationships of variables.

III. Analysis

1. Firms with formal technology planning tend to be different from firms without in terms of direction of technology strategy, the coverage, and the decision on R&D spending.

Firms with formal planning processes tend to take more aggressive approaches, “leader” or “follow-the-leader” strategies; while other firms without tend to take the less aggressive “imitation” strategy or a “contingent” approach. The surveyed firms employed many different names on the technology planning activities. 43% of the companies have “New Product Development Strategy,” 26% have “R&D Strategy,” 24% have “Technology Development Strategy,” and only 3% have “Technology Strategy” in their technology planning procedures. This distribution indicates that Korean firms have not reached the advanced level of technology management.

The scope of technology planning has been widely diversified by firm. Firms with technology development strategy have a much longer perspective -effectiveness - in the coverage on technology planning, while firms with an R&D strategy tend to focus on the short-term perspective - efficiency - focusing on effect project management. This means that firms with a technology development strategy deal with the formulation of technological goal setting and related decisions from the overall firm’s perspective, and that firms with R&D strategy mainly deal with efficient management of an R&D project within the R&D department.

There is a close relationship between the type of technology planning and the factors determining R&D spending. As mentioned previously, firms with a technology development strategy that deals with a longer and wider perspective in the coverage of technology planning tend to consider the overall outlook of sales volume and profit, while firms with an R&D strategy that deals with an effect project management tend to consider more seriously the number and size of research projects to be implemented.

2. Degree of participation of functions in the process of technology strategy formulation within a firm and what are the impacts of such involvement.

Interface with other functions is emphasized for effective commercialization and product success. Especially, extensive R&D - marketing - production collaboration from

planning stage to market launch is regarded as the short cut for higher R&D productivity and pay-off. Therefore, it is important to understand to identify participating functional groups and their degree in involvement and collaboration, in order to characterize the technology strategy of a firm.

The highest correlation is shown between planning function and finance function, followed by between marketing function and finance function and between top management and planning function. Both planning and marketing departments have positive relationships with other functional groups. Technology strategy formulation is undertaken under an overall corporate strategy and business planning and marketing function are heavily involved in new product development from the idea generation to market launching; therefore, it is natural that planning function and marketing function have high collaborations with other groups.

Two distinctive patterns in the form of technology strategy formulation have been emerged. The first type is CEO - finance - production connection, which can be easily seen in production-oriented manufacturing companies. The second type is CEO - central laboratory - R&D connection, which prevails in research-oriented manufacturing companies. The existence of two distinctively different types in the process of technology strategy formulation indicates that there are still significant numbers of Korean firms in which technology strategy is planned and formulated by other functional groups that have no direct involvement in new product development activities. In both types, however, marketing and planning functions are well involved in the technology planning process.

IV. Conclusion

As Korean firms have recognized the importance of technology in competition, there has been a substantial change in their approach to technology acquisition and product positioning during the past decade. In the past, many firms were inclined to focus more on follow-up and product differentiation, however, recently, they are moving toward a more aggressive manner by increasing R&D spending and formalizing technology planning and management.

In this study, an attempt is made to explore the practice and management of technology of Korean manufacturing firms. A general finding from the study is that, although firms are recognizing the importance of technology and they are increasing R&D spending, their strategic response to technology is not yet systematic.

First, 86% of the surveyed firms have a formal process of technology planning and the scope in technology planning is more short-term oriented by focusing on project selection and new product development. However, considering the facts that Korean firms are more export-oriented in their business nature and the technological gap with other competing countries such as China and Malaysia is narrowing, the technology management system including technology planning should emphasize structure more for the long-term.

Second, Korean firms are in the process of transforming their technology management system and structure. The existence of two distinctive patterns in technology planning -- the CEO - finance - production connection in production-oriented manufacturing and the CEO - central laboratory - R&D connection in research-oriented manufacturing -- with close collaborations of marketing and planning functions implies that Korean firms are aggressively responding to the technology-driven era.

References

- [1] Kim, L. (1999), *Imitation to Innovation*, Harvard Business School Press, and Boston: Massachusetts
- [2] Roussel, P., K. Saad and T. Erickson (1991), *Third generation R&D*, Boston, MA: Arthur D. Little, Inc.
- [3] Wilbon, A. (1999). "An Empirical Investigation of Technology Strategy in Computer Software Initial Public Offering Firms," *Journal of Engineering and Technology Management* 16, 147~169.
- [4] Zahra, S. and W. Bogner (1999). "Technology Strategy and Software New Ventures' Performance: Exploring the Moderating Effect of the Competitive Environment," *Journal of Business Venturing* 15, 135~173