

Impacts of R&D-Marketing Interaction on Market Performance of New Products

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Abstract: The new product development (NPD) involves a variety of interactive activities among departments of research and development (R&D), marketing, finance, manufacturing, and procurement. Studies for the high-tech products have shown that the steady interaction between R&D teams and marketing department members renders beneficial effects upon diverse departmental activities and downstream marketing performance for the product; that is, aligned with efficient and effective communication protocols, the close interaction has a positive impact on new product market performance with regards to financial gains and advanced market penetration. However, in previous researches, the explicit communicative ways and decisive factors to perform the successful integration between R&D activities and marketing department operations have not been seriously addressed. In this research, we first conducted a comprehensive survey with mainstream high-tech companies in Taiwan, then the definitive factors for well-integrated the R&D and marketing departments in high-tech companies are identified. Moreover, the hierarchical relationships and interactions between factors are built and their impacts on final responses are obtained. The results show that the outstanding financial performance and market share gain are strongly reflected by well-defined communication procedures, information transparency, and selfless resources sharing within NPD-project team members and their cross-departmental cooperation.

Keywords: New Product Development, R&D-Marketing Interaction, Market Performance

1 Introduction

Numerous accounts in the academic and popular press suggest that companies who rapidly develop new products enjoy substantial competitive advantages and higher new product success rates [1, 2, 3]. This ability to develop new products quickly and successfully has become increasingly more important in today's economy of rapid globalization, fierce competition, short product life cycles, and faster change of technologies.

Since late 1980s, Taiwan high-tech industry, such as information technology, electronics and semiconductors, has been capitalizing on advance manufacturing processes and efficiency to become the growth engine of Taiwan's economy. However, as manufacturing capability matures in other countries, Taiwanese companies need to strengthen their capability in new product development in order to stay competitive and to penetrate new markets in a global economy.

New product development process is a series of activities starting from idea generation, idea screening, concept development and testing, design, technical implementation, manufacturing to commercialization [4]. It is generally divided into three phases: pre-development phase, development and launch phase, and post-launch phase. The success of the NPD process is highly dependent on the timely and accurate execution of the tasks and activities by NPD project team members and the seamless coordination and cooperation between R&D and marketing functions. As the NPD team members come from different functions and departments, it is quite a challenge to achieve clear and effective communication among all team members given the personal, cultural, language, organizational, and physical barriers all of which make cooperation and communication difficult [5]. Furthermore, as firms grow, R&D and marketing functions become specialized, making cross functional collaboration even more difficult. Since the collaboration and communication between these critical functions decreases, so that their ability to combine skills to develop and produce successful products decreases, especially in high-tech industry where technology and market conditions change rapidly. This is the reason that new product success is highly dependent on interaction and integration of NPD project team [6, 7].

The purpose of this research is to identify important factors in the interaction between R&D and marketing functions in NPD processes that significantly impact new product market performance based on the empirical NPD experiences of high-tech companies in Taiwan.

2 Descriptions of the Research Model

There are two major groups of activities in the NPD Process: the technological related activities performed by R&D team members and the customer/market oriented activities performed by marketing team members. Technological proficiency leads to greater efficiencies in new product development and provides companies with superior technological solution and features, making a company more competitive and more successful in its NPD activities [8, 9, 10, 11]. Customer/market orientation proficiency enables a company to design and develop products that better match the needs of its customers and markets. It is positively related to new product success [8, 11, 12]. Empirical research indicates that the combination of technical and marketing capabilities ensures that firms develop

products that satisfy customer needs [13], and that effective cross-functional collaboration facilitates learning and concurrent problem-solving ability [14]. The close collaboration between technical and marketing functions not only increases information sharing and transferring [15], but also improves teamwork of a project team and in turn improves the proficiency of NPD activities [9]. In addition, effective cross-functional collaboration between R&D and marketing functions within the firm reduces NPD uncertainties [16, 17].

Empirical research also shows that ineffective collaboration between R&D and marketing is the norm rather than exception [18]. Studies in Germany and UK have identified that conflict between engineers and marketers can act as a barrier to effective collaboration [19, 20]. Similar cases can also be found in Japan and the United States [21]. It is therefore necessary to establish a formal communication mechanism in new product development process for inter-departmental integration. The outcome of NPD process will eventually be reflected in the market performance of the new products as measured by their financial results: namely, profitability and sales revenues; and new market opportunities created: namely, new product lines and/or new market segments penetrated.

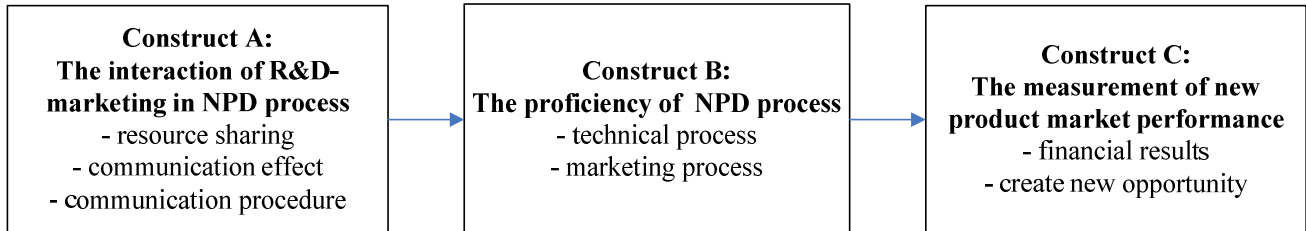
Summarizing the previously study, it assumes that the communication procedure, communication effect and resource sharing between R&D and marketing functions have impact on the proficiency of new product development process; the proficiency of technical process and marketing process in NPD process in turn has impact on new product market performance, i.e. financial results and new market opportunity created.

Based on that, the conceptual model of this research is developed as shown in Fig. 1; there are three constructs with seven variables. The construct **A** is the interaction and communication between R&D and marketing department including three variables: (1) communication procedure including the formalization, amount and frequency of communication; (2) communication effect defined as the result achieved through communication procedure; (3) resource sharing defined as inter-departmental support, sharing of information, manpower, budget and other resources. The construct **B** is the proficiency of NPD tasks and activities including two variables: (1) marketing process representing marketing related tasks and activities; (2) technical process representing R&D

related tasks and activities. The construct C is new product market performance defined by two variables: (1) financial results as represented by product profitability and sales revenue; (2) new

opportunity created as represented by new market segment penetrated or new product line added in original market.

Fig. 1 The conceptual model for the NPD



To confirm the conceptual model, this research uses Structured Equation Model (SEM) to construct the causal paths of factors with the following 10 hypotheses:

- (1) The interaction between R&D and marketing department in the NPD project:
 - H1a: communication procedure has positive influence on communication effect.
 - H1b: communication procedure has positive influence on resource sharing.
- (2) The relationship between R&D-marketing interaction and the NPD process:
 - H2a: communication effect has positive influence on the proficiency of marketing process.
 - H2b: communication effect has positive influence on the proficiency of technical process.
 - H2c: resource sharing has positive influence on the proficiency of marketing process.
 - H2d: resource sharing has positive influence on the proficiency of technical process.
- (3) The relationship between NPD process and new product market performance:
 - H3a: the proficiency of marketing process has positive influence on financial results.
 - H3b: the proficiency of marketing process has positive influence on new opportunity created.
 - H3c: the proficiency of technical process has positive influence on financial results.
 - H3d: the proficiency of technical process has positive influence on new opportunity created.

3 Research Designs and Analyses

A survey questionnaire was developed and sent to mainstream high-tech manufacturers, such as information technology, electronics, and semi-conductors, in Taiwan. Multiple respondents were sought within each firm to provide insight from R&D, marketing, and various management levels. In addition, personal interviews were conducted for a number of respondents to collect qualitative input and comments as to the practice and experience in new product development within their firms as well as any successes or failures they could share in NPD process.

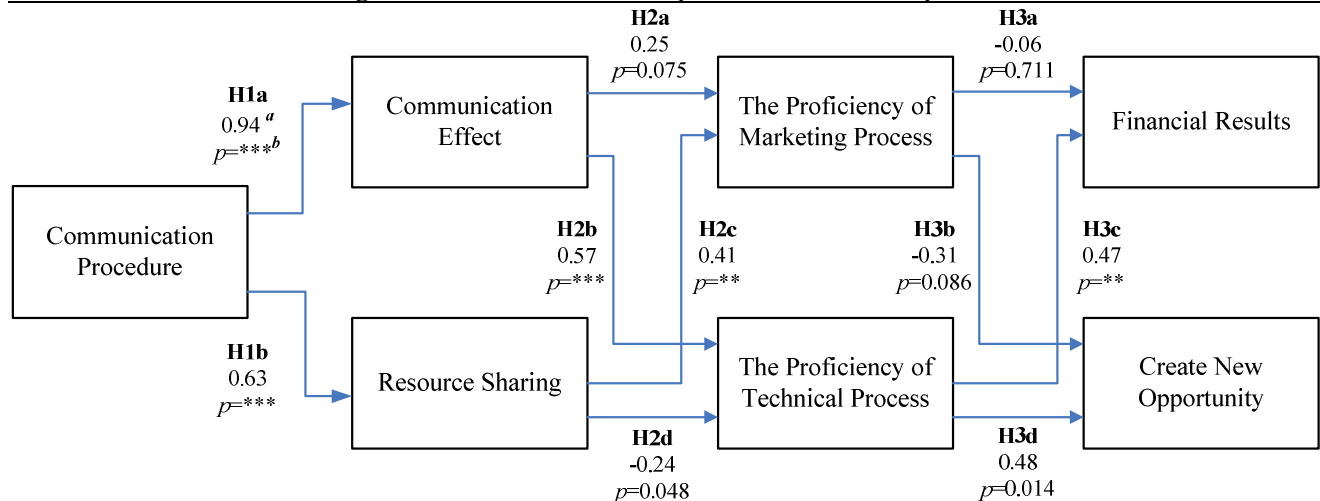
A total of 61 valid questionnaires were received. Respondents included engineers, specialists, assistant managers, managers and various management levels from R&D, marketing and other functions who participated in new product development projects. The collected data was validated for the reliability and analyzed using SPSS factor analysis tools.

The causal model of factors was then analyzed using AMOS graphics module of SPSS and the result is shown in Fig. 2. There are six out of ten hypotheses showing statistically significant relationship between factors and are listed below in the descending order of level of significance, they are : **H1a**: communication procedure has positive influence on communication effect; **H1b**: communication procedure has positive influence on resource sharing; **H2b**: communication effect has positive influence on the proficiency of technical process; **H2c**: resource sharing has positive influence on the proficiency of marketing process; **H3d**: the proficiency of technical process has positive influence on new opportunity created; **H3c**: the proficiency of technical process has positive influence on financial result.

The other four hypotheses, they are not significant statistically, **H2a**: communication effect has positive influence on the proficiency of marketing process; **H2d**: resource sharing has

positive influence on the proficiency of technical process; **H3a** and **H3b**: the proficiency of marketing process has positive impact on financial result and creation of new opportunity.

Fig. 2 The causal relationships for factors and responses



a: the standardized estimates *b*: *p*-value, *** stands for $p < 0.001$; ** stands for $p < 0.01$

4 Discussions of Findings

Based on the analysis and follow-up interviews with various respondents, several findings are suggested.

- (1) The proficiency of technical processes has significant impact on financial results of the products. It is advisable that over the NPD project period, the R&D managers should periodically monitor and evaluate the progress of design, manufacturing, and engineering activities to make adjustment if delayed. In addition, a NPD steering committee should be chaired by top-level or senior managers to make sure the plans of product development and project management are executing smoothly and in place on time.
- (2) Due to inherent heterogeneities of R&D and marketing in the NPD, their disputes and conflicts are not uncommon. It is suggested that top-level managers should regularly hold review meetings for open communication so as to prevent disagreement and arguments from being hidden or escalated.
- (3) As shown previous analysis, the communication with formal procedures performed between R&D and marketing have positive impact on resource sharing, inter-departmental support, communication effects, and problem-solving

collaboration, so the meeting with well-predefined agenda held for the NPD-project team members to systematic review its status and exchange information is the number one priority for the NPD success, where face-to-face is preferred..

- (4) The operating guidelines, procedures, and channels for the communication should be well documented. The standardized execution with least exceptions in the NPD is strongly suggested. Impromptu minutes-meetings held for small groups or few committee members are encouraged. Their conclusions should be recorded and distributed in a timely manner.

In addition to above findings, it is worthwhile to note that, (1) in new product development projects, too much support from R&D team for marketing activities often becomes a burden for R&D team which will negatively impact the progress and result of product development; (2) we found that the impact of proficiency of marketing process on new product market performance is not significant. However, it does not mean that the proficiency of marketing process is not important, rather that there is no guarantee that new products will be successful even if each marketing task is well executed.

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