Strategic Management of Competitive R&D Projects

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Abstract

This paper explores the emerging challenges associated with strategic management of corporate R&D projects. R&D involves a considerable commitment of significant financial resources, innovative human resources and irreversible time. However, firms have great difficulties in terms of the commercialization of R&D projects because of dynamically competitive market environments. It is therefore a matter of importance to systematically evaluate environmental influences and promptly orchestrate competitive strategies together with R&D projects. It is also necessary to encourage information sharing in the process of R&D decision-making. R&D projects should be managed in the light of both strategic impact and market opportunities, especially with regard to the development of technological core competency and the enhancement of competitiveness.

1. Introduction

R&D management remains its strategic importance because the underlining projects not only require substantial investments, but also possess unpredictable uncertainties. Conventional evaluation methods such as scoring, budgeting, and economic analysis together with intuitive judgements have been traditionally used for R&D project evaluation and selection, even if these methods have limitations such as inability to deal with analytical complexities. Numerous mathematical optimization models have been developed for R&D project evaluation. However, the use of optimization models is relatively limited in practical R&D decision-making, because they cannot effectively cope with different risks and support the communications throughout a decision-making process. The commercialization of R&D is increasingly challenging, especially in the highly competitive marketplace. It is difficult to objectively evaluate the viability of an individual project at the decision-making stage, and to adequately tackle risks throughout an R&D process and unpredictable market situations beyond the R&D process. It is also difficult to estimate the benefit of a project, because it depends on the success in promoting the relevant products and services. R&D projects involve the commitment of considerable resources and irreversible time. Therefore, R&D project selection should be conducted in the context of a firm's strategic direction, aiming at the generation of innovative technologies and the development of products and services with significant competitive edges.

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2. Strategic Alignment

relations The between R&D and strategic management have been extensively explored in existing literature [1] [2] [6] [7] [8] [13]. R&D driven by a particular competitive strategy can facilitate the achievement of optimal return on investments, while this requires an integrated technology and business planning process and an appropriate alignment between technology and business [2]. A technology-intensive firm can stand to benefit from R&D functions that operate with a high level of awareness and strategic orientation, based on strategic integration [8]. Strategic integration would be helpful to the identification of environmental influences on R&D decision-making. It should also encourage firms to be aware of market trends, opportunities for substitution, potential vulnerability to disruption in supply, and the state of competition, because these considerations are consistent with the environmental assessments generally emphasized in corporate strategic management. It should be the best practice that corporate business strategy is effectively communicated within an organization [11]. Firms should have a clear scope and a strategic objective on R&D planning commonly appreciated. Furthermore, empirical studies have proved that technology-based firms should benefit from the integration of between R&D and strategic management, because underlining R&D projects can be consistent with strategic objectives [7]. As a result, firms can effectively accumulate technological expertise and strengthen innovative capacities. The accumulation of technological assets should be considered as a strategic practice, because advanced technology can play a critical role in long-term corporate profitability. It should not only enable the generation of emerging technologies and the innovation of products with significant competitiveness, but also lead to the generation of unpredictable opportunities.

According to Porter [9] [10], competitive strategies generically represent the expectation of achieving cost leadership and differentiation. Cost leadership is one of the key strategies to maintain a competitive edge, which may enhance a firm's grasp of a competitive opportunity in the marketplace. A variable related to the commercialization might be the price of a potential product resulting from R&D. However, the prices of many products are under continuous pressures, because the elasticity of demand tends to be significant. Even if there might be a potential impact, undertaking an R&D project could result in unpredictable expenses. Hence, the anticipated revenue generated from the project cannot be economically justified. Therefore, firms have to minimize costs in all aspects in order to maintain their competitive advantages.

More importantly, a technology-based firm should continuously differentiate products and services in addition to the minimization of costs and expenses. As such, it might be able to achieve a higher-added value from providing a variety of applications to the customers. Alternatively, it might develop products either with a wide range of uses in different commercial areas or with a focus on specific customer groups. However, a firm may not be able to distinguish itself from competitors, even if it is able to differentiate its products and services. Innovation is the magic word thereby placing R&D in the midst of the competitive battle [4]. In spite of the tightness of marketplace, R&D investment should fulfill different expectations in order that innovation can preponderate in the long term. As far as this is concerned, a clear understanding of customer demand in a particular market segment is critical to the success of technological innovation [3]. Moreover, a firm must not only know to what customers presently want, but also predict what they may need in the near future. In other words, customer preferences and expectations must be carefully diagnosed in order to successfully commercialize new technologies.

The achievement of a higher-added value through technological excellence has been greatly emphasized [12]. Firms should aim to obtain a higher-added value from the development of sophisticated technology and a unique product through intensive R&D. The impact of a project can be measured by the ability to add value to existing products, and the possibility to create new products that represent improved value over competitors. Furthermore, the firms should make their endeavor to achieve technological breakthrough and create significant competitive edges and tremendous impact beyond that from conventional differentiation of products and services.

3. Conclusion

R&D projects must be consistently aligned in light of a firm's strategic direction in order to establish technological core competence. The selection of underlining projects is no longer a stand-alone decision-making task. Instead, it is part of the overall strategic planning of a technology-based firm with an emphasis of organizational context and decision behavior. As such, effective communications and interactions are essential to achieve a consensus for project management. However, most of the existing evaluation methods cannot effectively support entire decision-making process and cope with changing business environments. Therefore, it should be practically important to develop sophisticated approaches that enable concerned parties to systematically evaluate environmental influences and to fully participate in information sharing and decision-making. In addition, the emphasis of strategic integration demands an effective coordination in order to optimize corporate resources for projects. strategically important Technological competitiveness is characterized by first mover, fast-moving, exponential growth, and rapid diffusion [5]. There is an increasing challenge to effectively commercialize innovative products and services after the success of R&D. The presence of venture capital together with entrepreneurship raises numerus emerging issues in relation to R&D project management. It is practically vital to develop adequate approaches for assessing risks associated with R&D and facilitating strategic positioning of R&D in dynamic market environments.

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