The impact of interaction between R&D and marketing on new product performance: an empirical analysis of Chinese high technology firms

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Abstract: This study investigates empirically the impact of R&D-marketing interaction on new product performance in Chinese high technology firms. R&D-marketing interaction is defined along three dimensions: information exchange, influence, and departmental conflict. Based on data collected from 114 firms in China, the results suggest that information exchange and marketing's influence on product decisions have significantly positive impacts on new product performance. Furthermore, the results show that the impact of R&D-marketing interaction depends on product newness and project formalization. Research and managerial implications are drawn.

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1   Introduction

Both practitioners and researchers are increasingly interested in new product development (NPD) in contexts other than North America. In particular, given its substantial differences from the West in terms of culture, society, politics, and economic system [1], China has been viewed as an ideal site for testing and refining Western new product models in order to offer new comparative insights into new product success [2-5]. Following this research stream, the current study attempts to investigate the effect of R&D and marketing interaction on new product performance in Chinese firms.

In the marketing and technology management literature, it has long been recognized that NPD represents a team effort which requires the involvement of, and communication among, various functional groups such as R&D, marketing, manufacturing, and finance within a firm [6,7]. In particular, R&D and marketing interaction has been viewed as one of the most critical interfaces for new product success [7]. Empirical evidence has shown

that marketing's involvement, information sharing and relationship quality with R&D have significant impact on new product performance [8,9].

Although substantial progress has been made, several important issues concerning the impact of R&D and marketing interaction in the NPD process need to be addressed. First, as Gupta, Raj, and Wilemon [7, p.7] note:

> "While the systematic integration of R&D and marketing is essential for innovation success, unfortunately not many theoretical or empirical investigations have been conducted".

Previous work tends to focus on one or two dimensions of R&D-marketing interaction such as information sharing [7] or relationship quality [9] while the broad range of social processes involved in interfunctional relationships has largely been ignored [10]. Few studies have investigated the dimensions of R&D-marketing interaction and their differential impacts on new product performance. Therefore, given the complex nature of interfunctional relations, our knowledge is still limited concerning the R&D-marketing interaction process and its role in the NPD process.

Second, according to Ruekert and Walker [10], interfunctional relationship (e.g., R&D and marketing interaction), as an open social system is affected by many contextual variables. Within this system, the interaction between R&D and marketing represents a socio-political process for resources and advantage [11,12]. Power and roles of each of the involved functions may differ over various types of decisions, which further lead to different outcomes of the interactions. However, to date research on the contingent impact of R&D-marketing interaction is lacking in the extant literature.

Third, research on R&D and marketing interaction has been centered in North America with little to no attention on given to emergent new product development countries. Yet it is important to determine whether previous research on R&D and marketing interaction can be generalized to other contexts. An investigation within a non-US context may enrich our understanding of the role of R&D-marketing interaction in the NPD process.

Against this backdrop, this study aims to investigate the impact of R&D and marketing interaction on new product performance in Chinese firms. With the advent of China's economic liberalization and its strategic focus on technology development, Chinese firms are paying more attention to product innovation in order to compete with foreign entrants, and to adapt to an increasingly competitive marketplace [3,5]. This is particularly true for the firms located in high technology experimental zones. Since these zones are viewed as the window of China's high technology development, firms in these zones were established with the focus of product development. For example, in Beijing Experimental Zone (BEZ), high technology firms have developed over 20,500 new products in the last eight years [13]. However, given a history of central planning and control, many of these firms have relatively lower management skills to functionally integrate different departments. Hence, functionally integrated firms are relatively new. In Chinese firms, communication and interaction among departments has been traditionally poor. It follows that the current study provides insights into the role of R&D and marketing interaction in new product performance in a highly novel context.

Two research questions will be addressed in the study:

1   what are the dimensions of R&D-marketing interaction? and

2   how do these dimensions affect new product performance?

Based on two theoretical perspectives – information processing and resource dependence, this study argues that R&D-marketing interaction is a multidimensional construct which is comprised of three dimensions: information exchange, influence, and interdepartmental conflict. These dimensions are expected to have differential impacts on new product performance under different conditions.

The study begins with a literature review and the underlying rationale for the investigation. This is followed by a discussion of the research methodology and data analysis. The paper concludes with the examination and interpretation of results and their implications for new product management.

2   Theoretical background and hypotheses

Though the term R&D-marketing interaction has been extensively used in the marketing literature, there is no consistent definition of this construct. Such inconsistency may be attributed to the different perspectives adopted by previous studies on the nature and role of R&D-marketing interaction. In general, previous investigations of this issue have progressed with two different perspectives: information processing and resource dependence perspectives.

The information processing perspective suggests that NPD represents a team effort which involves information transfer and processing between marketing and R&D. Thus, successful product innovation depends on the enhancement of information transfer and sharing between these two functions [7,14,15]. This approach originates from organizational research on organization-environment relationship [16,17] and is widely adopted in the NPD literature. For example, it is based on this perspective that Gupta, Raj, and Wilemon [7] developed a conceptual model of R&D-marketing interaction in the product innovation process. In this model, they implicitly defined R&D-marketing interaction as the extent of R&D-marketing involvement and information sharing in the NPD process. They argued that the gap between the level of R&D-marketing integration needed and achieved can influence innovation success. This model has been empirically tested in other research fields (e.g., in Japan, [18]). Similarly, Moenaert and Souder [14] developed an information transfer model for integrating marketing and R&D personnel in NPD projects. In this model, R&D-marketing interaction was viewed as information transfer process through a channel from a source to one or more receivers. It was assumed that the relevance, novelty, credibility, and comprehensibility of the information transferred affect its perceived utility [15].

Despite its wide acceptance, this theory is limited because it constrains R&D-marketing interaction to information sharing or exchange. As Ruekert and Walker argued,

> "it largely ignores or assumes away the political processes, jockeying for influence, conflicts, and communications difficulties that frequently arise during the decision process..." [10, p.1].

Indeed, empirical evidence has shown that the correlation between R&D-marketing information sharing and new product performance is minimal [8]. A participation observation of a computer systems firm by Workman [19] revealed that marketing's interaction with R&D/engineering during the NPD process involves much influence and conflict.

According to the resource dependence view [20], marketing and R&D are seldom internally self-sufficient with respect to the critical resources required to perform their new product development roles effectively. Hence, they have to interact to ensure an orderly and reliable resource flow to ensure effective outcomes. Building on the resource dependence perspective and social systems theory, Ruekert and Walker [10] develop a framework for examining how marketing interacts with other functions in planning, implementing, and evaluating marketing activities. In this framework, they proposed that environmental conditions (both internal and external), determined marketing's interaction with another functional area in terms of transactions, communication flows, and coordination patterns. Though Ruekert and Walker's [10] model is not restricted to the R&D-marketing interaction, it does suggest that the R&D-marketing interaction process is composed of influence and conflict in addition to information transfer. The rationale is consistent with the resource dependence explanation of intergroup relationship [21]. That is, the more group A depends on group B's resource, the higher group B has influence over group A. Moreover, because of the struggle for resources, conflict is an inherent part of intergroup relationships. This perspective has been supported by Maute and Locander's [12] empirical findings which suggest that new product innovation has a social-political dimension. Thus influence and conflict are the norm of R&D-marketing interaction in the NPD process.

Based on the preceding background, we argue that R&D-marketing interaction is a multidimensional construct comprising information exchange, influence, and conflict. Drawing on the information processing perspective, *information exchange* is defined as the degree to which marketing personnel provide information and discuss new product issues with R&D personnel. The influence and conflict dimensions are derived from resource dependence theory. Influence is a reciprocal concept. This study focuses on *marketing's influence on R&D* which is defined as the degree to which marketing personnel are able to effect change in R&D personnel's opinion, attitudes, and behaviour in new product decisions. Such design responds to the call by Workman [19] for investigation of the influence of marketing in the NPD process. *Conflict* refers to a state of mutual disagreements, lack of cooperation and trust between marketing and R&D. In this study, conflict reflects R&D's perception about the state of tension and disagreements in its dealings with marketing personnel during the NPD process.

To investigate the impact of the dimensions of R&D-marketing interaction on new product performance, a theoretical framework is presented in Figure 1. The framework posits that:

1   the three dimensions of R&D-marketing interaction are directly related to new product performance, and

2   the effectiveness of these dimensions is contingent upon project structure (e.g., formalization), and product factor (e.g., newness).

Next, we discuss the main effects and moderating effects respectively.

Figure 1   Theoretical framework of the impact of R&D-marketing interaction in NPD
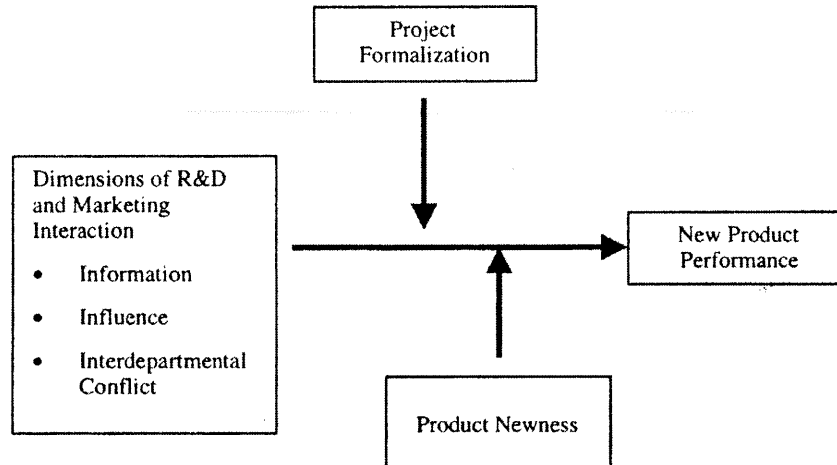
2.1   Main effects

The relationship between information exchange and new product performance is relatively straightforward. Developing new products requires information about the market and technology. The boundary spanning role of marketing determines that marketing personnel are more likely to be knowledgeable about customers' needs and wants and their purchasing behaviour. During the NPD process, marketing's information input and sharing with R&D can not only deal with environmental uncertainty but also reduce the risk of new product failure. Studies based on the information processing perspective have found that the extent to which marketing and R&D exchange and share information concerning the new product is conducive to new product success [7-9].

Marketing's influence on R&D indicates that marketing's inputs have achieved some effect on R&D's attitudes and behaviour in new product decisions. That is, R&D personnel accept and act upon marketing personnel's recommendations and suggestions. Based on the findings that marketing information and knowledge are critical for new product performance in a number of countries including China [2,3,18], it is expected that greater marketing's influence on R&D leads to higher new product performance. Interdepartmental conflict between marketing and R&D has been described as one of the major hindrances to product innovation [10]. Where there is a high degree of conflict between R&D and marketing, R&D is likely to feel vulnerable about being misled by marketing and is less likely to appropriately use marketing's information provided [22]. It could be argued that when interdepartmental conflict is high, R&D may reduce marketing's influence on product decisions by ignoring the latter's contribution. Moreover, a high degree of conflict may lead the project members to political manoeuvring [23], thus hindering the efficiency of product development. The discussion above suggests that:

H1: Marketing's information exchange with R&D is related positively to new product performance.

H2: Marketing's influence on R&D is related positively to new product performance.

H3: Interdepartmental conflict between marketing and R&D is related negatively to new product performance.

2.2 Moderating effects

In examining marketing's interaction with other functional units, Ruekert and Walker [10] argued that interfunctional relationship should be viewed as an open social system which is affected by environmental and structural variables. According to this view, R&D-marketing interaction as a subsystem is rooted in a broad system and its effectiveness is contingent on the contextual factors involved. This study focused on the contingent effects of two factors: project formalization and product newness. These factors are viewed as important predictors of new product performance and closely connected with R&D-marketing interaction process [7,18,24]. Because such an investigation has not been conducted previously in the NPD literature, the hypotheses represent a first step toward a contingency theory of the role of R&D-marketing interaction in the NPD process.

Project formalization refers to the use of rules and standard operating procedures to perform a job in the project team. Previous studies have found that the degree of formalization has a positive impact on information usage. For example, Ruekert and Walker [10] have shown that the creation of more formal, structured ties between marketing and other functional groups avoids misunderstanding. Formalized communication ties tend to break 'turfs' and reduce conflict between marketing and R&D which in turn increase information transfer and the favourableness of information reception [14]. Formalization of new product activity is likely to accord greater legitimacy and credibility to marketing. Hence, it may enhance the efficacy of marketing's influence on new product performance because team members are more likely to identify with and internalize its demands. Thus, we hypothesize that:

H4: The positive effect of information exchange on new product performance is *stronger* where project formalization is high than low.

H5: The positive effect of marketing's influence on new product performance is *stronger* where project formalization is high than low.

H6: The negative effect of interdepartmental conflict on new product performance is *weaker* where project formalization is high than low.

Product newness represents the degree to which the new product is innovative to the market and the firm. The development task for innovative products will be more uncertain, difficult and risky than for incremental products. Marketing's role in the NPD process is to reduce such uncertainty and risk by providing access to pertinent market and customer information [7,14]. It follows that where the new product is highly innovative, market information is likely to be seen as relatively more important for NPD success and valued by R&D personnel than where it is less innovative. New product teams are more likely to rely on, and use, marketing's input when developing products with high uncertainty and risks. Thus, the efficacy of information exchange and marketing's influence on new product performance will be higher when the new product is innovative. Moreover, since developing innovative products requires information

exchange and influence between R&D and marketing, it is expected that the negative effect of interdepartmental conflict on new product performance will be strengthened. The rationale is that interdepartmental conflict hinders communication and exchange between R&D and marketing, and thus is harmful for developing novel products.

H7: The positive effect of information exchange on new product performance is *stronger* where product newness is high than low.

H8: The positive effect of marketing's influence on new product performance is *stronger* where product newness is high than low.

H9: The negative effect of interdepartmental conflict on new product performance is *stronger* where product newness is high than low.

3 Methodology

3.1 Sample and data collection

The study selected Chinese high technology firms as a sample for investigating the role of R&D and marketing interaction in product innovation. As indicated previously, considering the cultural characteristics and the transitional nature of economy in China, investigating interfunctional relationships within Chinese firms can test and refine theories developed in market economies. In China, a high technology firm is defined as an economic entity which engages in research and development, product innovation and manufacturing within one or more high technology industries such as electronic information (computers and software), integrated optical-mechanical and electric products, new energy, and bioengineering [25].

A random sample of 200 firms was selected from a sample frame provided by the Association of High and New Technology Enterprises in Beijing Experimental Zone (BEZ). All the firms held the New-Tech Enterprise Certificate and Instrument of Ratification approved and issued by the BEZ office. The director of the BEZ was asked to invite firms to participate in the study. A letter was sent to the General Managers of these firms by the BEZ director explaining the purpose of the study and inviting their participation. As a result, 114 firms agreed to participate. One of the authors then called each of the firms to determine whether they had independent marketing and R&D departments. Ninety-eight firms were confirmed while in 16 cases they claimed that they had R&D departments but no marketing departments. A further check with the managers revealed that these firms labelled marketing department under such names as 'market development department', 'market research department' or even 'market department'. However the functions these kinds of departments performed were very similar to marketing. One reason for not using marketing as the label is that the English term 'marketing' is popularly translated into the term 'market' in Chinese [26]. Thus these cases were included in the sample as valid.

R&D personnel rather than marketing personnel were selected as key informants for the study. The reason is that R&D personnel are closest to the NPD process compared to other functional areas. Thus, they are expected to be knowledgeable not only about the role of marketing but also the outcomes of the NPD process [19]. In addition, since we adopted the construct 'marketing's influence on R&D', it seems appropriate to select

R&D personnel as key informants because prior research suggests that using key informants to assess their own influence leads to upward-bias [27,28].

To further improve the validity of the data collected, three more actions were specifically taken. First, the R&D informant was asked to identify the most recent new product developed by their firms which had been launched and achieved market performance. Second, following Kohli's [29] study, the R&D informant was asked to answer the questionnaire with reference to a specific marketing person whose behaviour in the new product process he/she is most knowledgeable of. Third, an interview approach was used to collect the data. The interviews allowed us to ensure that the respondent was directly involved in the project selected, he/she understood the purpose of the research and the interview focused on the appropriate project.

At the completion of data collection, data on 128 of the 200 projects were received for a response rate of 64%. The representativeness of the project selected as a referent for the study was assessed. The respondent was asked the following question on a five-point scale: "Considering your firm's new product operations and the nature of the product you have selected, to what extent is this product representative of new product projects of your firm?" The mean of this scale was 3.46 indicating a fairly high degree of representativeness. No significant differences were found between the sample and the population in terms of the percentage of firms from each industry. Sample characteristics are presented in Appendix A.

3.2   Measurement

The existing literature on NPD and influence formed the basis for developing the measures for the study. To avoid cultural bias and ensure validity, special attention was paid to establishing equivalence of measures. The original English questionnaire was first reviewed and revised by several academics in marketing and then translated into Chinese. The translator was a researcher competent in both languages and knowledgeable about Chinese management practices. Different translations were compared to detect any significant misunderstandings or confusion due to translation. The instrument was pre-tested by a series of interviews with 12 R&D managers from high technology firms in Beijing. The pretest helped us tailor the questions to the specific context of Chinese firms, to validate and verify the scales intended to measure the variables.

New product performance was measured by seven items tapping the extent to which the new product achieved its expected quality, market share, customer acceptance, and profit objectives. *Information exchange* was measured by five items adapted from [30]. Minor adaptations were made to reflect the study context. *Marketing's influence on R&D* was measured by eight items reflecting R&D's perception of their behavioural and attitude changes resulting from marketing's influence [29]. *Interdepartmental conflict* was measured by five items reflecting the degree of disharmony or tension that existed between marketing and R&D.

Project formalization was measured by four items reflecting the degree to which formal procedures existed for the respective roles of functions in the NPD team. *Product newness* was measured by a single item reflecting the degree of innovativeness of the product ranging from:

1   'product modification',

2   'line extension',

3   'new product to the firm',

4   'new product to the Chinese domestic market', and

5   'new-to-the-world product'.

Two control variables were included. First is *self-perceived influence* which refers to the influence the R&D informant believes s/he exerted on a decision. This variable was included to account for the possibility that the informants may attribute less influence to marketing if they perceive their own influence to be high [29]. The second is *project team size* which refers to the number of persons in a new product project team. Previous studies suggest that size has significant effect on manifest influence of participants in a decision making process [29].

4 Analysis and results

Table 1 shows means, standard deviation, and correlations among the constructs used in the study. To test the multidimensionality of R&D-marketing interaction, confirmatory factor analyses were performed to test two models: one-factor model and three-factor model. The results suggest that unlike the one factor model the three-factor model fits the data better ($\chi^2 = 125$, $p < 0.05$; $\chi^2/df = 1.43$; GFI = 0.88; RMSEA = 0.06; NNFI = 0.94; CFI = 0.95). Further, all items loaded on their respective constructs, each loading is large and significant above 0.01 level, indicating convergent validity. The correlations between any two constructs were less than one indicating discriminant validity [31]. Thus the results of the data supported our theoretical assumption that R&D-marketing interaction is a multidimensional construct.

Table 1   Descriptive characteristics, correlations and reliabilities of the constructs

	Construct	Original & retained no. of items	Mean	SD	1	2	3	4	5	6
1	Market performance	7 (7)	26.04	4.31	0.84*					
2	Information exchange	5(5)	19.68	3.60	0.28^a	0.78				
3	Manifest influence	8(7)	24.93	5.52	0.31^a	0.43^b	0.92			
4	Interdepartmental conflict	5(3)	6.24	2.08	-0.20	-0.39^b	-0.32^a	0.74		
5	Project formalization	4(3)	10.16	2.35	0.16	0.12	0.21	-0.24	0.64	
6	Self-perceived influence	5(5)	17.84	3.64	0.32	0.20	0.32^a	-0.29^a	0.16	0.71

* Coefficient alphas are shown in the diagonal   [a] $p < 0.01$ [b] $p < 0.001$

The hypotheses were tested using moderated regression analysis. Prior to the creation of the interaction terms, the independent and moderator variables were mean centred to reduce multicollinearity. To examine the potential threat of multicollinearity the variance inflation factor (VIF) for each of the regression coefficients was calculated to assess the degree to which relations among the independent variables inflate the standard error. The VIFs ranged from 1.116 to 2.245 suggesting that multicollinearity is unlikely to threat the parameter estimates. Table 2 presents the results of the regression analyses on the hypothesized relationships in two models. The first model includes only the control variables; the second model adds the direct effects of information exchange, influence and conflict, and their cross products with project formalization and product newness.

Table 2   Moderated Regression Analysis Results for New Product Performance (Standardized Parameter Coefficients) (N=128)

Variables	Model 1	Model 2
Control Variables		
Self-perceived influence	0.32^c	0.14
Team size	0.02	0.08
Main Effects		
Information Exchange		0.25^b
Marketing's influence		0.15^a
Interdepartmental conflict		−0.04
Project formalization		0.06
Product newness		0.13
Interaction Effects		
Information exchange x Project formalization		0.16^a
Marketing's influence x Project formalization		−0.04
Interdepartmental conflict x Project formalization		−0.11
Information exchange x Product newness		−0.03
Marketing's influence x Product newness		$−0.20^b$
Interdepartmental conflict x Product newness		$−0.17^a$
R^2	0.10	0.29
Adjust R^2	0.08	0.18
Changed R^2 with interactions	----	0.09^a
F value	5.30^b	2.56^b

Note. Significance levels shown are one-tailed for hypothesis-testing.
[a] $p < 0.10$; [b] $p < 0.05$; [c] $p < 0.001$.

The two control variables were entered in the first model of Table 2. They explained 10% of the variance in new product performance. The main and interactive effects of the variables were entered in model 2 of Table 2. In support of H1, information exchange is

related positively to new product performance ($\beta = 0.28$, $p < 0.01$). H2 posited that marketing's influence on R&D is positively related to new product performance. This hypothesis was supported ($\beta = 0.20$, $p < 0.05$). Contrary to H3, interdepartmental conflict is negatively related to new product performance but not statistically significant at $p < 0.10$ level.

H4, H5, and H6 state the moderating effects of project formalization. However, the data only showed statistically significant results concerning H4. This hypothesis states that the positive effect of information exchange on new product performance is stronger when project formalization is high than low ($\beta = 0.16$, $p < 0.10$).

H7 posited that the positive effect of information exchange on new product performance will be stronger when product newness is high than low. This hypothesis was not supported. H8 stated that the positive effect of marketing's influence on R&D on new product performance will be stronger when product newness is high than low. This hypothesis was disconfirmed ($\beta = -0.24$, $p < 0.05$). Contrary to our proposition, it seems that when new product is more innovative, marketing's influence is negatively related to new product performance. H9, which posits that the negative effect of interdepartmental conflict on new product performance will be stronger when product newness is high than low, was supported ($\beta = -0.19$, $p < 0.10$).

5 Discussion and implications

This study empirically investigated the impact of R&D-marketing interaction on new product performance in Chinese high technology firms. Based on information processing and resource dependence perspectives, the study developed three dimensions of R&D-marketing interaction and examined their differential effects. The results support the conceptual arguments regarding the importance of R&D-marketing interaction for new product performance. Furthermore, it provided insights into two conditions under which the dimensions of R&D-marketing interaction have impacts on new product performance in the Chinese setting.

The results suggest that information exchange has significant positive effects on new product performance. The findings are consistent with the information processing perspective, which argues that NPD is an information transfer process such that information exchange between R&D and marketing are conducive to new product success. Further, the results show that marketing's influence on R&D is positively related to new product performance. This finding is consistent with resource dependence arguments which state that NPD represents an influence process because of resource scarcity and dependence. The hypothesized negative effect of interdepartmental conflict on new product performance was not statistically supported. This is consistent with Ruekert and Walker's [10] finding that the correlation between interdepartmental conflict and the effectiveness of R&D-marketing interaction is negative but not statistically significant. There are three potential explanations. The first is that the negative effect of conflict between R&D and marketing is so minimal that it does not affect new product performance. Second, the effect of interdepartmental conflict may depend on contingent situations. Third, it may also be that our measure of interdepartmental conflict does not distinguish between functional and dysfunctional conflict [32]. We will discuss these issues in detail later on.

The findings of the study suggest that the effect of R&D-marketing interaction on new product performance depends on NPD contextual factors. The impact of information exchange between marketing and R&D on new product performance is stronger when the degree of project formalization is high. This finding is consistent with previous studies which reveal that formalization can strengthen information flow between marketing and R&D [10, 14]. The data show that, though the main effect of marketing's influence on R&D is positive, its interaction with product newness is negative. That is, when a new product is more innovative, marketing's influence during the NPD process may have dysfunctional impact on new product performance.

One possible explanation is that innovative products have high implementation and market risks. Hence, novel market information would exacerbate the perceived risks of managers in a high uncertainty avoidance society such as China [33]. Novel information may therefore be seen as unhelpful to performance. For example, Moenaert and Souder [15] found that the degree of novelty of information was inversely related to its use because it comes with an element of surprise, challenges current beliefs and commitments of the receiver. This argument is supported by the tendency for Chinese managers to avoid risks and to strive for greater certainty given the high uncertainty avoidance of their culture [34]. Another explanation is that for developing innovative new products, marketing's contribution is limited because of marketing personnel's perceived lack of technological knowledge and skills. As Workman [19] observed, the role of marketing in new product decisions of high technology firms is less than expected when the innovation is more radical. Given that, marketing's inputs pertaining market and technology information may be relevant or even detrimental to product decisions.

Contrary to our hypotheses, project formalization is less likely to moderate the effectiveness of R&D-marketing interaction on new product performance. A possible reason is that R&D may dominate the new product process in high technology firms [19]. Thus, project structure (e.g., formalization), is less likely to be related to the effectiveness of R&D-marketing interaction. Furthermore, given the collectivism of Chinese culture and the consensus nature of NPD in China [2], formalization may over-segment the new product activity to the extent that participants lose sight of the larger project and rather concentrate on their assigned duties hampering coordination and collaboration.

In drawing implications from these results, it is particularly important to be mindful of the cross-sectional and the retrospective nature of the study. The interpretations must be considered tentative rather than definitive. Further, the small sample size limits the robustness of the statistical analysis and thus the conclusions should be interpreted cautiously. Despite these limitations, preliminary implications are useful given the absence of guidelines for managing inter-functional relationships in NPD in China's transitional economy.

On the one hand, given the positive impact of information exchange on new product performance, it is important for project managers to encourage information exchange and sharing between marketing and R&D personnel in the project team. Project managers need to understand the impact of marketing's influence on new product performance from a contingency perspective. The findings suggest that the effectiveness of marketing's influence is dysfunctional when the product being developed is truly innovative. Given their lack of technical expertise in developing innovative new products, overemphasis on the role of marketing may decrease new product performance. A critical task for project managers is to clarify the roles of R&D and marketing in the NPD process. Perhaps, one way to improve marketing's contribution and the

effectiveness of R&D-marketing interaction is to provide technical training for marketing personnel.

The results of the study are encouraging enough to warrant further research along the following lines. First, the findings pertain to firms in high technology industries and the results may differ in other settings. Given the likely 'engineering-driven culture' in the firms examined here [19], future research should compare the results by focusing on the role of R&D-marketing interaction in the NPD process of firms likely to have with a market-driven culture. Second, potential social desirability bias is inherent in any research on influence. The key informants of this study were R&D personnel. Future research will provide greater understanding of the influence of marketing if alternative sources of informants are used. Third, the single informant design is a concern. Future research may assess marketing's influence from multiple respondents to ensure consensus and greater validity. As Calantone, Schmidt and Song [2] suggest consensus decision making in NPD is the norm in China, hence data collection should ensure that respondents gain the consensus of others in the new product teams on questions asked. The fourth research avenue pertains to the one sided treatment of organizational conflict. The concept of conflict used here pertains to dysfunctional rather than functional conflict. Future research should examine the impact of both dysfunctional and functional conflict on new product performance.

Acknowledgement

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Appendix A

A Profile of the Sampled Firms

	% of Firms in the Sample
Type of Industry	
Electronic Information	59.8
Integrated Optical-Mechanical and Electrical Products	11.0
Chemicals	7.9
New Pharmaceutic/Bioengineering	4.7
Machinery	3.9
New Energy and New Materials	3.9
Others	8.8
Ownership	
State-owned	36.6
Collectively-owned	23.6
Privately-owned	8.9
Foreign-owned	6.5
Share Ownership	13.8
Joint Venture	10.6
Number of Employees	
50 or less	40.7
51 to 200	28.9
201 or more	30.4
Percentage of Turnover Spent on R&D	
Less than 1%	13.3
1% to 3%	19.0
3.1% to 5%	18.8
5.1% to 9%	28.5
9.1% or more	20.4
Range of Product Newness	
Product modification	27.3
Line extension	38.3
New product to the firm	7.0
New product to the Chinese domestic market	15.6
New-to-the-world product	10.2
Experience in New Product Development	
1 year or less	16.9
2 to 4 years	44.8
5 to 9 years	22.1
10 years or above	16.2