Antecedents and Consequences of New Product Development and International New Product Rollout Timeliness: An Examination of Mediating and Moderating Influences

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The study examined the relationships between antecedents, timeliness in NPD and INPR, and consequences. A conceptual framework was tested using 232 new products from South Korean firms. The hypothesized relationships among the constructs in the model were evaluated by multiple regression and hierarchal regression analyses using SPSS 12 as well as by structural equation modelling (SEM) using SIMPLIS LISREL. In addition, confirmatory factor analysis (CFA) was carried out using SIMPLIS LISREL.

In the direct relationships, cross-functional linkages and marketing synergy exhibited a statistically significant effect on NPD timeliness. The results also supported the influences of the HQ-subsidiary/agent relationship and NPD timeliness on INPR timeliness as well as INPR timeliness on performance. In the mediating effect tests, marketing proficiency significantly accounts for the relationships between cross-functional linkages and NPD timeliness, between marketing synergy and NPD timeliness, and between the HQ-subsidiary/agent relationship and INPR timeliness. Technical proficiency also mediates the effect of the HQ-subsidiary/agent relationship on INPR timeliness. The influence of NPD timeliness on new product performance in target markets is attributed to INPR timeliness. As for the results of the external environments and standardization influences, competitive intensity moderates the relationship between NPD timeliness and new product performance. Technology change also moderates the relationship between cross-functional linkages and NPD timeliness and between timeliness in NPD and INPR and performance. Standardization has a moderating role on the relationship between NPD timeliness and INPR timeliness.

This study presents the answers to research questions which concern what factors are predictors of criterion variables, how antecedents influence timeliness in NPD and INPR and when the direct relationships in the INPR process are strengthened.

Key words: Time efficiency, Marketing proficiency, Technical proficiency, Competitive intensity, Technology change

To God, my wife (Hye Yun Jung) and two sons (Wonjae and Seungjae)

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Chapter One: Overall Introduction

1.1 Rationale for the Research.

Early rollout of new products in target markets has become an essential factor for survival. A company strives to improve performance (e.g., market share and financial performance) and firm value through new product introductions. Managers and scholars think that new product success is one issue and a second, and equally vital, concern to today's management is speeding products to market (Cooper, 1994). The rapid introduction of reliable new products is a prerequisite for the success of every company. Successful new products are engines of growth (Cohen *et al.,* 1997). In order to improve customer value, a faster response time is a significant way to gain competitive advantage (Oakley, 1996; 1997). Product introductions have positive and increasing effects on firm value[1] (Pauwels *et al.,* 2004).

Time compression enables manufacturers to improve their competitiveness. Timeliness is defined as "the time required to complete the project relative to its anticipated time frame" (Cooper and Kleinschmidt, 1994; Olson *et al.,* 1995). There is general agreement in the marketing literature that timeliness in new product development (NPD) and international new product rollout (INPR) is a competitive weapon for new product success (Cooper and Kleinschmidt, 1994; Chryssochoidis and Wong, 1998). Timeliness in developing a new product and introducing new products into target markets enables companies to have the potential to lock in the most profitable customers. This relates to firms that have sought to meet customer needs by offering competitive product advantages (i.e., product superiority). Furthermore, delays in product rollout pose significant problems for international companies seeking to introduce new products across many countries (Wong, 2002).

In terms of rationale for the research of timeliness in NPD and INPR, the intent to accelerate an NPD project increases organization members' motivation and sense of priority so that they give greater attention to the project activities and make more efficacious use of project resources (Swink, 2003). Companies' efforts such as effective

[1] The effect of delays in new product introductions on the market value of the firm is to decrease it, on average, by 5.25% (Hendricks and Singhal, 1997)

cooperative activities among functions (i.e., marketing, R&D and manufacturing) and efficacious use of marketing and technology resources increase the chances of on-time NPD (Cooper and Kleinschmidt, 1994; Chryssochoidis and Wong, 1998). As a consequence of timeliness in NPD and INPR, new product performance is also a prominent issue in international marketing research. There has been increasing emphasis on the need to study international new product launches in view of the difficulty in achieving successful new product development and commercialisation. To launch new products into target markets, the importance of subsidiaries has also been generally recognized. This implies that companies should achieve not only timeliness in NPD but also an effective relationship between headquarters and subsidiaries so as to ensure timely introduction of new products into markets.

However, previous research has highlighted the lack of empirical studies into the indirect effects of several internal (e.g., marketing and technical factors) and external environments (e.g., competition and technology change) on timeliness in NPD and INPR. In this regard, this study intends to examine the mediating roles of marketing and technical factors on the relationships between key determinants (i.e., marketing synergy, cross-functional linkages, technology synergy and the HQ-subsidiary/agent relationship) and timeliness in NPD and INPR. Furthermore, both new product development process and the timing of new product introductions are of interest to companies faced with global competition and technological obsolescence. Competition between companies has hugely increased and expanded globally. Technology and product life cycles have become increasingly compressed. Such factors may influence the marketing factors-timeliness in NPD associations, the technology factors-timeliness in NPD associations, the organizational context (e.g., cross-functional linkages and the HQ-subsidiary relationship)-timeliness in NPD and INPR associations, and timeliness in NPD and INPR-product performance associations.

Therefore, this research aims to address a gap in the understanding of the indirect effects of internal and external factors on the INPR process. That is, the focus of this research is to investigate both direct and indirect influences on NPD and INPR timeliness. The decomposition of effects into direct and indirect components has become widely recognized as a useful approach to interpreting causal modelling (Alwin and Hauser, 1975). In order to effectively use a firm's limited resources, an understanding of both direct and indirect effect of a firm's internal and external factors on timeliness in NPD and INPR is important. For timeliness in NPD and INPR, independent variables (e.g., a firm's marketing factor) directly influence the construct of timeliness in NPD and INPR. On the other hand, mediating and moderating variables (e.g., marketing proficiency and competition) indirectly influence the construct of timeliness in NPD and INPR. Indirect effects arise when the interaction between a direct variable and a moderator variable is significant because moderation implies that the causal relation between two variables changes as a function of the moderator variable (Baron and Kenny, 1986). Moreover, based on the findings of mediating effects in path analysis, the direct and indirect effects explain how the independent variables (i.e., direct effect) influence the criterion variables. In other words, in the direct relationship between an independent variable and a criterion variable, there is an indirect effect mediated by a mediator variable (Jöreskog and Sörbom, 1993). This is because the mediating effect is the indirect effect that a change in an independent variable has on a criterion variable through its relationship with a mediator variable. Therefore, influences of an antecedent are transmitted to a consequence through an intervening mediator (Baron and Kenny, 1986).

Except for some recent research (e.g., Bstieler and Gross, 2003; Song and Parry, 1997a, Song and Montoya-Weiss, 2001), few studies have attempted to distinguish between direct and indirect relationships among environmental variables, organizational design (e.g., cross-functional linkages), marketing and technical synergy, marketing and technical proficiency and timeliness in NPD and INPR. The intent to investigate the international new product rollout (INPR) process provides both literature and practice with understanding of new product success in international markets because the INPR process has had very little coverage in the literature, as will be discussed in the literature review chapter. This discussion leads to the research objectives and questions.

1.2 Research Objectives and Questions

Building upon the above argument, it could be said that this research is an attempt to uncover the relationships between antecedents, timeliness in NPD and INPR, and consequences, by including mediators and moderators, in order to explain the INPR process as whole. There is evidence to suggest that time efficiency (i.e., timeliness) in NPD and INPR is a result of marketing, technology and organizational context factors in a company. However, it is likely that the effects of such key determinants on timeliness in NPD and INPR are influenced by indirect effects of specific factors such as proficiency in NPD activities, external environments and standardization. Hence, this study focuses on analysing and understanding the role of indirect effects on the relationships between antecedents, timeliness in NPD and INPR, and consequences in order to improve timeliness in NPD and INPR. That is, the main objective of this study is to establish the direct and indirect factors determining timeliness in NPD and INPR. Accordingly, this research aims to:

- ***Demonstrate and test the direct relationships between marketing, technology and organizational context factors, time dimension (i.e., NPD timeliness and INPR timeliness) and new product performance in Korean companies.***
- ***Examine the mediating effects of proficiency in NPD activities and INPR timeliness on their direct relationships.***
- ***Identify the moderating effects of external environments and standardization on their direct relationships.***

Based on research objectives of this study, the three overall questions are presented as:

(1) Why should a company enforce specific internal factors for timeliness in NPD and INPR? Does timeliness in NPD and INPR influence new product success?

(2) How can a firm's internal factors influence timeliness in NPD and INPR and then it influences new product success?

(3) What moderator variables exist in their direct relationships?

In order to investigate the direct links of a firm's internal factors to timeliness in NPD and INPR, the first set of research questions concerns the effects of marketing, technology and organizational context factors on the time dimension (i.e., NPD timeliness and INPR timeliness). In addition, this question encompasses the effect of NPD timeliness on INPR timeliness and the effect of INPR timeliness on new product performance to examine their significant and direct relationships. The second set of research questions consists of five kinds of sub-questions; *(1) How does marketing synergy influence NPD timeliness? (2) How does technology synergy influence NPD timeliness? (3) How do cross-functional linkages influence NPD timeliness? (4) How does the HQ-subsidiary/agent relationship influence INPR timeliness? and (5) How does NPD timeliness influence new product performance?* The third set of research questions concerns the effects of various situational factors (i.e., competitive intensity, technology changes and standardization) on the direct relationships between antecedents, timeliness in NPD and INPR, and consequences.

1.3 The Research Hypotheses.

In section 1.2, I formulated three main research questions relating to the INPR process: (1) the allocations of specific factors for each predictor of criterion variables; (2) the indirect effects of mediators in the relationships; and (3) the indirect effects of moderators in the relationships. In line with these three overall research objectives, the hypotheses under test in this study are delineated below. These hypotheses were developed on the basis of the literature review which can be found in chapter 2. The construction of these hypotheses is discussed in greater detail in chapters 3.

- **Hypothesis 1a: The level of cross-functional linkages is associated positively with the level of timeliness in NPD.**
- **Hypothesis 1b: The level of marketing synergy is associated positively with the level of timeliness in NPD.**
- **Hypothesis 1c: The level of technology synergy is associated positively with the level of timeliness in NPD.**
- **Hypothesis 1d: The level of NPD timeliness is associated positively with the level of INPR timeliness.**
- **Hypothesis 1e: The level of HQ-subsidiary/agent relationship is associated positively with the level of INPR timeliness.**
- **Hypothesis 1f: The level of INPR timeliness is associated positively with new product performance.**
- **Hypothesis 2a: The level of proficiency in marketing activities mediates the association between cross-functional linkages and NPD timeliness.**
- **Hypothesis 2b: The level of proficiency in marketing activities mediates the association between marketing synergy and NPD timeliness.**

- **Hypothesis 2c: The level of proficiency in marketing activities mediates the association between HQ-subsidiary/agent relationship and INPR timeliness.**

- **Hypothesis 3a: The level of proficiency in technical activities mediates the association between cross-functional linkages and NPD timeliness.**

- **Hypothesis 3b: The level of proficiency in technical activities mediates the association between technology synergy and NPD timeliness.**

- **Hypothesis 3c: The level of proficiency in technical activities mediates the association between HQ-subsidiary/agent relationship and INPR timeliness.**

- **Hypothesis 4: The level of timeliness in INPR mediates the association between NPD timeliness and performance.**

- **Hypothesis 5a: The positive interconnection between cross-functional linkages and timeliness in NPD is stronger when competitive intensity is high than when it is low.**

- **Hypothesis 5b: The positive interconnection between marketing synergy and timeliness in NPD is stronger when competitive intensity is high than when it is low.**

- **Hypothesis 5c: The positive interconnection between HQ-subsidiary/agent relationship and timeliness in INPR is stronger when competitive intensity is high than when it is low.**

- **Hypothesis 5d: The positive interconnection between timeliness in NPD and performance is stronger when competitive intensity is high than when it is low.**

- **Hypothesis 5e: The positive interconnection between timeliness in INPR and performance is stronger when competitive intensity is high than when it is low.**

- **Hypothesis 6a: The positive interconnection between cross-functional linkages and timeliness in NPD is stronger when technological change is low than when it is high.**

- **Hypothesis 6b: The positive interconnection between technology synergy and timeliness in NPD is stronger when technological change is low than when it is high.**

- **Hypothesis 6c: The positive interconnection between HQ-subsidiary/agent relationship and timeliness in INPR is stronger when technological change is high than when it is low.**

- **Hypothesis 6d: The positive interconnection between timeliness in NPD and performance is stronger when technological change is low than when it is high.**

- **Hypothesis 6e: The positive interconnection between timeliness in INPR and performance is stronger when technological change is low than when it is high.**

- **Hypothesis 7: The positive interconnection between timeliness in NPD and timeliness in INPR is stronger when standardization is high than when it is low.**

1.4 Significance of the Research

The attainment of the three overall objectives is important for a number of reasons. Taking all three together, they form the anticipated theoretical and practical contribution of the thesis. The first importance of this study concerns the identification of INPR process (i.e., antecedents, timeliness in NPD and INPR and consequences) for new product performance. This study represents the conceptualising of the INPR process as an element in the achievement of new product success in target markets. This conceptualisation of the INPR process has implications for theory and management in exporting organizations. This study is in line with previous research because both direct and indirect effects are allowed for in this research. Importantly, it was empirically tested by a Korean sample (i.e., 232) to verify the validity of the research framework. In addition, for managers, there are also clear practical benefits to be gained. Perhaps the most significant concern the potential implications for guidance and recommendations relating to resource allocation decisions. Consequently, management can effectively plan and allocate resources to achieve the objectives of new product performance as well as timeliness in NPD and INPR.

The second importance of this study is to identify the key factors that drive timeliness in NPD and INPR in line with the first research objective. The study offers key facilitators (i.e., marketing, technology and organizational context factors) of timeliness in NPD and INPR. Furthermore, the investigation of the key role of time dimensions (i.e., timeliness in NPD and INPR) between antecedents and consequences in the INPR process is the focus of this research. The results of this study may help to provide substantive conclusions concerning the antecedents of NPD and INPR timeliness such as marketing, technology and organisational context factors. In particular, the first research question also provides a platform, so as to test the indirect effects of mediators and moderators in the INPR process on which the remaining two study objectives are based.

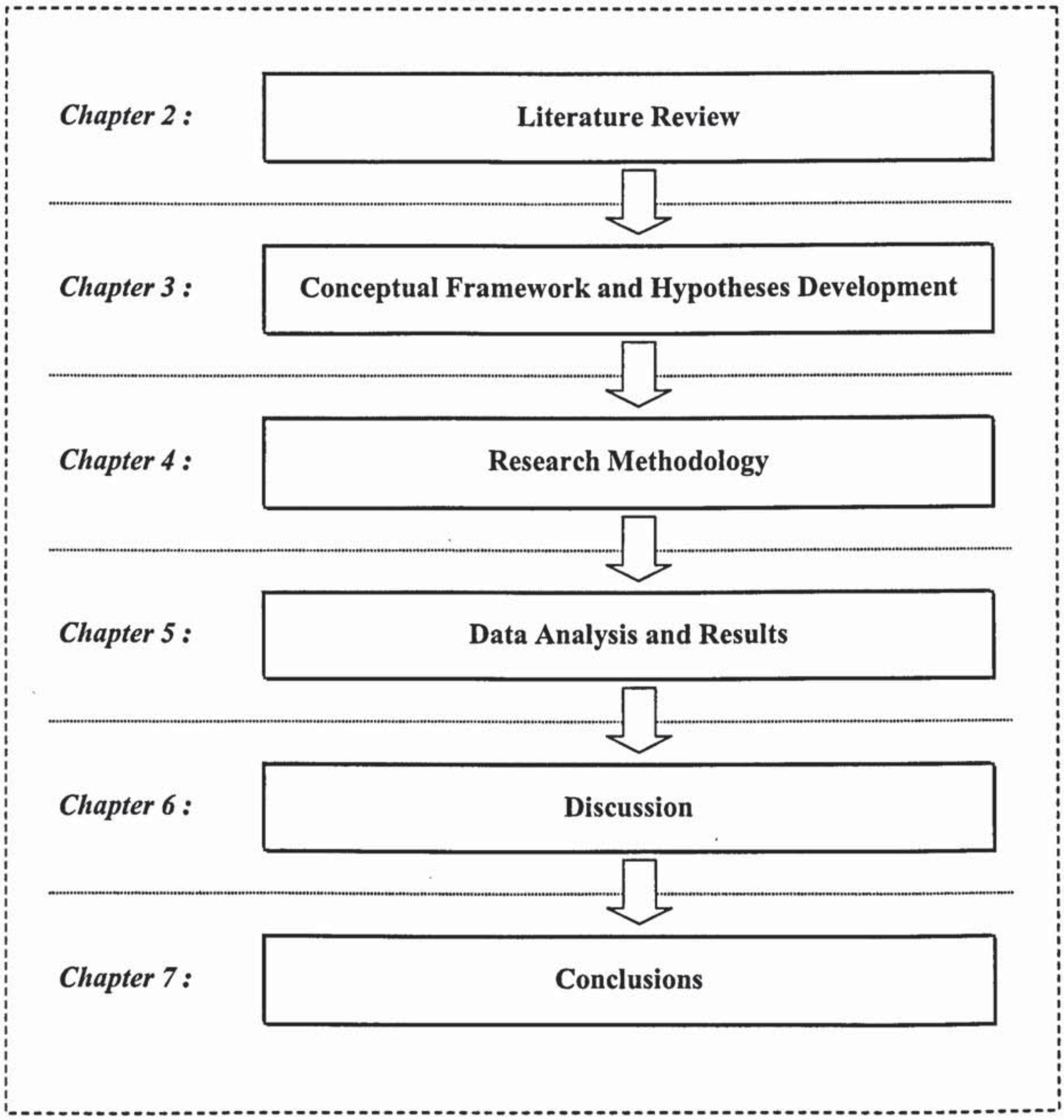
The third importance is to acknowledge how key factors influence the criterion variables (i.e., NPD timeliness, INPR timeliness and new product performance) in line with the second research question. The reasons for this research of the importance of mediated relationships become clearer from some examples from the literature on NPD timeliness or INPR timeliness. Although previous research showed several contributors to timeliness in NPD and INPR, it did not explain why these determinants influence the criterion variables. In line with the mediated hypothesised relationships, the attainments of the second research question, then, provide an understanding of how timeliness in NPD and INPR is achieved when developing new products.

The final importance is the assessment of the moderating effects of external environments (i.e., competitive intensity and technology change) and standardisation in the relationships. If a contingency perspective of the INPR process holds, one might expect the optimal levels of the INPR process to alter or change the effects of predictors on the criterion variables depending on the level of standardization related to marketing and technical activities as well as the level of environmental situations facing firms in their markets. This study provides managers with an understanding as to what factors differentially show their impacts on the criterion variables in varying internal and external situations. Managers that have more realistic expectations can make better decisions to achieve their aims.

1.5 The Structure of the Thesis.

In order to achieve the objectives outlined above, this study is organized as follows (see Figure 1.1).

Figure 1.1 Structural Overview of the Thesis



Chapter 2 covers a review of literature concerned with new product development, NPD timeliness and INPR timeliness studies. Discussions in this chapter include time dimensions (i.e., time-to-market, cycle time and timeliness), cross-functional linkages, marketing and technology synergy, the HQ-subsidiary/agent relationship, proficiency in NPD activities (i.e., marketing and technical proficiency), competitive intensity, technology change and standardization. The empirical evidence is examined and then compared to provide an in-depth perspective of the different factors that lead to timeliness in NPD and INPR. The consequences of timeliness in NPD and INPR on new product performance are discussed. Moreover, a review of the possible effects of mediators and moderators in the relationships is highlighted. The literature presented in this chapter sets the foundations for the present study.

Chapter 3 draws on the previous chapter to provide the theoretical framework of the INPR process. The framework is concerned with the direct, mediated and moderated relationships in the INPR process. This chapter also provides an exposition of the framework of analysis developed for the purpose of this research. In addition, chapter 3 discusses the research hypotheses formulated in line with research questions relating to the direct, mediated and moderated relationships in the INPR process. The hypotheses pertaining to these linkages are presented based on theoretical and empirical findings.

Chapter 4 provides the methodology adopted in the present study. This chapter also discusses a comprehensive description of the methodology employed to quantitatively investigate the research framework of the INPR process. These include the theoretical justification for the description of the research design, operational definitions of the variables, and instrumental refinements. Details of both the pilot and main studies are also provided, including sampling procedure and data collection method.

Chapter 5 presents the findings from the quantitative analysis of data relating to the present research. This chapter provides the data analysis and results, in which the framework developed in chapter 3 is tested. The results with regard to the descriptive analysis of the response from the main survey, measurement model, structural equation modelling (SEM), multiple regression and hierarchical regression are presented with their corresponding tables or figures.

Chapter 6 discusses the quantitative findings. This is followed by a more in-depth discussion of the key findings as they relate to the research questions and the hypotheses formulated in chapter 3. This chapter provides understandings the INPR process by providing the additional analysis results and alternative interpretations.

Chapter 7 presents the overall conclusions of the thesis. It begins with an overview of the research. The significance of the findings and their theoretical and managerial implications are also addressed. Limitations of the research are outlined, and several recommendations for future research are proposed.

Chapter Two: Literature Review

2.1 Introduction

Timely new product launch into foreign target markets involves several key internal and external factors. Among them, internal factors (e.g., cross-functional linkages, marketing synergy, technology synergy, internal communication between HQs and subsidiaries/agents, and proficiency in NPD activities) are more inclined to directly affect timeliness in NPD and INPR than external factors (e.g., market and technology uncertainty) (Chryssochoidis and Wong, 1998; Cooper and Edgett, 2003; Cooper and Kleinschmidt, 1994; Song *et al.,* 1997). Rather, external environments are disposed to interact with other variables that directly influence the timeliness dimension (Chryssochoidis and Wong, 1998; Song and Montoya-Weiss, 2001; Wong, 2002).

To understand the effects of external environments on NPD and INPR timeliness, it is necessary to test them as moderator variables. In addition, standardization will be examined as a moderator variable to find its interaction effect on the relationship between NPD timeliness and INPR timeliness. Although past studies support the direct effect of proficiency in NPD activities on timeliness dimensions, it may indirectly influence NPD and INPR timeliness as a mediator variable because key determinants of NPD and INPR timeliness (e.g., cross-functional linkages, marketing synergy and technology synergy) are associated positively with proficiency in NPD activities (Song, and Parry, 1997b; Song and Montoya-Weiss, 2001). This study suggests that the effects of key determinants on timeliness in NPD and INPR may be attributed to proficiency in NPD activities. Additionally, the effect of NPD timeliness on new product performance in target-country markets may be attributed to INPR timeliness. Therefore, this study will test the interlinkages among key determinants (i.e., cross-functional linkages, marketing synergy, technology synergy and the HQ-subsidiary/agents relationships), timeliness in NPD and INPR, and new product performance and then examine the effects of mediation (i.e., proficiency in NPD activities and INPR timeliness) and moderation (i.e., competitive intensity, technology change and standardization) on the interconnections among them.

This literature review seeks to discuss the state of knowledge at the start of the research and to identify areas where this research can make a significant contribution to knowledge regarding the antecedents of timeliness in NPD and INPR. In order to understand NPD and INPR timeliness, this chapter will address the various notions of timeliness and time dimensions. The review will serve to identify salient NPD and INPR timeliness constructs for this study. This review also examines the critical factors that influence NPD and INPR timeliness. In order to investigate these factors, the NPD literature will be reviewed to identify the key factors that influence NPD performance.

As this study focuses on the critical key factors (i.e., marketing synergy, technology synergy, cross-functional linkages and HQ-subsidiary/agent relationship) relating to timeliness in NPD and INPR, the effects of moderator (and mediator) variables (i.e., marketing proficiency, technical proficiency, INPR timeliness, competitive intensity, technology change and standardization) on the relationships between antecedents, timeliness in NPD and INPR and consequences (i.e., new product performance in target-country markets) are also discussed. Throughout the review, my aim is to highlight the current body of knowledge. The potential contribution of this study to that body is developed further in chapters 3, where a conceptual framework and hypotheses for the investigation of mediation and moderation tests as well as the interlinkages among key determinants, timeliness in NPD and INPR and new product performance are proposed.

2.2 Time Dimensions

Speed has become the new competitive weapon. In markets characterized by intensive competition, rapidly changing consumer tastes, accelerating technological advancements, lack of patent protection, and maturity of product life cycles, early rollout of new products is a critical issue in a firm's strategic business plan. This can afford companies significant cost reduction, greater market segment coverage, higher profit, and a dominant leadership role in the marketplace. Many studies have been conducted to determine what factors facilitate the speed of developing and launching a new product (see Table 2.1).

Time dimensions in relation to a new product can be largely classified into 3 types namely ***time(speed)-to-market***, ***cycle time***, and ***timeliness***. Generally, time-to-market defines the elapsed time between product definition and product availability (Vesey, 1991). Datar *et al,* (1996, 1997a) defines that time-to-market is "the time taken from the time the new product concept was finalized to achieving volume production." Cross-functional project team is a key determinant of time-to-market (Akgün and Lynn, 2002). Datar *et al.*, (1996, 1997a) explained that three considerations are critical in formulating new product development strategies to improve time-to-market. First, for a multiple-product firm with frequent new product introductions, cross-product learning among designers is vital for rapid product introduction. When cross-product learning is the dominant concern, a firm can facilitate such learning by locating all product designers in one facility. Second, when customers have different needs and their input guides new product specifications, proximity of designers to customers is a key factor in determining time-to-market. Third, with time pressures in product introductions, close coordination between product designers and process engineers facilitates timely production. When a distributed structure of a firm spreads the new product development effort to multiple manufacturing locations, the resulting structure may provide product designers with adequate proximity to customers and process engineers. Datar *et al.*, (1996; 1997) found that a distributed structure can achieve shorter time-to-market if the amount of customer interaction and concurrent projects is not allowed to overload its resources.

The commonest definition of NPD cycle time is the elapsed time from the beginning of one stage of the product development process to the end of a later stage. For example, Griffin (1993) defines total cycle time as the number of months between the start of the target identification and idea generation phase and the end of manufacturing start-up or date of first production for sale. Ali *et al.* (1995) measured cycle time through total project time from the beginning of idea generation to the end of the market launch in months or years. LaBahn *et al.* (1996) defines NPD cycle time as the elapsed time from the start of product development to the end of product launch. Menon *et al.* (2002) defines it as the pace of activities between idea conception and product implementation. Sherman *et al.* (2000) and Song *et al.* (1997a) measured NPD cycle time as the product development cycle time relative to primary competitors in the industry.

The major factors that influence a firm's decision to speed up NPD can be further divided into external and internal factors (Menon *et al.,* 2002). The former covers intensive competition, rapidly changing consumer tastes, accelerating technological advancements, lack of patent protection, and maturity of product life cycles. A firm that does not respond to such external factors adequately and in a timely way may incur a severe competitive disadvantage (Deshpande and Zaltman, 1984). With respect to the latter, Menon *et al.,* (2002) proposed that infrastructural characteristics (structure, culture, and capital investment) and procedural factors (group work, controls, and incentives) influence NPD speed. Ali *et al.* (1995) found that product advantage is associated with a shorter cycle time, whereas increasing innovativeness and complex technical content tend to lengthen cycle time. Griffin (1997) found that product complexity has a larger effect on increasing cycle time than does product newness. Also, Griffin (1997) reported that a cross-functional team not only reduces cycle time but also has a larger impact on reducing cycle time for newer products than for more incremental products. That is, the time-reducing effect of using a cross-functional team counters the time increasing effects associated with product newness.

Timeliness is defined as "the time required to complete the project relative to its anticipated time frame" (Cooper and Kleinschmidt, 1994; Olson *et al.,* 1995). Cooper and Kleinschmidt (1994) measured timeliness by using two measures (i.e., staying on schedule and time efficiency). Staying on schedule refers to the degree to which the project adheres to the time schedule and time efficiency is the degree to which the project is done in a time efficient manner relative to the competition/industry norm. Cooper and Kleinschmidt (1994) also suggested factors impacting on timeliness. Among several time savers, three factors seem to be key determinants in improving project timeliness. The first determinant of timeliness is the use of a cross-functional team, which is responsible for the project from beginning to end, is dedicated to it and is led by a strong leader. Empowered, dedicated, accountable cross-functional teams with senior executive sponsorship have been touted as one of the keys to cycle time reduction for years. Second is the use of projects where the team and its leader spend more time and effort on up-front homework (e.g., initial screening, preliminary technical and market assessments, detailed market studies, and the detailed business and financial analysis). Last is a strong market orientation. Projects where the marketing tasks (e.g., preliminary assessment of the market, detailed market studies and marketing research, customer tests of the product, test market or trial sell, and market launch) are carried out proficiently tend to have a strong market orientation.

Also, timeliness (conversely delay) has been considered in connection with rollout time of new products by Chryssochoidis and Wong (2000). However, unlike timeliness proposed by other researchers measuring it in a domestic market, timeliness in international new product launches has to take into consideration multiple target country markets. Based on a consideration of the latter, timeliness in international new product rollout (INPR) is defined as the actual availability of the new product within- or faster than- the planned (scheduled/anticipated) time frame for product availability across the firm's multiple target-country markets (Chryssochoidis and Wong, 1998). Chryssochoidis and Wong (1998) found key determinants influencing INPR timeliness; cross-functional linkages, sufficiency in marketing and technology resources, internal communication between HQs and subsidiaries/agents, product superiority, and proficiency of execution of the NPD process.

Table 2.1 Summary of the Findings relating Time Dimensions

Time dimensions	Author(s) / Source	Factors that influence Time dimensions	Direction of effects
Time-to-market	Datar *et al*, (1996) / The Journal of Product Innovation Management Datar *et al*, (1997a) / Management Science	NPD structures	• The concentrated structure[2] affords faster prototyping whereas the distributed structure[3] affords shorter time to volume production.
	Akgün and Lynn, (2002) / European Journal of Innovation Management	Team improvisation[4]	• Team improvisation has a positive impact on speed-to-market under turbulent markets and technologies.
Cycle Time	Griffin (1997) / Journal of Marketing Research	• Product complexity • Product newness	• Product complexity has a larger impact on increasing cycle time than does newness • Cross-functional teams have a larger impact on reducing cycle time for newer products than for more incremental products
	Ali *et al.* (1995) / The Journal of Product Innovation Management	• Innovativeness • Technical content • Product advantage	• Innovativeness significantly prolongs the cycle time • Higher level of technical complexity produce longer cycle times • Better product advantage speeds up cycle time
	Ali, (2000) / Marketing Letters	N.A.[5]	• Product innovativeness moderates the effect of cycle time on performance
	LaBahn *et al.* (1996) / Journal of Business Research	• Project characteristics (Project size, Product innovation and Technical content) • Process factors (Nontechnical outside assistance[6] and Output control[7]) • Product innovation × Output control • Market growth × Output control	• Project size and Technical content significantly prolong the cycle time • The greater use of nontechnical outside assistance significantly increases cycle time • Product innovation moderates the effect of output control on cycle time • Market growth moderates the effect of output control on cycle time
	Menon *et al.* (2002) / Industrial Marketing Management	• Structure • Culture • Capital investment • Group work • Controls • Incentives	N.A (No empirical tests)
	Sherman *et al.* (2000) / The Journal of Product Innovation Management	• The six forms of Cross-functional integration	• R&D integration of knowledge from past projects speeds up cycle time • R&D/marketing integration speeds up cycle time.

[2] It disperses the NPD effort to multiple manufacturing locations. For instance, companies concentrate their product design teams at one location in the United States and maintain their production facilities in the Far East.

[3] Companies develop a structure in which product designers and process engineers are located together at several manufacturing facilities.

[4] This is defined as planning and implementing any action simultaneously.

[5] Cycle time was used as an independent variable.

[6] Nontechnical outside assistance is defined as the degree to which persons or organizations external to the focal company are relied upon in the new product development process for marketing, strategic planning, and production support.

[7] Output control is defined as the extent to which performance standards are set, monitored, and the results evaluated.

Time dimensions	Author(s) / Source	Factors that influence Time dimensions	Direction of effects
Timeliness	Cooper and Kleinschmidt (1994) / The Journal of Product Innovation Management	• Project organization[8] • Early, sharp product definition • Solid up-front or predevelopment homework • Market orientation • Launch quality • Technical proficiency • Synergy • Familiarity • Market attractiveness • Market competitiveness	• Top three time savers; Project organization, Up-front homework and Market orientation • Four other timeliness drivers; Launch quality, Technical proficiency, Market attractiveness and Product definition • Constructs with no impact; Synergy, Familiarity and Market competitiveness
	Chryssochoidis and Wong (1998) / The Journal of Product Innovation Management	• Legal and regulatory environment • Technological heterogeneity • Complexity of customization of product technology • Slow rate of technological obsolescence • Market heterogeneity • Competitive environment • Diversity of country markets • Proficiency NPD process • Protocol/early target identification • Crossfunctional integration • Internal communication between HQ and subsidiaries • Sufficiency in marketing/technology resources • Product superiority • Synergies in product handling and use	• Proficiency NPD process, Protocol/early target identification, Crossfunctional integration, Internal communication between HQ and subsidiaries, Sufficiency in marketing/technology resources, Product superiority, and Synergies in product handling and use relate and lead to INPR timeliness • Legal and regulatory environment, Technological heterogeneity, Complexity of customization of product technology, Slow rate of technological obsolescence, Market heterogeneity, Competitive environment, and Diversity of country markets are not associated with INPR timeliness

Timely introduction of new products has a positive impact on new product success despite using different time dimensions and it also has the same result in

[8] A cross-functional team approach-focused, and accountable, with top management commitment.

international markets (Chryssochoidis and Wong, 1998; Cooper and Kleinschmidt, 1994). In order to adapt an optimal time dimension to my study, it is necessary to examine advantages and disadvantages between time dimensions (i.e., time-to-market, cycle time and timeliness) in relation to the purpose of research. The commonality among time-to-market, cycle time and timeliness is useful for measuring effectiveness and efficiencies in the new product development process. As mentioned earlier, time-to-market and cycle time are absolute measures (i.e., total time in terms of months or years). That is, time-to-market and cycle time are calculated from start in terms of product definition or idea generation to product availability in terms of volume production or market launch. Time-to-market and cycle time are widely viewed as key sources of competitive advantage, particularly in fast cycle industries such as high technology (Datar *et al.,* 1997; Griffin, 1997). These constructs are inclined to include a comparison with competition, namely time-based competition, because life cycles are shrinking and obsolescence is occurring more quickly than in the past while competition has also intensified (Griffin, 1997; Sherman *et al.,* 2000; Song *et al.* (1997a). Therefore, the constructs of time-to-market and cycle time are inclined to focus on measuring the order of entry as market pioneers or later entrants (Wind and Mahajan, 1997).

Accelerated NPD cycle time offers first-mover advantages (Ittner and Larcker, 1997). Popular wisdom with respect to first-to-market is that profit and market share advantages go to those who beat the competition to market with their product (Lambert and Slater, 1999). However, it seems that many researchers are still debating whether pioneers or late movers have advantages in research on order of entry and performance (e.g., Kerin *et al.,* 1996; Shankar *et al.,* 1998). Wind and Mahajan (1997), regarding the timing of the new product launch, pointed out that the pressure of speed in NPD is so great that companies rush out their new products, disregarding the optimal time of entry. Rather than emphasizing the appropriateness of time-to-market and cycle time as the construct of time efficiency, the construct of timeliness in the NPD studies is better because developing the ability to deliver products according to the initial schedule is critical to effective planning, and schedule slips translate into significant lost revenue and profits (Lambert and Slater, 1999). The construct of timeliness is concerned with how effective the organization is in executing its initial product plan. Moreover, Cooper and Kleinschmidt (1994) pointed out two points in relation to time dimensions. First, an absolute measure is not consistent with other measures of new product performance. That is, profit is measured relative to an investment (ROI) and sales are measured relative to objectives such as other products. Second, comparing projects via an absolute measure does not tell us which project is the more time efficient. In the case of comparing project A taking twelve months to project B taking twenty months, twelve months may be not time efficient, and project B may be more so. Unlike definitions of time-to-market and cycle time, timeliness is not an absolute measure but a relative measure. Timeliness refers to a way of measurement evaluated by managers in the light of initial planned time (Chryssochoidis and Wong, 1998; Cooper and Kleinschmidt, 1994; Olson *et al.,* 1995). Therefore, the construct of timeliness is useful for measuring the efficiency of the development process, namely the degree to which the project stays within its budget and is completed in a timely manner (Olson *et al.,* 1995).

2.3 Key Internal Factors on Timeliness in NPD and INPR

2.3.1 Cross-functional Linkages

New product development involves a cross-functional process [9] in which different functional areas have to cooperate to be successful. Although functional structures efficiently handle vertical systems within the organization, horizontal systems such as new product development necessitate structural coordination mechanisms to bridge the functional gap (Olson *et al.,* 1995). Cross-functional linkages between marketing, manufacturing and R&D are a major concern for companies. Cross-functional linkages have generated as a distinctive vocabulary because terms such as ***cross-functional interaction, cooperation,*** and ***integration*** have come to hold distinctive meanings in the NPD literature (Jassawalla and Sashittal, 1998).

Cross-functional interaction is defined as "the structural nature of cross-departmental activities" (Kahn, 1996). Such activities address formally coordinated activities between departments, including routine meetings, planned teleconferencing, routine conference calls, memoranda, and the flow of standard documentation. Cross-functional cooperation refers to interdependency and information sharing between the various organizational units (Song *et al.,* 1997a). Cross-functional cooperation was measured by communication, task orientation and interpersonal relations among functions (Song *et al.,* 1997a). Reward systems and top management support are internal facilitators that foster cross-functional cooperation, whereas external environments (e.g., market competitiveness and technological change) are not perceived to significantly affect it (Song *et al.,* 1997a). Cross-functional integration refers to the magnitude of interaction and communication, the level of information sharing, the degree of coordination, and the extent of joint involvement across functions in specific NPD task (Song and Montoya-Weiss, 2001). Gupta *et al.*, (1986) proposed that an

[9] As market requirements change and the manufacturing environment responds with a high product mix, low production volumes, and less vertical integration, it appears to be necessary to go beyond high technology engineering and manufacturing systems into the development of integrated multi-disciplinary teams. Teams are necessary to bring about a required understanding of the complexities of more frequent and cross-functional product development (Mendez and Pearson, 1994).

informal and decentralized organization and senior management's attitude (i.e., encouraging risk-taking, establishing joint reward systems for R&D and marketing, and promoting the need for integration between R&D and marketing) are associated with a greater degree of R&D-marketing integration. Specifically, an empirical test showed that the construct of centralization (i.e., the degree of hierarchical authority within an organization) has a significant negative effect on the R&D-marketing integration (Li, 1999). Also, 7 types of mechanisms (i.e., relocation and physical facilities design, personnel movement, informal social systems such as group event and trips, a cross-functional project team, incentives and rewards, formal cross-functional boards made by managers from different functional area, and information and communication technology) were found to have positive effects on the level of cross-functional linkages (Leenders and Wierenga, 2002).

Cross-functional linkages have several disadvantages (Song *et al.,* 1998). First, they violate two classic management principles (i.e., authority should equal responsibility, and every subordinate should be assigned to a single manager), thus complicating the relationship between functional areas and increasing organizational conflict. Second, joint involvement introduces conflict at an individual level because of the diverse backgrounds of personnel from different functional areas. For example, R&D is rewarded for creating new products, whereas marketing is rewarded for creating and maintaining markets and satisfied customers. Manufacturing's primary objective is the achievement of efficiency in production and cost minimization. Therefore, the stress from conflict in cross-functional linkages can disrupt work patterns. Third, cross-functional linkages can be costly. Many meetings are required to facilitate information flows, and reaching a consensus on decisions made across functions can take a considerable time. Finally, management of the interface can be difficult.

The functions are often separated by physical distance. However, co-location among functions (e.g., marketing, R&D and manufacturing) was not significantly related to any of the performance dimensions (Kahn and McDonough, 1997). Rather, efficient information inflow among functions has a positive effect on new product success. The barriers to communication and cooperation between functions reflect real or perceived differences in personality, departmental culture, use of language, expectations of cooperation, priorities and measures of success (Griffin and Hauser, 1996).

Frequent and genuine communication between functions correlates with NPD timeliness. This is because, to organizations, communication is of prime importance in gaining successful performance. When the CEOs (Chief Executive Officers) of 531 U.S. organizations that had recently undergone major changes were asked to identify one thing they would change about their efforts, overwhelmingly they pointed to the communication process (Larkin and Larkin, 1996). According to Harris (2002), communication is ranked as first, or sometimes second as the area in need of improvement within the organization. Communication and cooperation across functions influence the timeliness in new product rollout, that is high levels of interdepartmental connectedness can stimulate greater sharing of market intelligence throughout the organization. The amount of communication among team members influences the nature and strength of the relationships within the team which, in turn, impacts team project performance. Moreover communications and cooperation across functions, namely cross-functional linkages, encourage members to gather and disseminate market intelligence. The role of intensive communication and coordination of activities ensures early identification of technical and market information for the new product. Jassawalla and Sashittal (1998) found a strong association between effective cross-functional collaboration and "transparency" – "a condition of high awareness achieved as a result of intense communication."

Cross-functional project teams are typically task teams, with members representing multiple organizational functions that are formed to integrate expertise from those functions and operate at a lower level in the hierarchy (Denison *et al.,* 1996). Greater use of cross-functional teams make it easier for team members to increase the amount and variety of information available to design products and then enhanced information flows help teams catch potential downstream problems earlier in the process at a time when they are generally easier to correct. Furthermore, the cross-functional project team approach has been widely acclaimed as a core structural element catalyzing effective and accelerated NPD (Cooper and Kleinschmidt, 1994; Karagozoglu and Brown, 1993). For instance, the organization with the use of cross-functional project teams achieved 50% acceleration of development cycle, and a success rated of 90% with its new products (Donnellon, 1993). In addition, Olson *et al.* (2001) analyzed patterns of cooperation between marketing, operations and R&D participants across a variety of industries[10].

Past research has shown cross-functional linkages as a key determinant of NPD timeliness as well as new product success. In the new product literature, cross-functional linkages are important influences on new product success and NPD timeliness (Cooper 1994; Cooper and Kleinschmidt, 1994, 1995; Donnellon, 1993; Kahn, 1996; Kahn and McDonough, 1997; Leenders and Wierenga, 2002; Song *et al.*, 1997a, b; Song and Parry, 1997a, b). Specifically, cross-functional cooperation and integration overcome the constraints on timeliness in NPD and INPR (Chryssochoidis and Wong, 1998; Cooper and Kleinschmidt, 1994). As the constructs of cross-functional linkages, the employment of a cross-functional project team in the NPD studies has been used as well (Cooper and Kleinschmidt, 1994; Donnellon, 1993; Griffin, 1997).

Cross-functional linkages are associated with proficiency in NPD activities (i.e., marketing and technical proficiency) (Song, and Parry, 1997b; Song and Montoya-Weiss, 2001). This implies that marketing and technical proficiency may mediate the interconnection between cross-functional linkages and new product performance (i.e., new product development timeliness). That is, the affects of cross-functional linkages on new product development timeliness may be attributed to marketing and technical proficiency.

Regarding the relationship between environmental uncertainty and cross-functional linkages, several researchers have studied how the environment affects cross-functional linkages. Gupta *et al.*, (1986) proposed that organizations can be effective, even with a lesser degree of integration among functions under conditions of low

[10] They found that: (1) functional cooperation basically increases as the process moves from early to late stages; (2) cooperation between marketing and R&D is highest during early stages, but only for marketing and operations; also for R&D and operations, cooperation increases as the process moves from early to late stages; (3) higher project performance occurs when cooperation between marketing and R&D is high during early stages, irrespective of the level of project innovation; this also occurs when the cooperation between operations and R&D is high during early stages; (4) late stage cooperation between marketing and operations, as well as between R&D and operations, is a key determinant of project performance, but only for innovative, as opposed to non-innovative products.

environmental uncertainty, whereas high environmental uncertainty is likely to necessitate greater information processing and greater integration among functions. Ruekert and Walker (1987) also report that more complex and changing environments require the organization to be flexible and innovative and then this situation creates a greater need for people in various functional areas to interact. However, empirically, external environments (e.g., competitive intensity) are not found to be correlated to cross-functional linkages (Li, 1999; Song *et al.,* 1997a). Rather, external environment (e.g., perceived technological uncertainty) moderates the relationship between cross-functional linkages and new product outcome (Song and Montoya-Weiss, 2001). Therefore, given these prior observations, it would make sense to examine the moderating effects of external environments (e.g., competition intensity and technology change) on the relationships between cross-functional linkages and new product development timeliness.

2.3.2 Marketing and Technology Synergy

Successful new products emerge from a combination of the firm's existing capabilities, skills, and resources. Synergy is an important strategic construct in NPD studies (Cooper and Kleinschmidt, 1994). Synergy consists of marketing and technology synergy. Marketing synergy refers to the project's fit with a firm's existing marketing skills and resources, namely the available market research, sales force, distribution, and advertising and promotion skills and resources (Song and Parry, 1996; Song and Parry, 1997b; Song and Montoya-Weiss, 2001). The two constructs of marketing resources and marketing skills are typically aggregated into a single broad construct called "marketing synergy" (Cooper and Kleinschmidt, 1994; Song *et al.*, 1997b). Cooper (1979) reported a significant positive correlation between new product performance and the level of the firm's marketing resources and skills. Each of the constructs of marketing skills synergy and marketing resources synergy directly influences new product performance (Song *et al.*, 1997b). Moreover, Song *et al.* (1997b) found that marketing resources are positively associated with marketing skills. In a study on Korean companies' NPD process, Song *et al.* (1997b) focused narrowly on the role of marketing rather than emphasizing the value of complementary marketing and technical synergy in developing new products. Firm capabilities may not be valuable as single assets (Moorman and Slotegraaf, 1999). Therefore, it is necessary to simultaneously test the effects of marketing synergy and technical synergy in developing successful new products in Korean companies. Technical resources and technical skills may also individually influence new product performance when technical synergy is classified into technical resources and technical skills.

Technical synergy refers to a project's fit with a firm's existing technical skills and resources, namely the available R&D, engineering and production skills and resources (Song and Parry, 1996; Song and Parry, 1997b; Song and Montoya-Weiss, 2001). Technical synergy is also comprised of technology resources synergy and technology skills synergy. Technology resources refer to the sufficient quantity and adequate quality of R&D personnel/funds to adapt product hardware and software for the company's target markets (Cooper, 1994). In an empirical test, R&D strength (i.e., a company's resources and capacity for new technology development) is related positively to product advantage because firms with greater technology development resources can create products with more innovative features (Li and Calantone, 1998). Due to lack of technical synergy, a poorer understanding of the technology in projects is likely to result in greater ambiguity about how to solve technical problems (McDonough, 1993). Karagozoglu and Brown (1993) reported that the majority (77%) of the firms in the sample (31 U.S. companies which represent five high-technologies) developed new products based on an expansion of the existing technologies. Incremental technological development is one way of speeding up the development of new products (McDonough, 1993). In projects, where technological knowledge is greater, ambiguity is less not only about how to solve technical problems, but also about which problems warrant attention (McDonough, 1993).

NPD process and performance are enhanced by a good fit, or synergy between a firm's existing marketing and technical resources and skills and the new product (Song and Montoya-Weiss, 2001). Although many studies have tested a direct link between marketing and technical synergy and new product success, the benefits from marketing and technical synergy involve the nature of proficiency in NPD activities. Accordingly, marketing and technical synergies were modeled as antecedent drivers of proficiency in NPD activities, as well as direct determinants of new product performance (Song *et al.*, 1997b; Song and Parry, 1997b). Song and Parry (1997b) and Song and Montoya-Weiss (2001) found that marketing synergy and technical synergy as well as the level of cross-functional linkages are significantly associated with proficiency in NPD activities (i.e., a team's ability to competently execute various marketing and technical activities). That is, proficiency in NPD activities and market intelligence increases with increasing marketing and technical synergy and the level of cross-functional linkages (Song and Parry, 1997b; Wong, 2002). It assumes that a combination of an effective process and an integrated approach drives new product performance. Marketing synergy and technology synergy acquire product competitive advantage through marketing proficiency and market intelligence. This implies that both the coordinated utilization of resources and skills and organizational design (e.g., cross-functional linkages) may influence new product performance (e.g., NPD timeliness) through proficiency in NPD activities (i.e., marketing and technical proficiency).

Based on the affects of marketing and technology synergy on new product performance as well as NPD proficiency, NPD proficiency (i.e., marketing and technical proficiency) may mediate the interconnection between marketing (technology) synergy and new product development timeliness. That is, the affects of marketing and technology synergy on new product development timeliness may be attributed to marketing and technical proficiency. In addition, Song and Montoya-Weiss (2001) testified the moderating effect of perceived technological uncertainty on the relationships among skill and resource synergy, development process proficiency and project outcomes in the NPD process. This implies that competitive intensity as well as technology change as external environments may moderate the interconnection between marketing (technology) synergy and new product development timeliness.

2.3.3 HQ-subsidiary/agent Relationships

Past research on the HQ-subsidiary relationships has focused on HQ-subsidiary structural relationships (i.e., HQ control on subsidiary behaviour). As an effective HQ-subsidiary control relationship, many researchers have described the structural attributes of relationships in terms of three basic HQ-subsidiary governance mechanisms: centralization (i.e., the lack of subsidiary autonomy in decision-making), formalization (i.e., the use of systematic rules and procedures in decision-making or routinization of decision-making and resource allocation), and normative integration (i.e., the socialization of managers into a set of shared goals, values, and beliefs as a basis for decision-making) (Ghoshal and Nohria, 1989; Rodrigues, 1995). HQ prefers control over its foreign subsidiaries while the subsidiary desires autonomy. Therefore, how to manage the relationship between them is one of the core issues in contemporary studies of multinational corporations (MNCs) as regards the HQ-subsidiary relationship (Birkinshaw *et al.*, 2000).

The advantages of autonomy versus advantages of centralized structures have been presented (Paterson and Brock, 2002). With respect to the relationship between decision-making and performance, the literature has explained that decentralization in international marketing decisions has efficient results. Ghoshal and Nohria (1989) found that centralization is negatively associated with both environmental complexity (i.e., technological dynamism and competition) and local resources (i.e., subsidiary's size), whereas formalization is positively associated with both these variables. If companies introduce more product lines in foreign markets or modify products to meet local demand, then decentralization of decision-making is more likely to follow (Gates and Egelhoff, 1986).

Regarding the effectiveness of the HQ-subsidiary relationship, Roth and Nigh (1992) suggested that its effectiveness is related negatively to the level of conflict and positively to the coordination of the activities between HQ and subsidiaries. In a study on the design of coordination for managing the HQ-subsidiary relationship, Kumar and Seth (1998) demonstrated that interdependence between HQ and subsidiaries has a positive association with the extent of coordination through socialization (e.g., rotation of individuals between HQ and subsidiaries) as well as the level of the complexity of integrative mechanism (i.e., the least complex mechanism; direct contact between two managers vs. the most complex mechanism; temporary task forces and permanent teams). That is, the frequent rotations of individuals between two organizations help to coordinate the actions of the organization. Furthermore, such rotations create an integrative culture and also create a verbal information network. Also, the information-processing capacity of the integrative mechanisms increases as the integrative mechanisms increase in complexity from direct contact to permanent teams.

Another HQ-subsidiary control issue is the monitoring of subsidiary management behaviour through the use of bureaucratic mechanisms, including rules, programmes and procedures (O'Donnell, 2000). Monitoring increases information about agent behaviour and then leads to increased efficiency by reducing the risk that the agent will engage in behaviour that is not in the interest of the principle. In the MNC context, monitoring is defined as activities or mechanisms used by HQ to obtain information about the behaviours and decisions of subsidiary management (O'Donnell, 2000). With respect to the relationships between feedback seeking through monitoring and both structure variable (i.e., centralization) and process variables (i.e., HQ-subsidiary communication and use of socialization mechanisms), Gupta, *et al.* (1999) found HQ-subsidiary communication and socialization had significant impact on feedback-seeking through monitoring. On the contrary, centralization had no impact on feedback-seeking through monitoring. In a prior study into INPR, the construct of HQ-subsidiary communication was found to be positively correlated with INPR timeliness (Chryssochoidis and Wong, 1998). Communication flows between HQ and subsidiary/agents deliver information and knowledge of new products to local staff. HQ-subsidiary communication has been defined as the frequency of personal interactions, which include face-to-face meetings, telephone conversations, routine and periodic formal reporting, and written letters and memos, between the subsidiary president and parent company executives (Gupta, *et al.,* 1999).

Gupta and Govindarajan (2000) found that knowledge outflows from subsidiaries to the HQ are higher in the case of (1) subsidiaries that are larger in size, (2) subsidiaries that are located in countries with a higher level of economic advancement relative to the country of the HQ, and (3) subsidiaries that are integrated more tightly with the rest of the corporation through formal mechanisms (e.g., liaison personnel, task forces, permanent committees). Knowledge inflows from the HQ to subsidiaries are higher in the case of (1) subsidiaries that are integrated more tightly with the rest of the corporation through formal mechanisms, (2) subsidiaries that are located in countries with a lower level of economic advancement relative to the country of the HQ, and (3) subsidiaries that are given less decision-making autonomy by HQ.

In the INPR process, Chryssochoidis and Wong (1998) found that the use of "soft (i.e., informal communication and socialization)" integrating mechanisms has a lager effect on intensive coordination and communication between HQ and subsidiary/agent than "harder (e.g., centralization/decentralization of decision-making and the formalization of procedures)" ones. Also, the HQ-subsidiary/agent relationships are significantly correlated to proficiency in NPD activities as well as cross-functional linkages and marketing and technical synergy (Chryssochoidis and Wong, 1998). Based on the interconnection between HQ-subsidiary/agent relationships and proficiency in NPD activities as well as performance in foreign markets (e.g., time efficiency), the possibility of a mediating effect of proficiency in NPD activities (i.e., marketing and technical proficiency) exists in the interconnection between HQ-subsidiary/agent relationships and international new product rollout timeliness. That is, the affect of HQ-subsidiary/agent relationships on international new product rollout timeliness may be attributed to marketing and technical proficiency.

When competition intensifies, competitor learning becomes a necessity. Knowledge about competitors helps a firm anticipate changes in competitors' new product strategies, thus reducing the level of market uncertainty (Li *et al.,* 1999). In addition, a rapid change in technology presses firms to interact with customers because customers can provide demand information about emerging markets and trend (Day and Wensley, 1988). Thus, gathering knowledge about competitors and customers in target-country markets by a firm's subsidiaries (or agents) may differently influence international new product rollout timeliness depending on the conditions of the external environment (e.g., competition intensity and technology change). Recently, Luo (2003) found that market uncertainty moderates the effect of the HQ-subsidiary/agent relationship on subsidiary performance. That is, in a situation of greater market uncertainty, intra-organizational support (e.g., HQ support and the flow of information between HQ and subsidiary) becomes more important to subsidiary performance in terms of sales and profitability.

2.3.4 Proficiency in NPD activities

New product development proficiency refers to proficiency in screening, preliminary market and technical assessments, market research, product development, test marketing, and market launch (Song and Parry, 1997a). Proficiency in NPD activities refers to predevelopment project planning, test of prototypes by customers/trial sales, coordination of distribution channels, logistics, advertising and promotion, technical development and sorting out unexpected "bugs," as well as technical testing of the product (Chryssochoidis and Wong, 1998). Proficiency in NPD activities is comprised of marketing proficiency and technical proficiency (Song and Parry, 1997a; b; Song and Montoya-Weiss, 2001).

Marketing proficiency refers to how well marketing–related activities are conducted during a particular NPD project (Song *et al*, 1997b). Marketing proficiency includes activities such as evaluating consumers and competitors, determining market characteristics and trends, carrying out marketing research, test marketing, and executing product launch (Song *et al,* 1997b; Song and Montoya-Weiss, 2001). Three factors namely process skills (i.e., the skill levels of the personnel in the NPD function), project management skills (i.e., top management support and the project manager's skills), and skill/needs alignment (i.e., the fit between the project needs and the functional skills) lead to marketing proficiency (Song and Parry, 1997a).

Technical proficiency encompasses such activities as conducting engineering and manufacturing evaluations, product testing, determining product specifications, prototyping, and building the final product (Song and Montoya-Weiss, 2001). Two factors namely team skills (i.e., matters of member collaboration, participation and group dynamics) and design sensitivity (i.e., the incorporation of customer wants and needs into the product's design based on systematic feedback mechanisms established by the firm) lead to technical proficiency (Song and Parry, 1997a).

Past research has demonstrated that cross-functional linkages, marketing synergy and technical synergy are positively associated with proficiency in NPD activities (Chryssochoidis and Wong, 1998; Song and Parry, 1997a). The latter two studies suggest that while technical synergy and marketing synergy influenced respectively technical proficiency and marketing synergy, cross-functional linkages influenced both marketing proficiency and technical proficiency. Previous research has also shown that proficiency in NPD activities affects project outcome (Song and Montoya-Weiss, 2001; Song and Parry, 1996; 1997a; b).

Several studies have examined the mediator role of proficiency in NPD activities. Marketing synergy and technical synergy as well as cross-functional linkages increase product performance (e.g., product competitive advantage and ROI) through enhancing the quality of implementation of marketing and technical tasks during the development process (Song and Montoya-Weiss, 2001; Song and Parry, 1996; 1997a; b). These observations are concurrent with Song *et al.* (1997b) who show that marketing resources and skills affect new product performance through marketing activity proficiency.

In an INPR process study, proficiency in NPD activities is found to relate strongly not only to the constructs of marketing and technical synergy and cross-functional linkages but also to the construct of HQ-subsidiary/agent communication (Chryssochoidis and Wong, 1998). Additionally, proficiency in NPD activities independently leads to rollout timeliness (Chryssochoidis and Wong, 1998). Like the NPD process studies, the INPR process research needs to consider the mediating effect of proficiency in NPD activities on the relationships between the constructs of marketing and technical synergy, HQ-subsidiary/agent relationship and cross-functional linkages and timeliness dimension.

2.4 Key External Factors on Timeliness in NPD and INPR

2.4.1 External Environments as Moderators

Many researchers have investigated the direct relationships between external factors (e.g., competitive intensity and technological change) and new product success (e.g., timeliness in NPD and INPR) because external environments have been considered to be factors influencing new product success or timeliness in NPD and INPR. For instance, competitive intensity is negatively associated with performance (e.g., market share) (Jaworski and Kohli, 1993). However, empirical studies have not found that these environments directly effect new product success or timeliness in NPD and INPR (e.g., Bstieler; 2005; Chryssochoidis and Wong, 1998; Cooper and Kleinschmidt, 1994; Song and Parry, 1996; 1997b). Wong (2002) reported that external environments (e.g., competitive intensity and technological change) are important factors in the INPR process but they play an ancillary role in new product outcome. This implies that firms may adapt their internal forces in response to external environments. That is, external environments may only indirectly influence NPD and INPR timeliness.

External environments, as moderator variables, are also the basis of several studies on moderating effects in NPD (e.g., Bstieler, 2005; Bstieler and Gross, 2003; Song and Montoya-Weiss, 2001) as well as market orientation (e.g., Appiah-Adu, 1997; Bhuian, 1998; Diamantopolous and Hart, 1993; Greenley, 1995; Grewal and Tansuhaj, 2001; Harris, 2001). Most of these studies have conceptualised external factors such as competition and technology as moderator variables. Song and Montoya-Weiss (2001) found that the level of perceived technological uncertainty moderates the relationships between cross-functional integration and project outcomes (i.e., product competitive advantage and financial performance) and suggested that future research should explore how other external environments (e.g., competitive uncertainty) affect the NPD process. Bstieler and Gross (2003) found that proficiency in product concept development was strongly associated with time efficiency in the group of development projects with a low degree of competition in the marketplace, whereas the management of the development project by a strong project leader was strongly associated with time efficiency in the group of development projects with a high degree of competition. For projects with low technological unpredictability, having proficiency in product concept development was found to have an acceleration effect.

2.4.2 Competitive Intensity

When a firm tries to launch a new product into foreign markets it may achieve differing results depending on the degree of external environments such as the competitive environment and technological change (Song and Parry, 1997a). External forces are uncontrollable factors in the firm's environment (Song *et al.,* 1997a). Previous literature has pointed out that the more intensive the competitive environment, the more aggressive a business must be in discovering customer wants and creating superior customer value to satisfy them (Kohli and Jaworski, 1990; Jaworski and Kohli, 1993; Slater and Narver, 1994). However, past research has not precisely explained how organizations adapt the NPD process when the external environment is perceived to be highly uncertain (Song and Montoya-Weiss, 2001).

Competitive intensity is the degree of competitive strength in a product market (Li, 1999; Li and Calantone, 1998). The level of competition in a marketplace directly links to the level of performance (e.g., market share and product competitive advantage). Competitive intensity is negatively associated with market share (Bstieler and Gross, 2003; Jaworski and Kohli, 1993). Competitive intensity has a significant and negative direct effect on product competitive advantage (Song and Parry, 1997b). In contrast, a study by Song and Parry (1997b) did not show a significant and direct relation between competitive intensity and relative new product success. Moreover, competitive intensity does not directly influence NPD timeliness and INPR timeliness (Chryssochoidis and Wong, 1998; Cooper and Kleinschmidt, 1994). Recently, Wong (2002) proposed that competitive intensity and technological change play an ancillary role in INPR timeliness and also emphasized that a study of the causal routes (direct and indirect effects) of external influences on timeliness of new product rollouts and success in international markets will be necessary as an area for future research.

With respect to the relationships between competitive intensity and cross-functional linkages, more changing environment (e.g., changes in the behaviors of competitors) requires the organization to be flexible and innovative and, in turn, this situation creates a greater need for people in various functional areas to interact (Ruekert and Walker, 1987). Gupta *et al.*, (1986) proposed that high environmental uncertainty increases the information processing needs of an organization and, hence, the need for coordination among organizational subunits. However, empirically, competitive intensity does not have a significant effect on cross-functional linkages (Li, 1999; Song and Parry, 1997b; Song *et al.*, 1997a). Rather than emphasizing the importance of the direct effects of external environments, a few researchers have examined the indirect effects of external environments on the relationships between cross-functional linkages and new product performance (Akgün and Lynn, 2002; Song and Montoya-Weiss, 2001). For example, Song and Montoya-Weiss (2001) found that the positive relationship between cross-functional integration and financial performance is stronger when perceived technological uncertainty is high than when it is low in Japanese companies. Akgün and Lynn (2002) found that turbulent markets moderate the relationship between cross-functional team improvisation and time efficiency (i.e., speed-to-market). That is, the positive effect of cross-functional team improvisation on speed-to-market is stronger when market uncertainty is high than when it is low.

Competitive intensity is found to have a positive effect on R&D investment (Li, 1999). When competition intensifies in a product market, a firm is forced to compete on product development time to introduce new products ahead of the competition. Therefore, the race for speedy development causes R&D expenditure escalation among competitors. In successful companies, senior management has devoted the necessary resources to product competitive advantages; R&D budgets are adequate to achieve the firm's stated goals and objectives; and the necessary people are in place for new products (Cooper and Kleinschmidt, 1995). Competitive intensity also has a significant and positive direct effect on not only marketing and technical proficiency but also the level of competitive and market intelligence acquired during the new product development process in Japanese companies (Song and Parry, 1997b). That is, the level of competition affects a product's success through its effect on two elements of the NPD process; information acquisition and the proficiency in NPD activities (Song and Parry, 1997b).

2.4.3 Technology Change

Technology change is the speed of technology development in a product market (Li and Calantone, 1998). Technology change refers to the extent to which technology in foreign markets is in a state of flux (e.g., "The technology in foreign markets is changing rapidly") according to market orientation literature (Jaworski and Kohli, 1993). Technological uncertainty refers to the probability of improvements in technology; i.e. to new generations of technology which might render obsolete the current technology development effort (Robertson and Gatignon, 1998). Fast technological obsolescence implies greater market readiness to adopt new technologies and hence greater opportunity to secure timeliness in INPR (Chryssochoidis and Wong, 1998). If product life cycle is compressed and/or margins are sharply declining, new products should be developed quickly since there is limited time in which to obtain revenues (Bayus, 1997; Oakley, 1997). Thus, in high rates of technological change, product life cycles tend to be shorter, resulting in the increased importance of competing on the basis of product development cycle time, whereas the importance of cycle time may be less critical given a low rate of technological change (Sherman *et al.,* 2000).

With respect to the relationships between technology change and cross-functional linkages, technology change does not have a significant effect on cross-functional linkages (Song *et al.,* 1997a). McDonough (1993) suggested that technology's effect may moderate the relationship between speed of development and cross-functional linkages Moreover, familiarity with the technology affects the relationship between cross-functional project team's cognitive problem-solving style and NPD speed (McDonough and Barczak, 1992). Several studies have demonstrated the moderating effect of technology factor on the relationship between cross-functional linkages and NPD process or performance. Perceptions of high technological uncertainty significantly weaken the effects of cross-functional linkages on marketing proficiency, whereas perceptions of high technological uncertainty significantly strengthen the effect of cross-functional linkages on technical proficiency (Song and Montoya-Weiss, 2001). They explained that Japanese project teams have a tendency to tolerate ambiguity, to intentionally delay final technical specification in anticipation of more information, and to rapidly share and respond to new information. Thus cross-functional integration in Japanese companies is beneficial to technical proficiency under high perceived technological uncertainty. Also, the positive relationship between cross-functional linkages and project outcome (i.e., financial performance) is stronger when perceived technological uncertainty is high than when it is low (Song and Montoya-Weiss, 2001). This implies that cross-functional linkages may be fundamental to Japanese NPD because teams are the most culturally acceptable mechanism for achieving the information integration necessary to resolve technological uncertainty. Regarding the moderating effects of technological change on the relationship between cross-functional team improvisation and time efficiency (i.e., speed-to-market), Akgün and Lynn (2002) found that the positive effect of cross-functional team improvisation on speed-to-market is stronger when technology uncertainty is high than when it is low. This result indicates that spontaneous actions or team improvisation become important when time is a critical competitive factor. When the technologies in the industry change rapidly, teams may want to strive for a flexible NPD process. Therefore, team improvisation has a tendency to influence factors facilitating speed-to-market, such as speed learning, rapid prototyping and probing and learning under technical turbulence.

Technological turbulence also requires intensive resource investment in order to sustain development practices and the maintenance of technological norms (Kohli and Jaworski, 1990). When there is a rapid rate of change in the technical environment, the contributions of people with technical backgrounds become relatively more important because of their greater expertise in coping with one key source of uncertainty (Homburg *et al.*, 1999). With respect to the indirect relationship between technology uncertainty and both proficiency in NPD activities and marketing and technical synergy, Song and Montoya-Weiss (2001) found that marketing and technical synergy have significantly weaker effects on marketing and technical proficiency in Japanese companies. However, their results did not support the hypothesis that the positive relationship between marketing and technical synergy and project outcome (i.e., product competitive advantages) will be stronger under low perceived technological uncertainty than under high perceived technological uncertainty. With respect to the relationship between international new product rollout timeliness and performance, Mueller (1997) suggests that firms that enter rapidly changing markets may have greater chances of success because such markets generally offer more opportunities and higher growth than stagnant markets.

The reduction of product life cycle across successive product generations has been identified in Bass's model (Mahajan *et al.,* 2000). Due to technology and product life cycles being increasingly compressed, product and technology obsolescence becomes rampant and cannibalistic. This situation implies that companies always consider technological change in NPD and INPR timeliness. In industries characterized by rapidly changing technology, market orientation is not as important as it is in technologically stable industries (Jaworski and Kohli, 1993). Technological turbulence (i.e., the rate of technological change) in the marketplace also directly and indirectly affects NPD and INPR processes. However previous empirical study has not found any direct effects of external environments (e.g., technological change and competitive intensity) on INPR timeliness (Chryssochoidis and Wong, 1998). In addition Bstieler (2005) found that technological uncertainty did not show any direct effect on project time efficiency. Such results imply that external environments may interact with other variables that directly influence NPD and INPR processes. Consequently, in the recent NPD literature (Bstieler and Gross, 2003; Souder *et al.,* 1998; Song and Montoya-Weiss, 2001), there has been an increasing emphasis on the moderating effects of technological uncertainty on the NPD process.

2.5 Standardization

Standardization refers to the application of the same strategy to all markets (e.g., Samiee and Roth, 1992) or the domestic marketing strategy to a foreign market (e.g., Cavusgil *et al.,* 1993). Standardization has a marketing programme, which refers to various facets of the marketing mix (e.g., product design, product positioning, brand name, packaging, retail price, basic advertising message, creative expression, sales promotion, media allocation, role of salesforce, management salesforce, role of middlemen, type of retail outlets, and customer service) and the marketing process which implies tools that aid in programme development and implementation (Jain, 1989).

When introducing new products in international markets, standardization and adaptation are of significant concern to companies. Standardization exerts both positive and negative effects on performance. That is, success is not dependent upon standardization or adaptation (Vrontis and Papasolomou, 2005). At the core of the standardization and adaptation debate is the trade-off between satisfying heterogeneity of demand and exploiting economies of scale. Since the late 1980s, both standardization and adaptation have been believed to be equally important (Cavusgil *et al.* 1993). Rather, the right level of standardization and adaptation across the marketing mix elements and marketing strategies for each country is important for companies (Vrontis, 2003). Michell *et al.* (1998) pointed out that products are much more standardized and promotion, distribution and price more localized.

The total standardization perspective emphasizes the trend towards the homogenization of markets and buyer behaviour and the substantial benefits of standardization (Zou *et al.,* 1997). However, standardization is subject to internal constraints (e.g., resistance from local subsidiary management and the company's existing worldwide network of operations) (Zou *et al.,* 1997) because adaptation and flexibility add more value to subsidiary performance (Luo, 2003). Therefore, a balance between standardization and adaptation shaped through direct contact between headquarters and subsidiary managers positively influences product performance in international markets and this positive influence is strengthened by headquarters-subsidiary cooperation (Subramaniam and Hewett, 2004).

Standardization is also subject to external constrains (e.g., diverse government regulations and marketing infrastructure differences) (Zou *et al.,* 1997). Influences affecting the product standardization/adaptation decision are essentially related to the environmental conditions prevailing in foreign markets. With respect to the relationships between external environments and standardization, certain conditions such as economic and political stability greatly enhance the possibilities for standardization and its benefits (Sustar and Sustar, 2005). Particularly companies competing in an environment of rapid technological change adopt global standardization and consolidate their global operations (Samiee and Roth, 1992). Firms that follow a policy of product standardization place greater emphasis on product and process innovations (Yelkur and Herbig, 1996). The overall impact of NPD speed on profitability is compelling in markets involving short product life cycles (Ittner and Larcker, 1997).

The degree of standardization/adaptation tends to vary in accordance with the specific product element. With respect to the relationship between standardization and the nature of the product, standardization is more feasible for industrial goods than for consumer goods, since industrial products tend to be less sensitive to cultural and national differences (Baalbaki and Malhotra, 1993; Boddewyn *et al.*, 1986; Jain, 1989). Among consumer goods, durables offer greater opportunity for standardization than non-durables because the latter appeal to tastes, habits, and customs, which are unique to each society (Baalbaki and Malhotra, 1993; Jain, 1989).

Standardization carries great economies of scales (Levitt, 1983). The standardization offers attractive cost savings, owing to economies of scales in R&D, production and marketing (Sorenson and Wiechmann, 1975). The major benefit of international marketing standardization includes significant cost savings (Zou *et al.,* 1997) and adaptation involves huge costs (Vrontis and Papasolomou, 2005). Empirically, customization of product technology increases the likelihood of delays in the completion of new product development projects and multicountry rollout (Chryssochoidis and Wong, 2000). Moreover, Chryssochoidis and Wong (2000) found that NPD timeliness mediates the relationship between customization of product technology and new product performance as well as INPR timeliness. INPR timeliness also mediates the relationship between customization of product technology and new product performance.

2.6 Time Dimensions and New Product Performance

Speed to market is also an essential factor for survival (Brown and Karagazoglu, 1993). The time efficiency construct has been considered as new product performance dimension (e.g., Olson *et al.*, 1995; Song *et al.*, 1997a). Also, time dimensions such time-to-market, cycle time and timeliness are widely viewed as a key source of competitive advantage (Cooper and Kleinschmidt, 1994; Datar *et al.*, 1997a, b). Time efficiency in NPD process leads a firm to new product success. Speed to market enhances greater profitability as well as competitive advantage (Cooper and Kleinschmidt, 1994). According to a study by Dyer *et al.* (1999), the most common measures of new product performance are quantifiable. They include sales, or new product success rates, market share and profitability data, which can be provided by employees and are often verified through objective sources outside the firm. Other quantifiable measures of NP performance include a count of the number of new products introduced in the last five years, time efficiency, or meeting the planned time schedule during development of new products. Finally, the non-quantitative measures of performance, or qualitative measures, may include assessment internally of employee satisfaction with the NPD process, assessment externally of customer satisfaction, and perceptions of technical success.

With respect to the relationship between time dimensions and new product performance, many studies have been carried out in NPD literature (e.g., Cooper and Kleinschmidt, 1994; Chryssochoidis and Wong, 1998; Datar *et al.*, 1997b; Hultink and Robben, 1995). NPD studies have used a variety of different types of success measures: whereas some use financial measures of success (e.g., profit and sales), others use nonfinancial measures (e.g., design, social performance, and technology), and a third group uses a combination of the two (e.g., Hultink and Robben, 1995). Hultink and Robben (1995) divided new product performance dimension into product-level measures (e.g., launched on time and speed-to-market), financial performance (e.g., profitability and ROI), and customer acceptance measures (e.g., market share and unit sales). Other studies on the relationship between time efficiency and other performance dimensions in terms of financial performance and customer acceptance have been carried out (e.g., Cooper and Kleinschmidt, 1994; Chryssochoidis and Wong, 1998). Lead time at each stage of the new product development process (i.e., concept generation, prototype completion, and volume production) positively affects market share (Datar *et al.,* 1997b).

2.7 Summary

The issue of time dimensions is particularly important for companies which develop new products and export them to target-country markets. The topic of timeliness has not received a great deal of interest in the past decade, except for a few studies, even though it is a relatively useful construct compared to time-to-market and cycle time for the measurement of the completion of new product development projects and multicountry rollout. NPD timeliness implies the time required to complete the project relative to its anticipated time frame. INPR timeliness refers to the actual availability of the new product within the anticipated time frame for product availability across the firm's multiple target-country markets.

In this chapter antecedents and consequences of timeliness in NPD and INPR are reviewed on the basis of the diverse literature. Cross-functional linkages, marketing synergy, technology synergy and the HQ-subsidiary/agent relationship have been presented as key determinants of timeliness in NPD and INPR. To develop the timeliness theory, mediators and moderators have been reviewed in line with the related literature such as NPD and market orientation. This is in order to investigate indirect effects on timeliness in NPD and INPR. Although mediators such as marketing proficiency and technical proficiency are noticeably absent in previous studies on timeliness, NPD literature (e.g., Song & Parry, 1997a; Song & Montoya-Weiss, 2001) has addressed similar issues by examining the mediating effect of proficiency in NPD activities on the relationships between new product success and its causal antecedents. Other variables that have not been significantly linked to timeliness in NPD and INPR in previous studies are also included in this study as moderators. These include measures of external environments (i.e., competitive intensity and technology change) and standardization. Each of the constructs introduced in this chapter will be used and/ or extended in subsequent chapters of this manuscript. In the following chapters the conceptual model and hypotheses will be developed and proposed, research methodology will be discussed, the results will be presented, and their implications for marketing practice and future research will be discussed.

Chapter Three: Conceptual Framework and Research Hypotheses

3.1 Introduction

Chapter 2 reviews the literature, and argues for the need for companies to engage in timeliness in NPD and INPR. According to the literature, many key factors directly and indirectly influence timeliness in NPD and INPR. That is, cross-functional linkages, sufficiency in marketing and technical resources, HQ-subsidiary/agent relationships, proficiency in NPD activities (i.e., marketing proficiency and technical proficiency), external environments (e.g., competitive intensity and technology change) and standardization are thought to be critical factors affecting companies' ability to achieve timeliness in NPD and INPR. They also help companies to gain new product success in international as well as domestic markets.

In this chapter a conceptual framework which offers a research model and which is based on the inductive approach will be sketched. Drawing on several previous studies, a conceptual framework is developed for investigation in this research. I recognize, of course, that I share my interest with a growing number of scholars of whom Michael Song (e.g., Song and Parry, 1997a, b; Song *et al.*, 1997b; Song and Montoya-Weiss, 2001), Robert G. Cooper (e.g., Cooper, 1994; 1995; Cooper and Kleinschmidt, 1994, 1995; Cooper and Edgett, 2003), Veronica Wong, (e.g., Chryssochoidis and Wong, 1998; Wong, 2002) and those developing the new research field 'timeliness in NPD and INPR' come immediately to mind. In what follows this study builds on some of their work in order to offer a framework that will be more adequate to the task of analyzing the factors affecting NPD and INPR timeliness. In the remainder of this chapter, the hypotheses for testing (a) mediation, (b) moderation and (c) the link between not only key determinants (i.e., cross-functional linkages, marketing synergy, technology synergy, and the HQ-subsidiary/agent relationship) and timeliness in NPD and INPR but also timeliness in INPR and new product performance will be presented.

3.2 The Conceptual Framework

The current research model basically comprises 7 constructs (i.e., cross-functional linkages, marketing and technology synergy, NPD timeliness, HQ-subsidiary/agent relationships, INPR timeliness and performance) to test direct effects. 3 constructs (i.e., cross-functional linkages, marketing and technology synergy) are associated with NPD timeliness and then NPD timeliness and HQ-subsidiary/agent relationships lead to INPR timeliness and then INPR timeliness results in new product performance in target-country markets. To test indirect effects, I put 3 moderator variables (i.e., competitive intensity, technology change and standardization) and 3 mediator variables (i.e., marketing proficiency, technical proficiency and INPR timeliness) onto the conceptual framework as well.

The first premise of this study is that competitive intensity and technology change moderate the relationships between consequences of NPD (INPR) timeliness as well as the following determinants of NPD (INPR) timeliness: cross-functional linkages, marketing synergy, technology synergy and the HQ-subsidiary/agent relationship. The second premise is that standardization moderates the interconnection between NPD timeliness and INPR timeliness. The third premise is that proficiency in marketing and technical activities mediates the interconnections between HQ-subsidiary/agent relationships and INPR timeliness as well as between key determinants (i.e. cross-functional linkages, marketing synergy and technical synergy) and NPD timeliness. The fourth premise is that INPR timeliness mediates the relationship between NPD timeliness and new product performance in target-country markets.

Figure 3.1 Conceptual Framework

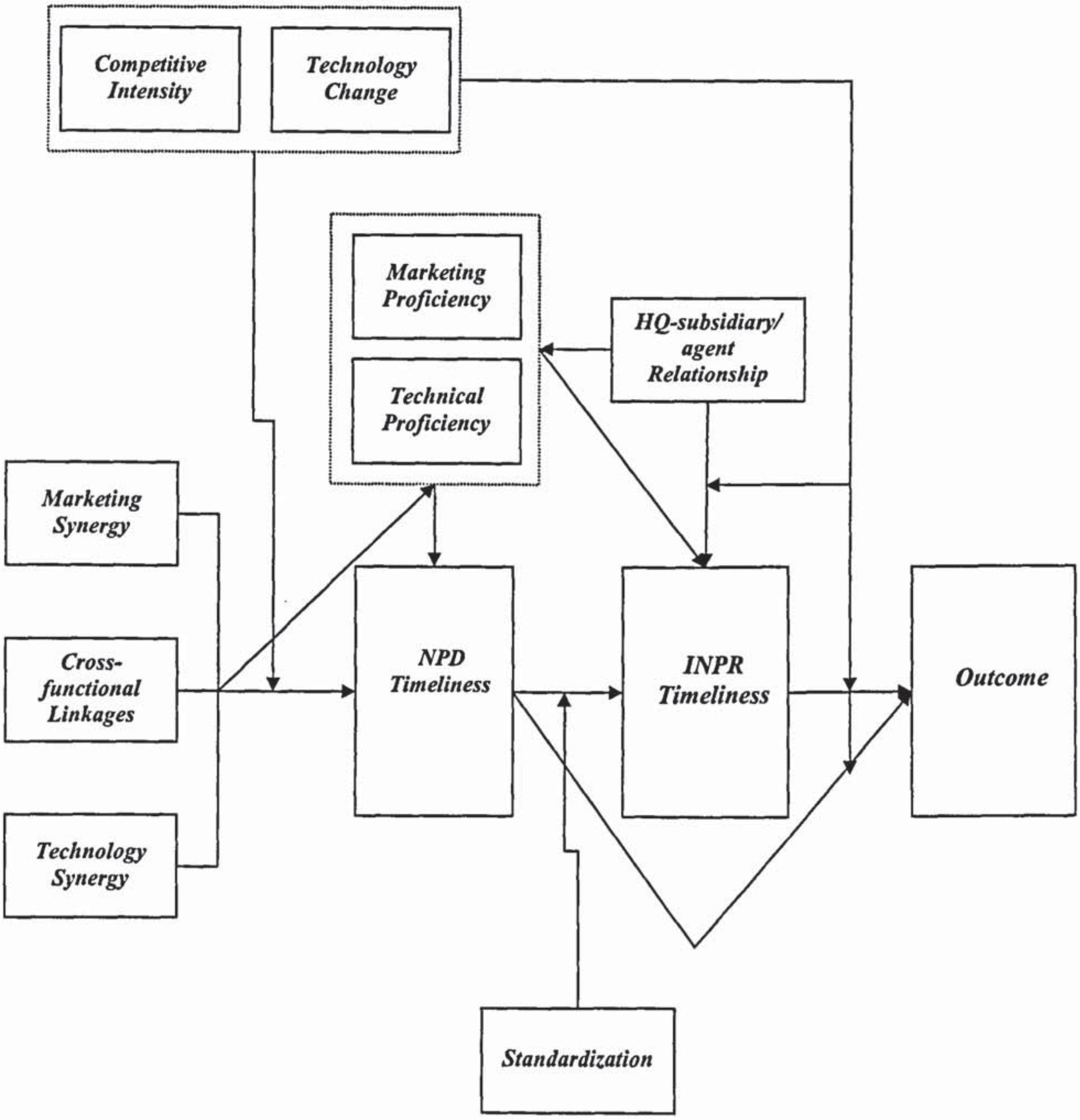


Figure 3.1 presents the conceptual framework of this study. In the proposed model there are twelve variables (i.e., cross-functional linkages, marketing synergy, technology synergy, NPD timeliness, the HQ-subsidiary/agent relationship, INPR timeliness, competitive intensity, technology change, standardization, marketing proficiency, technical proficiency, and performance) that require investigation in order that a conceptual framework can be confirmed. Among these twelve variables, three variables (i.e., cross-functional linkages, marketing synergy, and technical synergy) have been placed as key antecedents of NPD timeliness and one variable (i.e., HQ-subsidiary/agent relationship) has been placed as a key antecedent of INPR timeliness based on previous studies (e.g., Chryssochoidis and Wong, 1998; Cooper 1994; Cooper and Kleinschmidt, 1994, 1995; Wong, 2002).

The conceptual framework starts with the assumption that cross-functional linkages, marketing synergy and technology synergy directly influence NPD timeliness (conversely delay) and the HQ-subsidiary/agent relationships directly influence INPR timeliness and then NPD timeliness influences INPR timeliness (conversely delay). Finally, INPR timeliness results in NPD outcome. Cross-functional linkages may directly influence NPD timeliness. Cross-functional linkages between marketing, manufacturing and R&D have been previously identified as important determinants of new product success (Cooper 1994; Donnellon, 1993; Kahn, 1996; Kahn and McDonough, 1997; Leenders and Wierenga, 2002; Song and Parry, 1997a, b). Cross-functional linkages encourage a firm to achieve project effectiveness as well as to gain and disseminate market intelligence. Greater use of cross-functional teams facilitates team members in increasing the amount and variety of information available to design products. Enhanced information flows among team members help teams catch potential downstream problems (e.g., manufacturing difficulties or market and product portfolio mismatches) earlier in the process at a point, when they are generally easier to correct. Cross-functional teams are also associated with timeliness in NPD and INPR (Chryssochoidis and Wong, 1998; Cooper 1994; Cooper and Kleinschmidt, 1994; 1995).

The current conceptual model also depicts the links between marketing and technology synergy and NPD timeliness in INPR process. Marketing and technology synergy may directly influence NPD timeliness. Cooper (1994) identified that marketing and technology synergy directly influences NPD timeliness and NPD performance. That is, the ability to leverage the firm's existing technology, production, and marketing skills and resources to advantage in the new product means improved timeliness. In the case of new product success, NPD performance (e.g., ROI) is the result of how well the firm's skills and resources are matched in the NPD process (Song and Parry 1997a, b). Moreover, a firm with well-developed resources and proven skills has an advantage when it launches new products in foreign markets (Chryssochoidis and Wong, 1998). Accordingly, marketing and technology synergy is associated with NPD timeliness.

With regard to the HQ-subsidiary/agent relationship, the current conceptual model depicts that it may be directly related to INPR timeliness. International new product launches are activities across borders. A firm has to make or sustain a local subsidiary or agent so as to do business in a foreign market. When companies try to launch new products into foreign markets, a HQ-subsidiary/agent relationship necessarily arises. During the pre-, actual and post-development of new products to fit target-country markets, cross-border communication between a HQ and its foreign subsidiaries and agents plays an important role in new product launches. An effective level of HQ-subsidiary/agent communication and staff interaction brings more effective sharing of resources, skills and knowledge between them (Roth and Nigh, 1992). Moreover it leads to more comprehensive and varied information flows and feedback from different country-market environments to the project team in the NPD process (Chryssochoidis and Wong, 1998; Wong, 2002). Therefore, the proposed conceptual model assumes that cross-functional linkages, marketing synergy, technology synergy and HQ-subsidiary/agent relationships have direct effects on timeliness in NPD (INPR).

Also, this framework tries to investigate how cross-functional linkages, marketing synergy, technology synergy and the HQ-subsidiary/agent relationship influence NPD (INPR) timeliness through marketing and technical proficiency and how NPD timeliness influences performance through INPR timeliness (i.e. mediating effect). In the investigation of the relationships between cross-functional linkages, marketing synergy, technology synergy, marketing proficiency, technical proficiency and NPD timeliness, past research showed that all them (i.e., cross-functional linkages, marketing synergy, technology synergy, marketing proficiency, technical proficiency) were significantly related to timeliness in NPD (Chryssochoidis and Wong, 1998; Cooper and Kleinschmidt, 1994). However, past research has not obviously explained how key determinants (e.g., cross-functional linkages and marketing and technology synergy) influence NPD timeliness. This conceptual framework suggests that HQ-subsidiary/agent relationship may directly influence INPR timeliness and indirectly influence it through proficiency in NPD activities (i.e., marketing and technical proficiency) as well. Chryssochoidis and Wong (1998) found that the HQ-subsidiary/agent relationship was a determinant of INPR timeliness. However, past research has not obviously explained how HQ-subsidiary/agent relationship influence timeliness in INPR. Figure 3.1 presents that marketing and technical proficiency may mediate the interconnection between HQ-subsidiary/agent relationship and INPR timeliness. Wong (2002) expected that HQ-subsidiary/agent relationship is likely to have both direct and indirect effects on INPR timeliness. NPD proficiency is significantly associated with NPD timeliness (Cooper and Kleinschmidt, 1994). It also influences INPR timeliness (Chryssochoidis and Wong, 1998). Chryssochoidis and Wong (1998) confirmed that HQ-subsidiary/agent relationship is significantly correlated with proficiency in NPD activities. This implies that HQ-subsidiary/agent relationship may influence INPR timeliness through proficiency in NPD activities. That is, the effect of HQ-subsidiary/agent relationship on INPR timeliness may be attributed to NPD proficiency such as marketing and technical proficiency. Figure 3.1 presents that INPR timeliness may mediate the relationship between NPD timeliness and performance in target-country markets. Therefore, the proposed research model contains marketing proficiency, technical proficiency and INPR timeliness as mediator variables to test the mediating effects on the relationships among key determinants of NPD (INPR) timeliness, NPD (INPR) timeliness and performance.

Rather than the investigation of a direct relationship between competitive intensity and technology change and NPD and INPR timeliness, their indirect effects on the relationship between NPD and INPR timeliness and their antecedents should be examined in terms of the inclusion of potential moderator variables. In order to test the indirect effects of not only standardization but also external environments (i.e., competitive intensity and technology change) on the interconnections among key antecedents, consequences and NPD (INPR) timeliness, the proposed model comprises moderating variables (i.e., competitive intensity, technology change and standardization). That is, the current framework seeks to examine if there are strong interconnections between cross-functional linkages, marketing synergy, technology synergy, the HQ-subsidiary/agent relationship, NPD timeliness, and INPR timeliness and 3 moderator variables (competitive intensity, technology change and standardization) affect the strength of their relationships (i.e. moderating effect).

Market competitiveness is the least important factor for new product success and its relative unimportance may reflect conflicting indirect influences on new product success (Song and Parry, 1996). Technological change enables a firm to react with greater resource investment and market readiness to adopt new technologies and to sustain development practices (Chryssochoidis and Wong, 1998; Kohli and Jaworski, 1990). Key to the development of a conceptual model on the moderating effects of competitive intensity and technological change are several studies (e.g., Bstieler and Gross, 2003; Song *et al.,* 1997b; Song and Montoya-Weiss, 2001; Souder *et al.,* 1998; Wong, 2002). They have tested the moderating effects of external factors on NPD process and suggested the need to study their indirect effects in future research. Song *et al* (1997b) proposed that there is a need for future research to explore the possibility of additional moderator variables in the NPD process. Except for the moderating effects of other external environments (e.g., competitive intensity) on the relationships between development process proficiency and project outcomes, Song and Montoya-Weiss (2001) give empirical support for the moderating effect of perceived technological uncertainty on the relationships among cross-functional integration, development process proficiency and project outcomes and among skill and resource synergy, development process proficiency and project outcomes in the NPD process. Also, Bstieler and Gross (2003) employed not only technology uncertainty but also market competitiveness as moderator variables. Despite empirical tests on the indirect effect of perceived technological uncertainty in NPD process and a rationale for an indirect link between external environments and timeliness in INPR process, research on the moderating effects of external environments in INPR process is sparse. A conceptual framework depicts that competitive intensity and technological change may moderate the relationships among key antecedents of NPD (INPR) timeliness (i.e., cross-functional linkages, skills and resources synergy and the HQ-subsidiary/agent relationship), NPD (INPR) timeliness, and performance.

The proposed conceptual model also incorporates the construct of standardisation as a moderator variable. Although the purpose of development process standardisation is to reduce time to market (Cooper, 1995), market heterogeneity, technological heterogeneity and customization of product are not directly associated with INPR timeliness (Chryssochoidis and Wong, 1998). This implies that standardization may influence INPR timeliness in an ancillary role (i.e., a moderator). A company retains the advantages of large-scale production through standardisation of all products and components (Kotabe, 1998) because the key advantage of standardization is related to cost reduction and efficiency (Levitt, 1983; Sorenson and Wiechmann, 1975). In addition, the time efficiency of new product development enables companies to significantly reduce cost (Menon *et al.,* 2002). Standardisation facilitates companies in the rapid development of new products. High customization for individual local markets involves huge cost and internal inefficiency (Oktemgil and Greenley, 1997) whereas standardisation across national markets offers significant cost savings and efficiency (Vrontis and Papasolomou, 2005; Zou *et al.,* 1997). According to previous studies, the construct of standardisation is likely to indirectly influence the both constructs of NPD timeliness and INPR timeliness. Therefore, the proposed conceptual model also argues that standardization in NPD process (i.e., marketing and technical-related activities) may moderate the relationship between NPD timeliness and INPR timeliness.

3.3 Research Hypotheses

3.3.1 The Influence of Key Determinants on Timeliness in NPD and INPR as well as Timeliness in INPR on New Product Performance

3.3.1.1 The Influence of Cross-functional Linkages on NPD Timeliness

There is a clear consensus in the literature that a high level of cross-functional linkages improves new product performance in terms of firm-level measures (e.g., sales) (e.g., Song and Parry, 1997b), process measures (e.g., technical success) (e.g., Song and Parry, 1996; Song and Montoya-Weiss, 2001), customer measures (e.g., market share) (e.g., Song and Parry, 1996), and financial measures (e.g., ROI) (e.g., Song and Montoya-Weiss, 2001). Specifically, a high level of cross-functional linkages improves time efficiency (e.g., timeliness in NPD and INPR and cycle time) (Chryssochoidis and Wong, 1998; Cooper and Kleinschmidt, 1994; Griffin, 1997; Olson *et al.,* 1995; Ruekert and Walker 1987; Sherman *et al.,* 2000; Song *et al.,* 1997a).

Organizations divide their employees into specialized functions so that people with appropriate knowledge and experience can perform the firm's various activities (Xie *et al.,* 1998). The existence of specialized functions in a company leads to interfunctional conflict when dealing with complex tasks (e.g., NPD) that require information sharing and cooperation among functions (Ruekert and Walker, 1987). That is, an insufficiency of cooperation and interaction among functions in the NPD process prevents the members across functions from sharing information and knowledge of technology and market situations. Furthermore, a high level of interfunctional conflict requires excess organizational costs in terms of time (Xie *et al.,* 1998). However, a high level of cross-functional linkages brings the mutual involvement of all technical, marketing and manufacturing functions, accurate, on time and high quality input by technical and marketing personnel as well as customers' involvement (Chryssochoidis and Wong, 1998). For new product development, a high level of cross-functional linkages enables a company to rapidly reach optimal solutions and decisions without requiring excess time. As a result, the likelihood of timeliness in NPD should increase with an increase in the level of cross-functional linkages. Therefore,

H1a: The level of cross-functional linkages is associated positively with the level of timeliness in NPD

3.3.1.2 The Influence of Marketing and Technology Synergy on NPD Timeliness

Every firm tries to acquire and accumulate the resources and skills that underpin its production activities. Superior resources and skills reflect the pattern of a firm's past investment to enhance its competitive position, and they represent a firm's ability to produce more efficiently or better satisfy customers (Song *et al.,* 1997b). NPD performance (e.g., speed of brand quality improvement) is a consequence of an organization's marketing and technology capabilities in the capabilities-based NPD studies (Moorman and Slotegraaf, 1999). In addition, marketing and technology synergy has been found to have a positive effect on project outcome (i.e., NPD timeliness, product competitive advantage, and financial performance) (e.g., Cooper and Kleinschmidt, 1994, Song and Parry, 1996; Song and Montoya-Weiss, 2001). Resources (i.e., the tangible and intangible marketing and technology capabilities) enable a firm to efficiently and effectively deliver a new product of value to the market (Song and Montoya-Weiss, 2001).

Previous studies (e.g., Chryssochoidis and Wong, 1998; Song and Montoya-Weiss, 2001) also found that levels of skill and resource synergy simultaneously affect performance (e.g., time efficiency) as well as proficiency in NPD activities. Skill and resource synergy enables a company to competently execute various marketing and technical activities to improve time efficiency in the NPD process. This is because proficiency in executing the development process is driven by the fit between a new product concept and a firm's available resources and skills (Song and Montoya-Weiss, 2001). However, a firm's insufficiency of resources and skills in the NPD process is one of the causes of new product failure and it is also a major time waster (Cooper and Kleinschmidt, 1994; Cooper and Edgett, 2003). Accordingly, a lack of synergy between project needs and available resources and skills in a firm may be negatively related to the level of time efficiency. A gap between the amount of information required to perform particular NPD activities and the amount of information already possessed by the firm originates from a lack of marketing and technology synergy (Song and Montoya-Weiss, 2001). Therefore, this study will have similar results, namely that marketing and technology synergy will achieve timeliness in NPD and will be positively related to timeliness in NPD. Consequently,

H1b: The level of marketing synergy is associated positively with the level of timeliness in NPD

H1c: The level of technology synergy is associated positively with the level of timeliness in NPD

3.3.1.3 The Influence of NPD Timeliness on INPR Timeliness

Most products are now developed for international markets, meaning that they can be sold simultaneously in multiple markets (Rogers *et al.,* 2005). To compete effectively in international markets, companies must quickly identify changing customer needs, develop more complex products to satisfy those needs worldwide, and provide better customer service. This may result in a time lapse between domestic and overseas launches, delays in planned launches into overseas markets may reduce new product success. Oakley (1996; 1997) found that both time to overseas launch and the proportion of total sales in overseas markets are significantly associated with new product commercial success one year after launch. That is, more successful launches in the domestic market are strongly associated with a much faster introduction to overseas markets. The timely development of a new product is a prerequisite factor for its successful introduction into the domestic market because a short new product development (NPD) cycle can afford companies significant efficiency (e.g., cost reduction) and greater market segment coverage (Menon *et al.*, 2002).

Speed enables firms to respond quickly to rapidly changing markets and technologies (Cooper and Kleinschmidt, 1994). Moreover it enhances product superiority (Ali *et al.*, 1995; Cooper and Kleinschmidt, 1994). Product competitive advantage encourages a firm to quickly launch its new product into target markets. The relationship between NPD timeliness and INPR timeliness was positive and significant (Chryssochoidis and Wong, 1998). In addition, product superiority was significantly correlated to INPR timeliness (Chryssochoidis and Wong, 1998). This implies that a delay in completing the NPD project raises doubts about product competitive advantage and then causes delay in INPR. Accordingly, NPD timeliness will influence INPR timeliness and will be positively related to INPR timeliness. Consequently,

H1d: The level of NPD timeliness is associated positively with the level of INPR timeliness

3.3.1.4 The Influence of the HQ-subsidiary/agent Relationship on INPR Timeliness

HQ-subsidiary behavioural relationships have explained that HQ-subsidiary cooperation is associated with subsidiary product performance (e.g., market share, sales and ROI) (Hewett and Bearden, 2001). This is because the HQ and subsidiaries achieve mutual goals with respect to the marketing procedures, directives, and programmes for a particular product through their effective relationships. Developing products for international markets with customers across borders is a complex process, containing multiple interactions (Rogers *et al.*, 2005). Gathering market intelligence on local markets (e.g., customers and competition status) will be achieved through cooperation between HQ and subsidiaries' units or agents. Cavusgil *et al.* (1993) suggest that market-driven learning is beneficial for companies in developing new products for export since it allows them to gain insights into local market characteristics conducive to new product acceptance.

In the NPD and INPR process, Chryssochoidis and Wong (1998) have identified an additional factor (i.e., the HQ-subsidiary/agent relationship) affecting timeliness in INPR as key antecedents of INPR timeliness. Proficiency in marketing and technical activities is driven by the effective organization of work (e.g., the HQ-subsidiary/agent relationship) (Brown and Eisenhardt, 1995). Successful relationships between HQ and subsidiaries can adapt a new product and marketing strategies to meet consumers' needs and preferences based on the amount and variety of information available to them. HQ-subsidiary cooperation enables firms to respond quickly to rapidly changing markets and technologies. Therefore, increasing information about target-country markets leads to increased efficiency by reducing uncertainty. The effective HQ-subsidiary relationship drives proficiency in NPD activities and then achieves product competitive advantage. Product competitive advantage allows companies to successfully deliver a new product to the marketplace on time. On the basis of the above considerations, the HQ-subsidiary/agent relationship will influence INPR timeliness.

H1e: The level of HQ-subsidiary/agent relationship is associated positively with the level of INPR timeliness

3.3.1.5 The Influence of INPR Timeliness on New Product Performance

Brown and Karagazoglu (1993) reported that time efficiency for NPD is an essential factor for survival. An empirical test on the relationship between the construct of timeliness and performance has been carried out. Cooper and Kleinschmidt (1994) found that the NPD timeliness construct was correlated with new product success in terms of sales and profitability. Time efficiency in the NPD process increases new product performance (Brown and Karagazoglu, 1993) because it enhances profitability as well as competitive advantage (Cooper and Kleinschmidt, 1994). Therefore, the timely development of new products leads to competitive advantages (e.g., product superiority) and then positively influences product performance.

Relative to the relationship between INPR timeliness and performance, Chryssochoidis and Wong (1998) found that the construct of INPR timeliness is positively associated with sales and ROI. First-mover advantage is typically enhanced by a pioneer's temporary monopoly (Robinson and Min, 2002). However, INPR timeliness is related to comparative advantage (i.e., market evolution changes success requirements in terms of marketing, engineering and R&D) not absolute pioneer advantage (i.e., market pioneers are intrinsically stronger than early followers and late entrants) because INPR timeliness is not measured on the basis of order of market entry (e.g., time-to-market). When a company launches new products in the marketplace, the market entry decision is influenced by situation-specific factors (e.g., the entrant's degree of product innovation, available distribution channels, and expected competitive reactions) (Robinson *et al.,* 1992).

Timely roll-out of new products across target-country markets in terms of a planned time enables companies to acquire comparative advantages in line with market's situation-specific factors. This implies that planned market entry timing has a tendency to reflect a company's view of its advantages, given that timing, in terms of the market's requirements for success. This is because market pioneers, early followers, and late entrants tend to have different skill and resource profiles [11] (Robinson *et al.,* 1992). According to a study by Abell (1978), the 'strategic window' for market entry tends to open at different times for different entrant types. A delay in INPR is likely to mitigate company's advantages in matching the target market's success requirements. Therefore, a company, achieving timely roll-out of new products across target-country markets, is able to execute and match its specific competencies (e.g., marketing or manufacturing advantages) to its target market's key success requirements. In light of

[11] Strong R&D skills encourage market pioneering. Strong manufacturing skills encourage early followers. Strong marketing skills encourage late entry. In addition, finance skills can be important to secure and sustain funding for a pioneer's product and market development costs.

the above discussion, the likelihood of new product success should increase with an increase in the level of timeliness in INPR. Consequently,

H1f: The level of INPR timeliness is associated positively with new product performance.

3.3.2 The Influence of Proficiency in NPD activities on the Relationships between Key Determinants and Timeliness in NPD and INPR

3.3.2.1 The Mediating Role of Marketing Proficiency on the Relationships between Key Determinants and Timeliness in NPD and INPR

Past research has shown that development process proficiency affects project outcomes (Cooper, 1994; Song and Parry, 1997a, b). A firm should attain proficiency in screening, preliminary market and technical assessments, product development, test-marketing, and market research so as to gain success for its new product. In particular, knowledge about customers' needs and wants, preferences, tastes, price sensitivities, and purchasing behaviour are essential for successful marketing (Calantone *et al.,* 1996). A firm that ignores or poorly performs particular NPD activities (e.g., market research) in the sophisticated NPD process may develop new products poorly because it cannot utilize important information and resources. Moreover, Song and Parry (1997b) report that proficiency in NPD activities positively affects product competitive advantage and this, in turn, results in new product success. That is, proficiency in NPD activities (e.g., marketing proficiency) is expected to increase consumer perceptions of a product's advantages relative to competitors. Based on good information about the market (e.g., competitors and consumers) companies are able to develop products of a higher quality than competing products (Calantone *et al.,* 1996).

Key antecedents (e.g., marketing synergy, cross-functional linkages, technology synergy and the HQ-subsidiary/agent relationship) influence timeliness in NPD and INPR as well as new product success (e.g., a product's competitive advantage and financial performance) through proficiency in NPD activities (Song and Parry, 1997a, b; Song and Montoya-Weiss, 2001; Wong, 2002). Most of the studies show that a firm's existing resources and skills synergy lead to proficiency in NPD activities (Cooper and Kleinschmidt, 1994; Song and Parry, 1997b; Song and Montoya-Weiss, 2001). Sufficient levels of marketing resources and skills are needed to enable firms to gather intelligence about their competition and the market. Specifically, successful cross-functional teams appear to concentrate their marketing resources and skills on gathering good information about the competition and the market (Calantone *et al.*, 1996). In addition, proficiency in NPD activities is a consequence of cross-functional linkages (Song and Parry, 1997b; Song and Montoya-Weiss, 2001). The gaining and dissemination of market intelligence through cross-functional linkages have been emphasized (Jaworski and Kohli, 1993; Kohli and Jaworski, 1990; Narver and Slater, 1990). Also, the effects of the integration of knowledge from past projects make the largest contribution to the reduction in cycle time (Sherman *et al.*, 2000).

In empirical studies on new product success, proficiency in NPD activities (e.g., marketing proficiency or technical proficiency) mediates the relationship between marketing resources and skills and product performance (Song *et al.*, 1997). This implies that proficiency in NPD activities may have an indirect as well as a direct effect on timeliness in NPD and INPR because cross-functional cooperation, marketing and technology synergy are related to timeliness in NPD and INPR as well as new product performance (e.g., market share or profits). The effects of cross-functional linkages and marketing synergy on NPD timeliness may be attributed to marketing proficiency. Additionally, in international marketing, intensive communications and cooperation between HQ and its subsidiary/agent enable a firm not only to properly share market intelligence on target foreign markets but also effectively to fit their existing resources and skills to NPD and INPR process (Chryssochoidis and Wong, 1998; Wong, 2002). Moreover the interconnection between the HQ-subsidiary/agent coordination (e.g., internal communication between them) and proficiency in NPD was positive and significant (Chryssochoidis and Wong, 1998). It is expected that the HQ-subsidiary/agent relationship will also influence INPR timeliness through proficiency in NPD activities (e.g., marketing proficiency and technical proficiency). Therefore the effect of the HQ-subsidiary/agent relationship on INPR timeliness may be attributed to marketing proficiency. This study thus proposes the following three hypotheses:

H2a: The level of proficiency in marketing activities mediates the association between cross-functional linkages and NPD timeliness.

H2b: The level of proficiency in marketing activities mediates the association between marketing synergy and NPD timeliness.

H2c: The level of proficiency in marketing activities mediates the association between HQ-subsidiary/agent relationship and INPR timeliness.

3.3.2.2 The Mediating Role of Technical Proficiency on the Relationships between Key Determinants and Timeliness in NPD and INPR

Marketing activity proficiency is positively related to new product success in Korean companies (Song *et al.*, 1997b). However, a study of the influence of technical activity proficiency on NPD timeliness as well as new product success has not been carried out in relation to Korean companies. Although the link between key determinants of new product success or NPD timeliness and proficiency in NPD activities is obvious, an empirical test on Korean companies did not show significant correlation between marketing resources and skills synergy and marketing proficiency when it tested the role of marketing only without including the constructs of technology synergy and technical proficiency (Song *et al.*, 1997b). However, Song and Parry (1996) found that cross-functional linkages positively affect technical proficiency which, in turn, influences new product success. Accordingly the likelihood of proficient execution of NPD activities should increase with an increase in the level of cross-functional linkages, skills and resources synergy, and the HQ-subsidiary/agent relationship. Proficiency in NPD activities may be attributed to other factors (e.g., technical resources and skills and cross-functional linkages) in Korean companies. It is necessary to empirically test an additional, extended model which includes other dimensions (e.g., cross-functional linkages, technology synergy, and technical proficiency). Accordingly, this study tries to investigate whether marketing and technology synergy influence new product performance namely new product development timeliness, with data from Korean companies.

In order to perform technical activities, a firm needs information on competitors' product offerings and technological advances as well as on the characteristics of the market (Calantone *et al.*, 1996). Quality of execution of technical actions leads to more time-efficient projects (Chryssochoidis and Wong, 1998; Cooper, 1994; Cooper and Kleinschmidt, 1994, 1995). Technical proficiency is expected to increase product competitive advantage by raising the actual performance of the new product relative to competitors. This is consistent with the results of a study by Chryssochoidis and Wong (1998). Proficiency in new product development process significantly effects product superiority. In addition, like the relationship between proficiency in NPD activities and new product success, proficiency in NPD activities on NPD timeliness in the INPR process has also been identified (Chryssochoidis and Wong, 1998). It is expected that proficiency in NPD activities (e.g., marketing proficiency, technical proficiency) will also influence NPD timeliness. As a result, the likelihood of timeliness in NPD should increase with an increase in the level of proficiency in marketing activities, technical activities, and market intelligence. Furthermore, Song and Parry (1997b) and Song and Montoya-Weiss (2001) have found that proficiency in NPD activities (e.g., marketing proficiency or technical proficiency) has a mediating effect on the relationships between cross-functional integration and marketing and technical synergy and new product performance (e.g., profits) as well as a direct effect on new product success. Therefore, technical proficiency may mediate the relationships between technology synergy, cross-functional linkages and the HQ-subsidiary/agent relationship and timeliness in NPD and INPR. That is, the effects of technology synergy, cross-functional linkages and the HQ-subsidiary/agent relationship on timeliness in NPD and INPR may be attributed to technical proficiency. These arguments are summarized in the following hypotheses:

H3a: The level of proficiency in technical activities mediates the association between cross-functional linkages and NPD timeliness

H3b: The level of proficiency in technical activities mediates the association between technical synergy and NPD timeliness.

H3c: The level of proficiency in technical activities mediates the association between HQ-subsidiary/agent relationship and INPR timeliness.

3.3.3 The Influence of INPR Timeliness on the Relationships between NPD Timeliness and New Product Performance

NPD timeliness and INPR timeliness have positive impacts on new product success (e.g., sales, return on investment and market share) (Chryssochoidis and Wong, 1998; Cooper and Kleinschmidt, 1994). Also, the relationship between NPD timeliness and INPR timeliness was positive and significant (Chryssochoidis and Wong, 1998). On-schedule projects are able to achieve shorter time to market due to organizational efficiency (e.g., cost reduction) and competitive advantage (i.e., product superiority) (Cooper, 1994; Menon *et al.,* 2002). In addition, a good and efficient launch is one of the keys to new product success (Cooper, 1994; Cooper and Kleinschmidt, 1994). Non-product advantage (e.g., superior sales force, advertising and promotion) is a key element of a good and efficient launch (Cooper, 1994). Timely roll-out of new products to target markets also needs non-product advantage. Thus, both product advantage (i.e., product superiority) and non-product advantage (e.g., superior sales force, advertising and promotion) simultaneously support the time efficiency of product launches.

Speed in NPD enables a company to benefit from expected time-to-market advantages (Bstieler and Gross, 2003). However, many new product failures include those first into target markets (Cooper, 1994). Generally, the first movers contain strong R&D skills. However, success and failure are not strongly connected to the nature of the innovation (Cooper, 1994). Therefore, a market entry strategy based on timeliness in INPR is far more effective than simply being first to market. This is because a firm's planned time of INPR should reflect situation-specific factors such as the entrant's degree of product innovation, available distribution channels, and expected competitive reactions. Therefore, INPR timeliness encourages a firm that has product advantage to properly match a market's success requirements. This implies that product advantage based on NPD timeliness depends on the scheduled time taken to roll out new products across target-country markets in order to achieve new product success. That is, NPD timeliness based on product advantage is likely to influence new product performance through INPR timeliness. Based on the reasons mentioned above, the effect of NPD timeliness on new product performance in target-country markets may be attributed to INPR timeliness. Consequently,

H4: The level of timeliness in INPR mediates the association between NPD timeliness and performance

3.3.4 The Influence of External Environments on the Relationships between Key Determinants, Timeliness in NPD and INPR, and New Product Performance

3.3.4.1 The Moderating Role of Competitive Intensity on the Relationships between Cross-functional Linkages and NPD Timeliness

Competitive reactions to a new product launch may seriously harm the performance of a new product in the marketplace. However, market competitiveness had no direct impact on timeliness in NPD (Cooper and Kleinschmidt, 1994). Like technological change, competitive intensity does not directly influence INPR timeliness (Chryssochoidis and Wong, 1998). The changing environments (e.g., market competition) facing many companies have caused them to attempt various means of reducing the time they take to develop new products. For instance, the use of teams of individuals drawn from different functional areas is popular in the NPD process (McDonough, 1993). With respect to the moderating effects of market uncertainty and market competition on the relationship between cross-functional linkages and NPD performance, past research has not found a moderating effect of market uncertainty or market competition on the relationship between cross-functional linkages (e.g., R&D/marketing integration and the existence of cross-functional project team) and NPD cycle time in U.S. and U.K. high-technology companies (Souder *et al.,* 1998) and Canadian high-technology companies (Bstieler and Gross, 2003).

However, Song and Montoya-Weiss (2001) suggest that future research needs to explore alternative sources and types of perceived uncertainty (e.g., competitive uncertainty) on the relationships between integration (i.e., cross-functional cooperation) and NPD performance as a moderator variable. When competition intensifies, competitor learning becomes a necessity (Li *et a*l., 1999). Knowledge about competitors helps a firm anticipate changes in their new product strategies, thus reducing the level of market uncertainty. Team members' creativity can lead to an increase in product concept effectiveness and importing knowledge from outside can positively contribute to product development productivity. Increased environmental uncertainty (e.g., competitive intensity) requires increased information acquisition and processing about the environment, especially about customer and competitor forces (Daft *et al.,* 1988). Thus, competitive intensity may encourage project team members frequently to exchange information on competitors and customers and then cross-functional cooperation may have a stronger positive effect on NPD timeliness.

When competition intensifies, the market often becomes less predictable. Market uncertainty increases the need for joint information processes among functions (Li, 1999). Greater environmental uncertainty leads to an increased need for cross-functional linkages (Griffin and Hauser, 1996). Gupta *et al.*, (1986) proposed that organizations can be effective, even with a lesser degree of integration among functions under conditions of low environmental uncertainty, whereas high environmental uncertainty is likely to necessitate greater information processing and greater integration among functions. When the competition is absent or weak, an organization may perform well, even though there are shortages of cooperation or integration across functions, and so the effect of integration on NPD timeliness may be not important. By contrast, under conditions of high competition, the effect of integration (e.g., cross-functional linkages) is expected to be a more important determinant of timeliness in NPD because an organization that does effect timely introduction of new products is likely to lose customers to its competitors and fare poorly. Consequently cross-functional linkages would have stronger positive effects on NPD timeliness when competitive intensity is high.

H5a: The positive interconnection between cross-functional linkages and timeliness in NPD is stronger when competitive intensity is high than when it is low.

3.3.4.2 The Moderating Role of Competitive Intensity on the Relationship between Marketing Synergy and NPD Timeliness

Many new product failures are attributed to a lack of market information, a failure to listen to the voice of the customer and unstable product definition.

Specifically, insufficiency in resources and skills is a critical reason (Cooper and Kleinschmidt, 1994, 1995). Most new product development efforts suffer from resource crunch, namely either resource deficiencies or misallocated resources (Cooper and Edgett, 2003). Therefore, a firm should manage the allocation of adequate and proper resources to develop the new product as well as to adapt product and marketing strategies to customer needs and requirements.

A firm tries to strengthen marketing capability by means of the screening, use, and dissemination of market information. Research techniques are employed to capture customer needs, wants, and preferences and then they result in improving marketing capabilities. In conditions of high competitive intensity, increased information acquisition and processing through a firm's attempt to explore market information may present the opportunity adequately to allocate its resources to NPD activities. In conditions of low competitive intensity, investment in flexible resources and strategic options is not useful, because an organization is less likely to face circumstances that require the use of these resources. In contrast, in highly competitive environments, strategic flexibility is a valuable asset (Aaker and Mascarenhas, 1984). Competitive intensity requires a firm to take a flexible approach so that it can adapt and improve in order to put its best foot forward (Moorman and Miner, 1998). Moreover, high competitive intensity may compel senior management to devote the necessary resources to achieve the firm's new product objectives. This leads them to allocate adequate R&D budgets and the necessary personnel for new products. R&D and manufacturing consequently increase their capabilities regarding new products. A firm may also achieve proficiency in NPD activities by skills and resources synergy under conditions of high competitive intensity. That is, high competitive intensity may lead to proficiency in the adapting of existing marketing skills and resources to a current project development process and this, in turn, may allow an NPD team to gain product competitive advantage. Moreover, the presence of unpredictability in a market may increase sensitivity to development time and exhort the innovating companies to speed up NPD in order to benefit from expected time-to-market advantages (Bstieler and Gross, 2003). Accordingly marketing synergy would have stronger positive effects on NPD timeliness when competitive intensity is high.

H5b: The positive interconnection between marketing synergy and timeliness in NPD is stronger when competitive intensity is high than when it is low

3.3.4.3 The Moderating Role of Competitive Intensity on the Relationship between the HQ-subsidiary/agent Relationship and INPR Timeliness

Recently, research on the moderating effects of external environments (e.g., market opportunity, regulatory uncertainty and structural uncertainty) on the HQ-subsidiary/agent relationship and subsidiary performance has been carried out (Luo, 2003). In that study it was hypothesized that when structural uncertainty, measured by five structural attributes (e.g., the number of firms), is higher there is a stronger contribution from the HQ-subsidiary relationship (e.g., information flow) to subsidiary performance (e.g., sales and profit). However, unlike the moderating effects of market opportunity and regulatory uncertainty, structural uncertainty did not moderate the relationship between information inflow between HQ and subsidiary and subsidiary performance in an analysis of 196 MNC subsidiaries in China (Luo, 2003).

In a market without competition, a firm lacks external pressure to launch new products, whereas, in a competitive market, a firm is often forced to compete on product development time to introduce new products ahead of the competition (Li, 1999). For a firm, the essence of competition in an export market is to persuade local customers to adopt its new product over its competitors (Li *et al.,* 1999). When the concentration is high, incumbents expect new products to have an impact on their market share gradually as new entrants will inevitably invade their markets (Bowman and Gatignon, 1995). Competitors, therefore, are forced to defend their market position against rival activities swiftly. A competitor learning process enhances product success in export markets through its role in facilitating product development speed management (Li *et al.,* 1999). A firm with more competitor information will be able to turn its knowledge to a position of advantage in a number of ways. These include pitching its own strengths against the competitor's weaknesses, internalizing the competitor's strengths by first imitating and then improving on them, or nullifying the competitor's strengths by differentiating its own products.

If a subsidiary has a marketing role, the HQ-subsidiary/agent relationship will be an important process in NPD for export markets. Li (1999) gave two reasons. First, in an export market in which buyers' tastes and preferences are complicated by culture and other idiosyncratic factors, an effective HQ-subsidiary/agent relationship enables a firm to gain insights into local market characteristics that are conducive to new product acceptance. Thus, if the HQ-subsidiary/agent relationship is not effective, a company is unlikely to achieve a fit between its product offerings and the diverse needs of its target customers and thus an ineffective HQ-subsidiary/agent relationship may influence INPR timeliness. Second, the HQ-subsidiary/agent relationship not only enables a firm to understand buyers' current tastes and preferences, but also permits it to learn their potential needs and future market trends, thus making it a valuable source for new product ideas. Homburg *et al.* (1999) also reported that marketing makes a more important strategic contribution to the firm under high market uncertainty because there is a greater need to gather and process market-related information. Accordingly the HQ-subsidiary relationship would have stronger positive effects on INPR timeliness as well as NPD timeliness when competitive intensity is high.

H5c: The positive interconnection between HQ-subsidiary/agent relationship and timeliness in INPR is stronger when competitive intensity is high than when it is low

3.3.4.4 The Moderating Role of Competitive Intensity on the Relationships between Timeliness in NPD and INPR and New Product Performance

Many researchers have not found that competitive intensity directly influences timeliness in NPD and INPR as well as new product success (e.g., Chryssochoidis and Wong, 1998; Cooper and Kleinschmidt, 1994; Song and Parry, 1996; 1997b). With respect to the moderating effect of competitive intensity, previous studies have been focused on the relationship between market orientation and business performance. They have explained that market orientation is expected to be a more important determinant of performance under conditions of high competitive intensity (Kohli and Jaworski, 1990; Jaworski and Kohli, 1993). Recently, external environments (e.g., market competitiveness and technology uncertainty), as moderating factors on new product success (e.g., time efficient product development and profits), have received the least attention from researchers (Bstieler and Gross, 2003; Song and Montoya-Weiss, 2001). Song and Montoya-Weiss (2001) suggested that future research should explore how competitive uncertainty affects the NPD process.

Cooper and Kleinschmidt (1994) explained that market competitiveness may indeed be a two-edged sword in that competitive markets may cause the innovator to move more quickly due to competitive pressure as well as discourage management from moving in swiftly due to a greater hostility towards new product introductions. Increased competitive intensity in the market is reflected through tactics such as aggressive pricing, high levels of advertising, product introductions, and the adding of services. Competitive intensity allows a firm to understand what product functions and attributes are more preferable and are, therefore, more persuasive in the marketplace (Day, 1994).

The degree of threat is perceived to rise with the number of company markets whose sales and long run performance are affected by competitive attack (Chryssochoidis and Wong, 1998). When a new product poses a threat to industry profitability, competitors are more likely to react faster. Therefore, Song *et al.* (1997a) explained that the external environment typically impacts the firm at the strategic decision-making level and in the upper echelons of an organization. The speed of a competitor's reaction to a company's introduction of a new product is associated with the original company's ability in new product development time (Bowman and Gatignon, 1995). In an intensively competitive international market environment, a firm faces greater time pressure on the introduction of new products into target-country markets to satisfy customer needs and provide better customer service. That is, the firm is more committed to achieve on-time INPR to compete effectively in international markets. Accordingly, competitive intensity may moderate the relationship between timeliness in NPD and INPR and new product performance.

H5d: The positive interconnection between timeliness in NPD and performance is stronger when competitive intensity is high than when it is low.

H5e: The positive interconnection between timeliness in INPR and performance is stronger when competitive intensity is high than when it is low.

3.3.4.5 The Moderating Role of Technology Change on the Relationships between Cross-functional Linkages and NPD Timeliness

A second environmental factor that may be argued to moderate the interconnections between skills and resources synergy, cross-functional linkages, HQ-subsidiary/agent relationship, timeliness in NPD and INPR, and new product performance is technology change. First of all, a study on the moderating effect of technical uncertainty on the relationship between cross-functional integration and NPD performance (e.g., financial performance, NPD cycle time and product launch proficiency) has been carried out (Song and Montoya-Weiss, 2001; Souder *et al.,* 1998). In empirical tests, Song and Montoya-Weiss, (2001) found that the positive relationship between cross-functional integration and project outcomes (e.g., financial performance) is stronger when perceived technological uncertainty is high than when it is low in Japanese companies, whereas technical uncertainty was not found to moderate the effects of integration between marketing and R&D on NPD cycle time and product launch proficiency in U.S. and U.K. firms (Souder *et al.,* 1998). Tseng (2006) found that technological innovation moderates the relationship between the design-manufacturing late stage cooperation and time performance effectiveness (i.e., NPD time performance). Moreover, technological uncertainty moderates the relationship between cross-functional project team and time efficiency (Bstieler, 2005). Therefore, it is necessary to examine the effect of technological change on NPD timeliness because cross-functional linkage is an antecedent of NPD timeliness as well as new product success.

The organization's perceived environmental uncertainty (e.g., its ability to anticipate changes in technology and emergence of new competitive forces in the market) influences the need for R&D-marketing integration in the NPD process (Gupta and Wilemon, 1986). Variety in the make-up of a team can provide a wider understanding of the product development problem. That is, cooperation, integration and communication across functions increase the amount and variety of information available to team members (Song and Montoya-Weiss, 2001). When there is a rapid rate of change in the technical environment, people in R&D provide information on emerging technologies and ideas about applying technology in new ways that may provide greater benefit to customers (Homburg *et al.,* 1999). Therefore, cooperation, integration and communication across functions increase their ability to solve complex problems as well as potential solutions.

Although an external force such as technical uncertainty is not perceived significantly to affect cross-functional cooperation (Song *et al.,* 1997a), such an external environment may impose additional constraints in communication, cooperation and integration across functions. That is, high technological change leads to learning problems in a company's workplace and it may also influence communication and cooperation across functions. The information, knowledge, and understanding of the technologies needed to manage a successful project are poor under conditions of high technical uncertainty (Song *et al.,* 1997a). A high rate of technological change also requires increased investment in R&D and production capability (Slater and Narver, 1994). Rapid technological changes bring about marked product or process design changes (Yelkur and Herbig, 1996). An organization requires time because it has to learn new technology under conditions of rapid technological change. Moreover perceptions of technological uncertainty lead to more critical evaluations of cross-functional communication exchange which in turn lead to inefficiencies in the conduct of certain development activities (Song and Montoya-Weiss, 2001). High perceived technological uncertainty tends to increase the difficulty of reaching consensus among functions (Song and Montoya-Weiss, 2001). High perceived technological uncertainty also increases the propensity for conflict and compromise in marketing, technical, and competitive intelligence activities (Song and Montoya-Weiss, 2001). Therefore, NPD managers should strive carefully to match high degrees of integration across functions under conditions of high technical uncertainty because a high rate of technological change may negatively influence timeliness in NPD. Therefore cross-functional linkages would have stronger positive effects on NPD timeliness when technological change is low.

H6a: The positive interconnection between cross-functional linkages and timeliness in NPD is stronger when technological change is low than when it is high.

3.3.4.6 The Moderating Role of Technology Change on the Relationship between Technology Synergy and NPD Timeliness

A firm's intentions to swiftly adopt new technology in the current new product development process by using existing skills and resources will be influenced by the level of technology turbulence and, in turn, such skills and resources synergy may affect proficiency in NPD activities. Technology synergy refers to a project's fit with available R&D, engineering and production skills and resources (Song and Montoya-Weiss, 2001). Previous studies report that a project's outcome is enhanced by a good fit or synergy between a firm's technical resources and skills and the new product concept

(Cooper, 1994; Song and Parry, 1997b). Therefore, technology synergy is an antecedent of NPD timeliness as well as new product success.

However, high technology change may present difficulties in adopting existing technology resources and skills in a project development process and subsequently not allow an organization to gain product competitive advantage. A lack of synergy between project needs and available resources and skills in relation to technology implies a gap between the amount of information required to perform particular NPD activities and the amount of information already possessed by the firm (Song and Montoya-Weiss, 2001). Perceived technological uncertainty implies that an NPD project manager lacks information about the application of technology to the current development project or regarding the predictability of impending changes in that technology (Song and Montoya-Weiss, 2001). In a period of high technology change, an organization should rearrange, reinforce, and expand its existing skills and resources base in relation to technology in order to conduct the necessary development activities. High technology change may be less beneficial because the existing technical skills and resources may not be the right ones for the project. Developing and introducing new products can require large investments in R&D and plant and equipment (Woo, 1987). Consequently technology synergy would have stronger positive effects on NPD timeliness when technological change is low.

H6b: The positive interconnection between technology synergy and timeliness in NPD is stronger when technological change is low than when it is high.

3.3.4.7 The Moderating Role of Technology Change on the Relationship between the HQ-subsidiary/agent Relationship and INPR Timeliness

Recently, Luo (2003) found that market uncertainty moderates the effect of the HQ-subsidiary/agent relationship on subsidiary performance. Although the study by Luo (2003) does not address timeliness in NPD and INPR, there exists the possibility of a moderating effect of external environments on the interconnection between the HQ-subsidiary/agent relationship and timeliness in NPD and INPR. The HQ-subsidiary/agent relationship influences the timeliness dimension as well as subsidiary performance (Chryssochoidis and Wong, 1998; Luo, 2003). Thus the study of the moderating effect of external environment (e.g., technology change) is essential to the study of timeliness in NPD and INPR.

HQ management assesses the subsidiary's importance for technical development in terms of product and production development (Andersson *et al.,* 2002). The firm's leaders put more emphasis on internationalization under high technological turbulence (Kuivalainen *et al.,* 2004). Traditionally, MNCs often transfer technology to foreign subsidiaries because distinctiveness in this field frequently constitutes the firm-specific advantage that allows the MNCs to complete successfully against local firms. However, the firm-specific advantages of MNCs, which make it possible to overcome the disadvantages associated with carrying out business activities in foreign markets, can be located in a subsidiary's local market, not only the HQ country. Among a variety of a subsidiary's strategic roles (e.g., marketing, R&D and production) (Tavares, 2002), access to innovation or technological change from a subsidiary's external network of specific relationships or local networks (e.g., customer and supplier) has been put forward as one of the basic competitive advantages of the multinational firm (Andersson *et al.,* 2002).

Market pioneers typically face the greatest technological uncertainties (Robinson and Min, 2002). Technological change is especially likely to arise during the market's early years because a pioneer's first-generation technology may not work very well (Robinson and Min, 2002). High technology change (e.g., technology innovation) requires a strategy that adapts to changes in markets and customers because gathering environmental information is associated with strategic decision making in MNCs (Muralidharn, 1999; 2003). If external conditions are favorable or contain more opportunities, MNCs are likely to harvest greater returns from resource commitments. The survival and growth of foreign subsidiaries depend on the MNC HQs making appropriate decisions in response to changes in the foreign subsidiary's environment (Muralidharn, 1999). MNC HQs make strategic decisions based on information gleaned from scanning the foreign subsidiary's environments (Muralidharn, 2003). External environments also affect a firm's resource allocation and deployment (Luo, 2003).

The HQ-subsidiary relationship is shaped by host country environmental conditions (Rosenzweig and Singh, 1991). A lack of information exchange between HQ and subsidiary/agent magnifies operational uncertainty (e.g., INPR timeliness) because the ineffective exchange and sharing of knowledge may increase both the expense of searching for information and the costs of coordination within the firm. However, if the HQ-subsidiary/agent relationship is effectively maintained through information inflow, a high technology change may enable a subsidiary to gain more from HQ support. During the product definition phase, input data and information about emerging technologies should be frozen early in the development process (Cooper, 1994). Specifically, HQ should depend on a subsidiary in relation to INPR timeliness due to the information symmetry of local market environments. MNC HQs that scan more frequently are better equipped to perceive changes in the environment than MNC HQs that scan infrequently because active scanners are more likely to identify environmental changes earlier than firms that scan less frequently (Muralidharn, 2003). From the information process viewpoint, intra-network information sharing is a base dimension of the HQ-subsidiary/agent relationship (Luo, 2003). Also, the flow and sharing of information between HQ and its subsidiary/agent has strong implications for the efficiency of that relationship (Birkinshaw and Morrison, 1995). Therefore the HQ-subsidiary/agent relationship would have stronger positive effects on INPR timeliness when technological change is high.

H6c: The positive interconnection between HQ-subsidiary/agent relationship and timeliness in INPR is stronger when technological change is high than when it is low

3.3.4.8 The Moderating Role of Technology Change on the Relationships between Timeliness in NPD and INPR and New Product Performance

Delays in INPR result in lower than expected product sales and profitability (e.g., Chryssochoidis and Wong, 1998). Major reasons for accelerating the NPD process are domestic and global competitive pressures and rapid technological changes (Gupta and Wilemon, 1990). An innovative organization tends to launch its new products into target markets quickly so as to increase market share before its competitors enter those markets. Rapidly changing technology could drive a major product into technological obsolescence before it sees the light of day (Bstieler, 2005).

Technological uncertainty has been cited as a major reason for delay due to waiting time for newer technology (Gupta and Wilemon, 1990). That is, there may be a desire to incorporate the latest technological improvement into the product when newer technology becomes available. However, except for a few studies (e.g., Bstieler and Gross, 2003), empirical research has not found that technological uncertainty or technological obsolescence directly effect new product success or timeliness in NPD and INPR (e.g., Bstieler, 2005; Chryssochoidis and Wong, 1998; Cooper and Kleinschmidt, 1994; Song and Parry, 1996; 1997b). Bstieler and Gross (2003) found that technological unpredictability negatively influences the time efficiency of the projects as well as new product success (i.e., profitability). They also recommended that this environmental variable should, indeed, be considered when discussing drivers of new product performance.

External environments may necessitate different efforts to confidently achieve better performance (Bstieler, 2005). Companies need to be particularly concerned with quality in order to rush products to market. When perceived technological uncertainty is high, identifying customer needs and translating them into product technical specifications may be more complex and challenging, and these activities may require altogether different marketing and technical capabilities than they require when perceived technological uncertainty is low (Song and Montoya-Weiss, 2001). To rush the product to market, a number of activities, often critical, are often omitted altogether, and other key activities are superficially or weakly undertaken (Gupta and Wilemon, 1990). This leads to poor design, product malfunctioning, product liability suits, expensive product recalls, and potential higher production costs. Based on the reasons mentioned above, this study puts forward the following hypotheses:

H6d: The positive interconnection between timeliness in NPD and performance is stronger when technological change is low than when it is high.

H6e: The positive interconnection between timeliness in INPR and performance is stronger when technological change is low than when it is high.

3.3.5 The Influence of Standardization on the Relationship between NPD Timeliness and INPR Timeliness

Most products contain both features that are standardised across markets and those that are responsive to individual local markets (Cateora and Ghauri, 2000; Subramaniam and Venkatraman, 2001). If all products and components are standardized, the manufacturing division can retain the advantages of large-scale production (Kotabe, 1998). That is, a standardization approach is desirable because sales can be increased by developing a consistent image of the product across national markets; and costs can be lowered by pooling production activities across countries, moving production to low-cost locations without redefining the production process, and capturing the economies associated with formulating and implementing a single marketing plan (Szymanski *et al.* 1993).

However, high adaptation is associated with high cost and internal inefficiency despite the potential benefits to be gained from being adaptive (Oktemgil and Greenley, 1997). Customization of product technology results in delays in the completion of new product development projects and multicountry rollout (Chryssochoidis and Wong, 2000). Moreover, bolstering a subsidiary's strategic adaptation to the host country environment needs additional time because this may in turn help reap benefits from emerging opportunities (Luo, 2003). Hence,

H7: The positive interconnection between timeliness in NPD and timeliness in INPR is stronger when standardization is high than when it is low

3.4 Summary

This chapter presents the conceptual framework and hypotheses on the basis of the literature. This study primarily determines the direct effects of key determinants and indirect effects of proficiency in NPD activities, external environments and standardization on INPR process. The proposed hypotheses are 24 in number and their results would contribute to the literature.

Firstly, hypotheses H1a – H1f investigate the direct impact of key determinants on timeliness in NPD and INPR and performance. This study hypothesized that cross-functional linkages (H1a), marketing synergy (H1b) and technology synergy (H1c) directly influence NPD timeliness. The direct effects of NPD timeliness (H1d) and the HQ-subsidiary/agent relationship (H1e) on INPR timeliness are also hypothesized. In addition, a hypothesis that INPR timeliness is positively associated with new product performance (H1f) is included.

Secondly, to study the mediating effects of proficiency in NPD activities and INPR timeliness in the INPR process, this study has 7 hypotheses. It has been proposed that marketing proficiency mediates the relationships between key determinants and timeliness in NPD and INPR (H2a – H2c). This study also hypothesized that technical proficiency mediates the relationships between key determinants and timeliness in NPD and INPR (H3a – H3c). With respect to the mediating effect of INPR timeliness on the relationship between NPD timeliness and new product performance, the current study proposed H4.

Finally, this study developed 11 hypotheses to test the moderating effects of external environments and standardization on the interconnections between NPD timeliness, INPR timeliness, antecedents and consequences. The moderating effect of competitive intensity on the relationships not only between key determinants and timeliness in NPD and INPR but also between timeliness in NPD and INPR and new product performance has been hypothesized (H5a – H5e). In addition, there are included several hypotheses that technology change moderates the relationships between NPD timeliness, INPR timeliness, antecedents and consequences (H6a – H6e). Regarding the moderating effect of standardization on the NPD timeliness and INPR timeliness, the current study proposed H7. These predictions are tested in the cross-sectional survey of firms described in chapter 5 of this thesis.

Table 3.1 Exposition of Hypotheses

	Statement of Hypotheses
H1a	The level of cross-functional linkages is associated positively with the level of timeliness in NPD
H1b	The level of marketing synergy is associated positively with the level of timeliness in NPD
H1c	The level of technology synergy is associated positively with the level of timeliness in NPD
H1d	The level of NPD timeliness is associated positively with the level of INPR timeliness
H1e	The level of HQ-subsidiary/agent relationship is associated positively with the level of INPR timeliness
H1f	The level of INPR timeliness is associated positively with new product performance
H2a	The level of proficiency in marketing activities mediates the association between cross-functional linkages and NPD timeliness
H2b	The level of proficiency in marketing activities mediates the association between marketing synergy and NPD timeliness
H2c	The level of proficiency in marketing activities mediates the association between HQ-subsidiary/agent relationship and INPR timeliness
H3a	The level of proficiency in technical activities mediates the association between cross-functional linkages and NPD timeliness
H3b	The level of proficiency in technical activities mediates the association between technical synergy and NPD timeliness
H3c	The level of proficiency in technical activities mediates the association between HQ-subsidiary/agent relationship and INPR timeliness
H4	The level of timeliness in INPR mediates the association between NPD timeliness and performance
H5a	The positive interconnection between cross-functional linkages and timeliness in NPD is stronger when competitive intensity is high than when it is low
H5b	The positive interconnection between marketing synergy and timeliness in NPD is stronger when competitive intensity is high than when it is low
H5c	The positive interconnection between HQ-subsidiary/agent relationship and timeliness in INPR is stronger when competitive intensity is high than when it is low
H5d	The positive interconnection between timeliness in NPD and performance is stronger when competitive intensity is high than when it is low
H5e	The positive interconnection between timeliness in INPR and performance is stronger when competitive intensity is high than when it is low
H6a	The positive interconnection between cross-functional linkages and timeliness in NPD is stronger when technological change is low than when it is high
H6b	The positive interconnection between technology synergy and timeliness in NPD is stronger when technological change is low than when it is high
H6c	The positive interconnection between HQ-subsidiary/agent relationship and timeliness in INPR is stronger when technological change is high than when it is low
H6d	The positive interconnection between timeliness in NPD and performance is stronger when technological change is low than when it is high
H6e	The positive interconnection between timeliness in INPR and performance is stronger when technological change is low than when it is high
H7	The positive interconnection between timeliness in NPD and timeliness in INPR is stronger when standardization is high than when it is low

Chapter Four: Research Methodology

4.1 Introduction

This chapter discusses the research methodology applied in this study. The first section provides research design for this study. Research design is the plan to be followed to answer the research objectives or hypotheses (Churchill and Iacobucci, 2002; McDaniel and Gates, 1993). Therefore, the research design for this study is driven by the research objectives (i.e., the testing of the indirect effects of external environments, standardization and proficiency in NPD activities on the relationships between antecedents, outcomes and timeliness in NPD and INPR) as outlined in an earlier chapter. The notion of research design, the basic types and their interrelations will be introduced. Then, the appropriate type of design for this study will be discussed. The second section specifies a sample frame, sampling methods and the determination of sample size. Data will be collected from the targeted Korean manufacturing companies. The third section describes the procedure for developing a questionnaire. This part specifies the required information and question items for this study. The main measurement scale will be discussed. This section also includes the type of questionnaire applied in this study, the procedure of its modification and an appropriate development and design of the questionnaire. Based on the pretest and pilot test, the final questionnaire will be completed. Moreover, this section introduces the procedures for translating an English-version instrument into a Korean-version. Finally, the main survey, response rate and non-response bias are outlined.

4.2 Research Design

For this study, the research design will be applied for explanatory as well as exploratory research because a given marketing research project involves more than one type of research design and thus serves several purposes (Malhotra and Birks, 2000). Many marketing research textbooks (e.g., Churchill and Iacobucci, 2002; Saunders *et al.,* 2003) report that research design is classified into 3 types of research (i.e., exploratory[12], descriptive[13] and explanatory[14] (causal) research).

Following McDaniel and Gates (1993), exploratory research will be used at an early stage in this study. Exploratory research rarely involves large samples and probability sampling plans (Malhotra and Birks, 2000). Rather, it tends to rely on small-scale surveys or case analyses (Tull and Hawkins, 1993; Wrenn *et al.,* 2002). As a general rule, a questionnaire should not be used in a field survey without adequate pilot-testing (Malhotra and Birks, 2000) because the purpose of the pilot-test is to refine the questionnaire so that respondents will have no problems in answering the questions and there will be none in recording the data (Saunders *et al.,* 2003). A small-scale survey (e.g., pilot-testing) will refine my questionnaire in order effectively to conduct an actual field survey of my study. Based on Malhotra and Birks (2000), the pilot-test sample size for this study consist of 20 – 40 respondents for the initial testing of the questionnaire.

When a pilot study is conducted as exploratory research, it can revise and supplement the questionnaire for testing hypotheses because exploratory research has also the great advantage that it is flexible and adaptable to change. Above all, a pretest will be done by personal interview which enables one to observe respondents' reactions and attitudes. After making the necessary changes based on recommendations from the

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[12] Exploratory studies are a valuable means of finding out 'what is happening; to seek new insights; to ask questions and to assess phenomena in a new light' as "general picture" research (Churchill and Iacobucci, 2002; Saunders *et al.,* 2003).

[13] Descriptive research is an extension of, or a forerunner to, a piece of exploratory research (Saunders *et al.,* 2003).

[14] Explanatory research studies a situation or a problem in order to explain the relationships between variables and it establishes causal relationships between them (Saunders *et al.,* 2003).

interviewees, the research instrument is tested with a different sample of respondents (Malhotra and Birks, 2000). The pilot-test will be conducted by means of a recommended administration method as a result of the pretest because it will be also used in the actual survey. Malhotra and Birks (2000) reported that a pilot-test should involve administering the questionnaire in an environment and context similar to that of the actual survey. The reliability of the measurement scale is evaluated through the pilot-test (Saunders *et al.,* 2003).

Based on the improvement of questionnaire through the pilot study, an explanatory study will be applied. Explanatory research comes under the heading of conclusive design. Conclusive research is typically more formal and structured than exploratory research (Malhotra and Birks, 2000). It is based on large, representative samples, and the data obtained are subjected to quantitative analysis (Malhotra and Birks, 2000). For the field survey, the questionnaire will be used to gather information from a large sample of respondents in order to test the study hypotheses.

4.3 Sample Design for Data Collection and Sample Size

4.3.1 Sample Frame

A sample is a set of elements selected in some way from a population (Sapsford and Jupp, 1996). The main aim of sampling is to construct a sub-set of the population which is fully representative of the main areas of interest. It is then possible to infer statistically the likelihood that a pattern observed in the sample will also be replicated in the population (Smith *et al.*, 1991). Accordingly, the first requirement in sampling is the need to define clearly and accurately the population because sample design error may be biased for the sampling frame error, population specification error and selection error (McDaniel and Gates, 1993). The sampling process consists of six sequential steps[15] (Tull and Hawkins, 1993). The population is defined in terms of (a) element[16], (b) units[17], (c) extent, and (d) time (Tull and Hawkins, 1993; Malhotra and Birks, 2000). A target population is the collection of elements that possess the information sought by the researcher and about which inferences are to be made (Malhotra and Birks, 2000). New products that have been exported to targeted foreign markets will be the target population for my study. This study defines key informants as ones who are largely senior-ranking executives or managers in the firm's strategic product planning department or product exporting and management function and who are well informed about the introduction of products in their respective foreign markets as well as the implementation of new product development. Therefore, the population for the current empirical test comprises those company personnel (element) who are well informed about NPD projects or products of Korean manufacturing companies (sampling unit) that have exported as well as developed their new products (extent) during the past years (time).

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[15] (1) define the population, (2) specify sampling frame, (3) specify sampling unit, (4) specify sampling method, (5) determine sample size, and (6) execute the sampling process.

[16] An element is the object about which or from which the information is desired. In survey research, the element is usually the respondent (Malhotra and Birks, 2000).

[17] A sampling unit is a unit containing the element that is available for selection at some stage of the sampling process (Malhotra and Birks, 2000).

A sampling frame is a means of representing the elements of the population (Tull and Hawkins, 1993; Malhotra and Birks, 2000). The sampling frame will also be used to identify the elements in each sampling unit (Sapsford and Jupp, 1996). If a probability sample is to be taken, a sampling frame is required. The sampling frame for any probability sample is a complete list of all the cases in the population from which a sample will be drawn (Saunders *et al.,* 2003). The sampling frame for this study is presented in Table 4.1. This was compiled from the data-bases of the Korea Trade-Investment Promotion Agency (KOTRA) and the Korea Chamber of Commerce and Industry (KCCI), which cover companies operating within South Korea. Examples of a sampling frame include an association directory listing the firms in an industry and the telephone book (Malhotra and Birks, 2000). KOTRA and KCCI, who provide information about Korean companies, are non-profit governmental organizations engaged in the promotion of improvement and development in Korea's commercial and industrial sectors. According to the data base of companies in KCCI, Korean manufacturing companies comprise 85,139. Among them, exporting companies comprise 8,403. Accordingly, the sampling frame consists of 8,403 manufacturing companies exporting their products to foreign markets. Table 4.1 illustrates the numerical breakdown of the total number of Korean manufacturing firms and further divides them into exporting and non-exporting companies.

Table 4.1 Sampling Frame of the Research

Segment	Number of Companies	Percentage (%)
Total	85,139	100 %
Exporting companies	8,403	10 %
Non-exporting companies	76,736	90 %

4.3.2 Sample Size Determination

The sampling unit (i.e., NPD projects or products of Korean exporting companies) selected will be dependent upon the sampling frame (i.e., Korean exporting companies). According to Tull and Hawkins (1993), the sampling unit may be the element itself or a unit in which the element is contained. It might be easier to select companies as the sampling unit and investigate NPD projects or products developed and exported by Korean companies because the addresses of Korean companies, not NPD projects or products, will be an efficient way to select the sampling unit if the researcher is employing a mail questionnaire.

The sampling method is the way the sample units are to be selected (Tull and Hawkins, 1993). The choice between a probability and non-probability sample is based on the cost versus value principle. Generally speaking, the need for low allowable errors, high population heterogeneity, small non-sampling errors, and high expected costs of errors favors the use of probability sampling (Tull and Hawkins, 1993). Therefore the probability sampling as the sampling method will be used. Sample size refers to the number of elements to be included in the study (Malhotra and Birks, 2000). In any sample size determination problem, serious consideration must be given to the number and anticipated size of various subgroups of the total sample about which there will be a need to make statistical inferences (McDaniel and Gates, 1993). Depending upon the number of subgroup analyses to be run, national samples of institutions (companies, for example) range in size from 200 to 1,000 or more (Tull and Hawkins, 1993). It has been suggested that the sample should be large enough to ensure that there will be 100 or more respondents in each major subgroup and a minimum of 20 to 50 respondents in each of the less important subgroups (McDaniel and Gates, 1993; Tull and Hawkins, 1993). In this research, data should be divided into 2 subgroups depending on the degree of external environments. That is, the results will be analyzed by 2 subgroups of the degree of competition (i.e., high and low competition) and technology change (high and low technology change). If a sample size of 100 is needed per subgroup, the overall sample size will be therefore $2 \times 100 = 200$. In addition, non-response has to be considered in sample size determination. Non-response refers to the percentage of respondents who refuse to participate in a survey (Tull and Hawkins, 1993). In this study, a response rate of 20% is assumed because the response rate to recent business surveys has been shown to be as low as 10-20 per cent for postal surveys (Saunders *et al.*, 2003). Incidence rate is a term used to refer to the percentage of respondents out of the general population that fits the qualification of respondents to be interviewed in a particular study (McDaniel and Gates, 1993). Due to the selection of a pre-screened sampling frame, a certain sample within it will achieve a lower incidence rate for this study.

Thus, a simple approach is to use the formula:

$$\begin{aligned}\text{Initial sample size} &= \text{required response} \div \text{response rate}\\ &= 200 \div .2\\ &= 1{,}000\end{aligned}$$

According to Tull and Hawkins (1993), a formula for determining the required initial sample size to achieve an obtained sample size with a specified level of confidence is as follows:

Equation 4.1 A Formula for Determining the Required Initial Sample Size

$$IS = \frac{2X + Z(ZQ) + \sqrt{(ZQ)^2 + 4XQ}}{2P}$$

IS = initial sample;

X = required sample minus .5 = 200 - .5 = 199.5;

P = the incidence (proportion) for the characteristic times the estimated response rate = 1 × .2 = .2;

Q = 1 - P =1 - .2 = .8;

C = the desired probability or confidence that the initial sample will produce the desired sample, say .90 for this case; and

Z = the value that exceeds 100(C) % of the standard normal distribution = 1.282.

Thus, where ZQ = (1.282) (.8) = 1.0256

$$IS = \frac{2(199.5) + 1.282(1.0256)\ + \sqrt{(1.0256)^2 + 4(199.5)(.8)}}{2(.2)}$$

$= 1{,}064$

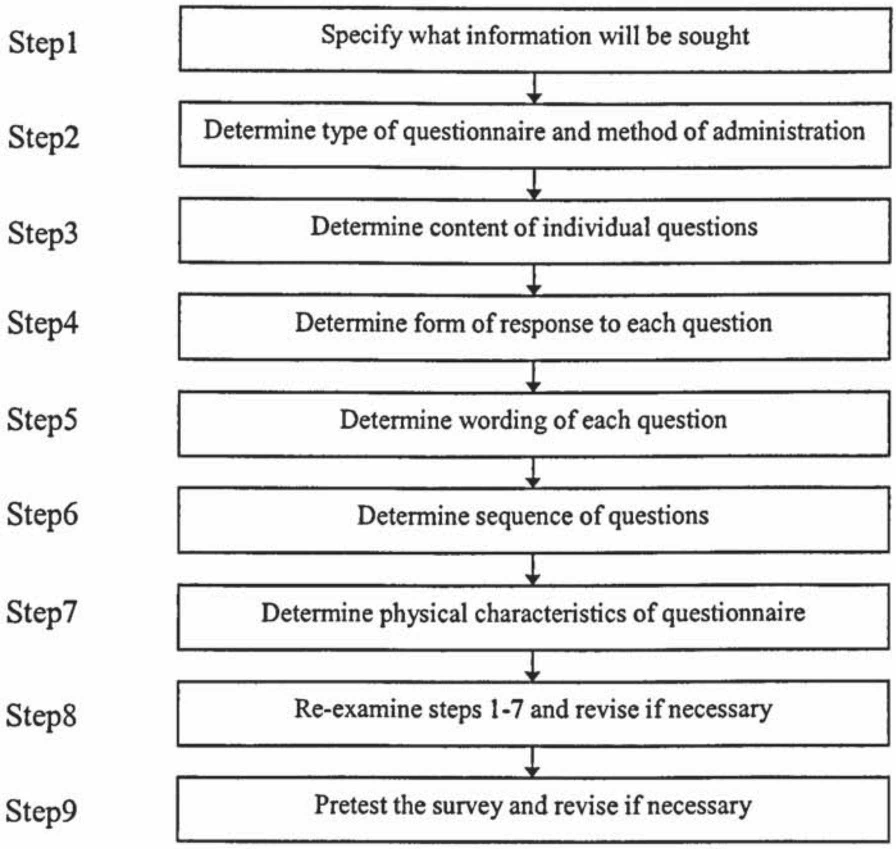
Therefore, sampling plans are as follows;

- Population: NPD projects or products in the foreign markets of Korean manufacturing companies that have exported as well as developed new products
- Sampling frame: 8,403 manufacturing companies which have exported products to foreign markets
- Sampling unit: NPD projects or products
- Sampling method: the use of probability sampling
- Sample size: 1,064

4.4 Questionnaire Design

4.4.1 Procedure for developing the Questionnaire

Figure 4.1 Stages in Questionnaire Development



Source: Churchill and Iacobucci (2002)

A questionnaire will ordinarily go through a series of drafts before it is in an acceptable final form. The design of the questionnaire for this study will be carried out in two phases. In the first phase of the design process, the content of individual questions will be determined. Following the literature review, the determination of the content of the questionnaire will be informed by previous studies. Via the pretest, the questionnaire will be modified to make it easier for respondents to comprehend and reply to it. In the second phase of the design process, the developed questionnaire will be then piloted with several companies, so that it can be further modified to minimize errors and biases prior to sending it out to the intended companies to collect primary data. A questionnaire should minimize response error. A major source of such error is attributed to questionnaire design (Malhotra and Birks, 2000). Measurement error may be defined as the variation between the information sought and that generated by the measurement process employed by the researcher (Malhotra and Birks, 2000). Measurement instrument bias is the result of problems with a questionnaire as well as the measurement instrument (McDaniel and Gates, 1993). Errors of this type are avoided by careful attention to detail in the questionnaire design phase of the research and by the use of questionnaire pre-tests at the start of field interviewing. Through pilot-testing, a questionnaire can be improved in the areas of question content, wording, sequence, form and layout, question difficulty, and instructions. The following parts describe the development of the questionnaire for this study based on the procedures outlined by Churchill and Iacobucci (2002) as presented in Figure 4.1.

4.4.2 Information Sought

The hypotheses, which are developed from the literature as described in chapter 3, determine what information the current research has to gather, because they specify what relationships will be investigated (Churchill and Iacobucci, 2002). The twelve constructs be used as tests for the proposed hypotheses. Table 4.2 provides a list of the issues to be included in the measurement.

Table 4.2 Information Sought

Construct	Information Requirements
Cross-functional linkages	• Interaction, cooperation and integration between marketing, R&D and manufacturing for developing the selected new product.
Marketing synergy	• The project's fit with firm's existing marketing skills and resources in terms of the available market research, sales force, distribution, advertising and promotion.
Technology synergy	• The project's fit with firm's existing technical skills and resources in terms of the available R&D, engineering and production skills and resources.
Marketing proficiency	• How well marketing-related activities were conducted during the development of this particular new product.
Technical proficiency	• How well technical-related activities were conducted during the development of this particular new product.
The HQ-subsidiary/agent relationship	• The complementary coordinated actions taken by the headquarters and subsidiary/agent.
NPD timeliness	• The time required to complete the development of the new product relative to its anticipate time frame.
INPR timeliness	• The actual availability of the new product within- or faster than- the planned (scheduled/anticipated) time frame for product availability in the firm's target country-markets.
Competitive intensity	• The degree of competitive strength in a product market.
Technology change	• The speed of technology development in a product market.
Standardization	• The degree of using a common programme and process on a worldwide basis.
New product performance	• The degree of new product success in terms of profits and non-profits.

4.4.3 Measurement

4.4.3.1 Introduction

Measurement[18] means assigning numbers or other symbols to characteristics of objects according to certain pre-specified rules (Tull and Hawkins, 1993; Malhotra and Birks, 2000). The purpose of measurement in theory testing and development research is to provide an empirical estimate of each theoretical construct of interest (Gerbing and Anderson, 1988). When measuring constructs, one has to consider the possibility of measurement error (i.e., systematic error and random error) because the fundamental objective in measurement is to produce measured scores[19] which approximate true scores as closely as possible (Churchill, 1979). Typical measurement errors originate from several factors[20]. Accordingly, the chief concern is how to deal with the basic issues of validity and reliability. In order to address reliability as well as validity in an empirical test, Churchill (1979) pointed out the limitations of single-item measures and recommended multi-item measures.

This study intends to use multiple-items scales for each variable (construct) described in previous chapters instead of single-item measures as well as to adopt and adapt the items of each variable (construct) from the relevant literature. Adopting or adapting questions may be necessary if researchers wish to replicate, or to compare their findings with, other studies (Saunders *et al.,* 2003). This allows reliability to be assessed and it is also more efficient than developing their own questions.

In marketing research, numbers are usually assigned because they permit statistical analysis of the resulting data (Malhotra and Birks, 2000). Measurement can

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[18] Measurement has been defined as the assignment of numbers to objects to represent quantities (Churchill and Iacobucci, 2002).

[19] Functionally, the relationship can be expressed as: Measured value = true score + systematic error + random error (Churchill, 1979; Van Bruggen *et al.*, 2002).

[20] (1) true differences in other relatively stable characteristics which affect the score (e.g., a person's willingness to express his or her true feelings), (2) differences due to transient personal factors (e.g., a person's mood or state of fatigue), (3) differences due to situational factors (e.g., whether the interview is conducted in the home or at a central facility), (4) differences due to variations in administration (e.g., interviewers who probe differently), (5) differences due to sampling of items (e.g., the specific items used on the questionnaire), (6) differences due to a lack of clarity in the measuring instrument (e.g., vague or ambiguous questions which are interpreted differently by those responding), and (7) differences due to mechanical factors (a check mark in the wrong box or a response which is coded incorrectly).

occur on a nominal, ordinal, interval, or ration scale[21]. All questions will use interval scales. Items will be scored on the Likert type scale (anchored by 0, "strongly disagree" and 10, "strongly agree") and the respondents will be executives, project managers or SBU managers, depending on the extent of their knowledge of the situations. Each construct of this study will be discussed in more detail in subsequent sections of this chapter.

[21] A nominal scale simply identifies the individually assigned numbers. A second property of a scale of numbers is that of order. The numbers 1, 2, 3, and 4 are ordered, and the larger the number, the greater the property. A third is that the intervals between the numbers are meaningful in the sense that the numbers tell us how far apart the objects are with respect to the attribute. This means that the differences can be compared. The difference between "1 and "2" is equal to the difference between "2" and "3." The ratio scale differs from an interval scale in that it possesses a natural or absolute zero, one about whose location is universal agreement.

4.4.3.2 Measures of Cross-functional Linkages

As mentioned in chapter 2, cross-functional linkages in the literature have been used in various constructs by researchers. For example, as measurements of cross-functional linkages, cross-functional project teams, co-location, interaction, collaboration, cooperation, and integration have been used (e.g., Chryssochoidis and Wong (1998); Cooper and Kleinschmidt, 1994; Kahn and McDonough, 1997; Leenders and Wierenga, 2002; Ruekert and Walker, 1987; Sherman *et al.*, 2000; Song *et al.*, 1997a; Song and Parry 1997b; Song and Montoya-Weiss, 2001; Souder and Song, 1997). Cooper and Kleinschmidt (1994) measured the construct of cross-functional linkages with the single-item measure of usage of the cross-functional project team, namely to what extent cross-functional project team (marketing, R&D, manufacturing, etc.) was the project undertaken by a multidisciplinary team (e.g., comprised of marketing, R&D, production). As mentioned earlier, this single-item measure has a weakness compared to multiple-item measures in relation to reliability and validity. However, this single item is useful because an organization with cross-functional teams achieved 50% acceleration of its development cycle and a success rate of 90% with its new products (Donnellon, 1993).

Co-location[22] has been measured by asking respondents to identify whether their department was located in the same building as the other department via a "yes" or "no" format (Kahn and McDonough, 1997). However, co-location was not significantly related to any of the performance dimensions (e.g., product development, product management, and satisfaction) (Kahn and McDonough, 1997). Moreover, this construct may not be an appropriate measurement for this study because efforts to co-locate departments from various countries might be too costly or time-consuming in the case of companies engaged in global NPD.

With respect to the construct of cross-functional interaction, Ruekert and Walker (1987) measured the amount of communication (i.e., the frequency of contact between marketing and another functional area through the various modes of

[22] Co-location is not a moderating variable on the relationship between interdepartmental interaction and performance factors (Kahn and McDonough, 1997).

communication available) and communication difficulty (i.e., the effort required and problems involved in either getting in contact with or in getting ideas across to the other party). The amount of communication was operationalised using 4 items[23]. Communication difficulty was measured with 2 items[24]. However, items used by Ruekert and Walker (1987) did not reflect one important factor (i.e., written communication) in relation to information inflow across functions. Kahn and McDonough (1997) measured the construct of cross-functional interaction by including not only verbal but also written communication. That is, interaction would be measured by asking respondents to evaluate the degree to which their department interacted with other departments in terms of either verbal information flow and immediate exchange (i.e., meetings, committees, teleconferencing, phone conversations, phone mail, electronic mail) or documented information exchange (i.e., exchange of forms, reports, memoranda, and fax materials). Cross-functional collaboration has usually been measured by asking respondents to evaluate the degree to which their own department and other departments achieved collective goals, had mutual understanding, worked together informally, shared the same vision for the company, shared ideas, information, and/or resources and worked together as a team (Kahn and McDonough, 1997).

The constructs of cross-functional project team, cooperation, and integration have been simultaneously applied in relation to timeliness as well as new product success, whereas the constructs of co-location, interaction, and collaboration have been employed by researchers who want to focus on investigating them in relation to the results of cross-functional linkages as the representative measurement. Due to the relevancy of new product success and timeliness constructs to this study, the construct of cross-functional linkages used in the literature on new product success and timeliness should be reviewed. Song *et al.* (1997a) measured the construct of cross-functional

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[23] (1) how frequent were communications with this other unit effected through written letters, memos, or reports of any kind during the past six months?, (2) through personal face-to-face discussions?, (3) through telephone calls?, and (4) through group or committee meetings between three or more people from each unit?.

[24] (1) overall, how much difficulty was experienced in getting ideas clearly across to individuals in this other unit during communication with them?, and (2) when communication with individuals in this unit became necessary, how much difficulty was experienced in getting in touch with them?.

cooperation with 5 items[25]. With respect to the cross-functional integration construct, Song and Parry (1997b) and Song and Montoya-Weiss (2001) measured it using 3 items[26]. Integration between functions in relation to NPD cycle time has been developed and measured by Sherman *et al.,* (2000); Souder and Song (1997). The construct of R&D/marketing integration was composed of 4 items[27]. R&D/manufacturing integration was also composed of 3 items[28]. However, this measure did not include items regarding marketing/manufacturing integration. Recently, Leenders and Wierenga (2002) measured marketing/R&D integration with 15 items[29]. However, these measures are not appropriate items for this study because Leenders and Wierenga (2002) focused on integration between marketing and R&D without considering manufacturing as well as new product performance. In studies of timeliness in NPD and INPR, the construct of cross-functional linkages has been used by Cooper and Kleinschmidt (1994) and Chryssochoidis and Wong (1998). In relation to cross-functional linkages respondents were asked 3 items[30], whereas a study by Cooper and Kleinschmidt (1994) has the weakness of measuring a single-item.

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[25] (1) people from all three departments interact, (2) open communication among all three departments, (3) similar goals and objectives among the three departments, (4) overall satisfaction with interdepartmental relationships, and (5) the existence of a give-and-take relationship among the three departments.

[26] (1) the integration between R&D and manufacturing was very good for this selected project, (2) that between marketing and R&D was very good for this selected project, and (3) that between marketing and manufacturing was very good for this selected project.

[27] (1) level of contact frequency between R&D and marketing, (2) level of information flow between R&D and marketing, (3) level of participation by marketing in problem definition, and (4) level of participation by R&D in problem definition.

[28] (1) manufacturing details are explicitly considered in designing our new products, (2) close collaboration between R&D and manufacturing, and (3) attention to manufacturability during design.

[29] (1) a friendly attitude exists between marketing and R&D, (2) open communication of relevant information occurs between marketing and R&D, (3) marketing and R&D intentionally provide each other with misleading information, (4) marketing and R&D search for solutions that are mutually agreeable, (5) marketing and R&D are more like teammates than competitors, (6) if disagreements arise, marketing and R&D are usually able to resolve them, (7) marketing and R&D openly share their ideas with each other, (8) marketing and R&D help each other to more effectively perform their tasks, (9) marketing and R&D often fail to communicate information to each other, (10) marketing and R&D are always blaming each other for failures, (11) it is difficult for marketing and R&D to contact each other, (12) conflicts between marketing and R&D are of a constructive kind, (13) marketing and R&D perceive their problems as mutual problems, (14) marketing and R&D recognize each other's talents and expertise, and (15) marketing and R&D share resources to complete tasks.

[30] (1) integration between technical, marketing and manufacturing functions was high, (2) integration between these functions when located in different countries was also high, and (3) technical and marketing personnel contributed accurate, on time and high quality input.

Table 4.3 Scale Items for Cross-functional Linkages

Construct	Scale Items
Cross-functional Linkages	'Cross-functional Linkages' is defined as interaction, cooperation and integration between marketing, R&D and manufacturing for developing the selected new product.
	(1) the degree of integration between R&D and manufacturing was high during the entire development process (Song and Parry, 1997a, b; Song and Montoya-Weiss, 2001).
	(2) this product was developed from frequent interactions between customers and our cross-functional product development team - it was a truly a cross-functional team effort (Song and Parry, 1997a, b; Song and Montoya-Weiss, 2001).
	(3) the degree of integration between marketing and R&D was high during the entire development process (Song and Parry, 1997a, b; Song and Montoya-Weiss, 2001).
	(4) the degree of integration between marketing and manufacturing was high during the entire development process (Song and Parry, 1997a, b; Song and Montoya-Weiss, 2001).

The current study will adapt items used by three well known studies, namely Song and Parry (1997a, b) and Song and Montoya-Weiss (2001). The scales are robust, relevant and well-established to suit the research context of this study because these studies have measured the items for new product performance. The complete scale for cross-functional linkages is provided in Table 4.3. This was measured on an 11-point, four-item scale. All the items used were anchored at 0 = "strongly disagree" to 10 = "strongly agree."

4.4.3.3 Measures of Skills and Resources Synergy

The construct of synergy in the literature has been measured by dividing it into two parts, namely the marketing synergy construct and the technical synergy construct (Chryssochoidis and Wong, 1998; Song *et al.,* 1997b; Song and Parry, 1996; Song and Parry, 1997b; Song and Montoya-Weiss, 2001). However, in a study by Cooper and

Kleinschmidt (1994), the synergy construct was measured by 9 items[31] without further sub-classification. Any attempt to adapt these items to this study will be inappropriate. This is because the aim is to investigate the effects of the independent variable on criterion variable by dividing marketing and technical synergy. Thus, the items of marketing construct and technical construct should be individually reviewed.

For the marketing synergy construct, most studies in the marketing field have selected items in relation to marketing research and distribution and promotion/advertising. Marketing skills have been measured with three items that address the firm's marketing research skill, salesforce skills, and distribution skills. Marketing resources are divided into marketing research resources, salesforce resources, and distribution resources. Song and Parry (1996) measured marketing synergy with 6 items[32]. Song and Parry (1997b) measured marketing synergy with 4 items[33]. Chryssochoidis and Wong (1998) measured sufficiency in marketing with 4 items[34].

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[31] These items comprised the following; (1) strong fit between the needs of the project and the firm's resource base, skills etc. in terms of R&D (product development) skills and resources, (2) strong fit between the needs of the project and the firm's resource base, skills etc. in terms of manufacturing skills and experience, (3) strong fit between the needs of the project and the firm's resource base, skills etc. in terms of manufacturing plant and equipment, (4) strong fit between the needs of the project and the firm's resource base, skills etc. in terms of selling skills and resources, (5) strong fit between the needs of the project and the firm's resource base, skills etc. in terms of distribution resources, (6) strong fit between the needs of the project and the firm's resource base, skills etc. in terms of advertising and promotion skills and resources, (7) strong fit between the needs of the project and the firm's resource base, skills etc. in terms of customer service and tech support resources and skills, (8) strong fit between the needs of the project and the firm's resource base, skills etc. in terms of market research and market intelligence skills/resources, and (9) strong fit between the needs of the project and the firm's resource base, skills etc. in terms of management skills and resources.

[32] (1) our company's resources were more than adequate for this project in terms of marketing research skill, (2) our company's resources were more than adequate for this project in terms of salesforce skills, (3) our company's resources were more than adequate for this project in terms of distributions skills, (4) our company's resources were more than adequate for this project in terms of marketing research resources, (5) our company's resources were more than adequate for this project in terms of salesforce resources, and (6) our company's resources were more than adequate for this project in terms of distribution resources.

[33] (1) our company's salesforce was more than adequate for this selected project, (2) our company's distribution resources were more than adequate for this selected project, (3) our company's advertising/promotion salesforce resources were more than adequate for this selected project, and (4) our company's salesforce skills were more than adequate for this selected project.

[34] (1) sufficiency of adequate quality of marketing personnel/funds to adapt advertising/promotion, (2) sufficiency of adequate quality of personnel to train sales staff and technicians, (3) sufficiency of adequate quality of after-sales service personnel and equipment, and (4) sufficiency of adequate quality of distribution channels.

Song and Montoya-Weiss (2001) measured marketing synergy with 8 items[35]. In particular, Song *et al.* (1997b), focusing on the role of marketing in Korean companies, classified marketing synergy construct into resources synergy construct and skills synergy construct[36]. Rather than items used by Song *et al.* (1997b), the items used by Song and Montoya-Weiss (2001) may be appropriate measures for the current study. Unlike Song *et al.* (1997b), Song and Montoya-Weiss (2001) measured the construct of marketing synergy by combining marketing resources synergy and marketing skills synergy into a single construct. Moreover, although this study similarly conducts empirical research in Korean companies, it does not have the sole objective of focusing on the role of marketing. That is, this study is to simultaneously investigate the role of the technology synergy construct as well as the marketing synergy construct on NPD timeliness. Therefore, this study will combine resources and skills synergy into a single construct namely the construct of marketing synergy. In addition, the marketing synergy construct will include the following items; marketing research, sales force, distribution, and advertising/promotion.

As for the construct of technology synergy, technological skills have been classified into R&D skills, engineering skills, and manufacturing skills. Three items, namely R&D resources, engineering resources, and manufacturing resources, are used to measure the construct of technological resources. Song and Parry (1996) measured technological synergy with 1 item; our company's R&D resources were more than adequate for this project. However, this item seems to be measured by focusing solely on R&D resources and it did not consider other items such as engineering and

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[35] (1) our company's marketing research skills were more than adequate for this project, (2) our company's salesforce skills were more than adequate for this project, (3) our company's distribution skills were more than adequate for this project, (4) our company's advertising/promotion skills were more than adequate for this project, (5) our company's marketing research resources were more than adequate for this project, (6) our company's salesforce resources were more than adequate for this project, (7) our company's distribution resources were more than adequate for this project, and (8) our company's advertising/promotion resources were more than adequate for this project.

[36] Marketing resources synergy was comprised of 4 items; (1) our company's marketing research resources were more than adequate for this project, (2) our company's sales force resources were more than adequate for this project, (3) our company's distribution resources were more than adequate for this project, and (4) our company's advertising/promotion resources were more than adequate for this project. Marketing skill synergy was also comprised of 4 items; (1) our company's marketing research skills were more than adequate for this project, (2) our company's sales force skills were more than adequate for this project, (3) our company's distribution skills were more than adequate for this project, and (4) our company's advertising/promotion skills were more than adequate for this project.

manufacturing. Moreover this is not a multiple-items approach. Extended measurement of the technology synergy construct has been developed in studies by Chryssochoidis and Wong (1998); Song and Parry (1997b); Song and Montoya-Weiss (2001). Chryssochoidis and Wong (1998) measured sufficiency in technology with 3 items[37]. Song and Parry (1997b) and Song and Montoya-Weiss (2001) have developed items including engineering skills and resources as well as R&D skills and resources[38]. This study will adapt R&D skills and resources, engineering skills and resources, and manufacturing skills and resources to items of technology synergy construct from existing items in the literature.

The appropriate items for this study will be selected following three steps. First, items of constructs used without classifying into marketing synergy and technology synergy will be excluded. This study has as an objective a simultaneous analysis of the effects of marketing and technological synergy on dependent variables. Therefore, items used by Cooper and Kleinschmidt (1994) will be excluded. Second, single-item analysis used by Song and Parry (1996) will be excluded. Third, it is necessary to adapt the constructs of marketing synergy as well as technological synergy. However, Song *et al.* (1997b) measured by focusing on the role of marketing not technology. This study will draw and use items of marketing and technical synergy construct from the above three points. Thus, items used by two studies (i.e., Song and Parry, 1997b; Song and Montoya-Weiss, 2001) will be adapted to this research. The complete scales for marketing synergy and technology synergy are provided in Table 4.4. These two constructs were measured on an 11-point Likert type scale. All the items used were anchored at 0 = "strongly disagree" to 10 = "strongly agree."

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[37] (1) sufficiency of adequate quality of R&D personnel/funds to adapt the product, (2) sufficiency of adequate quality of hardware adapted for European country markets, and (3) sufficiency of adequate quality of software adapted for European country markets.

[38] (1) our company's R&D skills were more than adequate for this selected project, (2) our company's engineering skills were more than adequate for this selected project, (3) our company's R&D resources were more than adequate for this selected project, and (4) our company's engineering resources were more than adequate for this selected project.

Table 4.4 Scale Items for Marketing Synergy and Technology Synergy

Construct	Scale Items
Marketing synergy	'Marketing Synergy' is defined as the project's fit with your firm's existing marketing skills and resources in terms of the available market research, sales force, distribution, advertising and promotion. (1) the company's marketing research skills were more than adequate for this project (Song and Montoya-Weiss, 2001) (2) the company's salesforce skills were more than adequate for this project (Song and Parry, 1997b; Song and Montoya-Weiss, 2001) (3) the company's distribution skills were more than adequate for this project (Song and Montoya-Weiss, 2001) (4) the company's advertising/promotion skills were more than adequate for this project (Song and Montoya-Weiss, 2001) (5) the company's marketing research resources were more than adequate for this project (Song and Montoya-Weiss, 2001) (6) the company's salesforce resources were more than adequate for this project (Song and Parry, 1997b;Song and Montoya-Weiss, 2001) (7) the company's distribution resources were more than adequate for this project (Song and Parry, 1997b; Song and Montoya-Weiss, 2001) (8) the company's advertising/promotion resources were more than adequate for this project (Song and Parry, 1997b; Song and Montoya-Weiss, 2001).
Technology synergy	'Technology Synergy' is defined as the project's fit with your firm's existing technical skills and resources in terms of the available R&D, engineering and production skills and resources. (1) the company's R&D skills were more than adequate for this selected project (Song and Parry, 1997b; Song and Montoya-Weiss, 2001) (2) the company's engineering skills were more than adequate for this selected project (Song and Parry, 1997b; Song and Montoya-Weiss, 2001) (3) the company's manufacturing skills were more than adequate for this selected project (Song and Parry, 1997b; Song and Montoya-Weiss, 2001) (4) the company's R&D resources were more than adequate for this selected project (Song and Parry, 1997b; Song and Montoya-Weiss, 2001) (5) the company's engineering resources were more than adequate for this selected project (Song and Parry, 1997b; Song and Montoya-Weiss, 2001). (6) the company's manufacturing resources were more than adequate for this selected project (Song and Parry, 1997b; Song and Montoya-Weiss, 2001).

4.4.3.4 Measures of HQ-subsidiary/agent Relationship

Most of the studies with respect to the HQ-subsidiary/agent relationship have been carried out by focusing on subsidiary performance (e.g., Luo, 2003; Chen and Wong, 2003). Chen and Wong (2003) measured 2 dimensions, namely interaction with headquarters and support provided by headquarters. According to Luo (2003), items about the HQ-subsidiary/agent relationship were measured by classifying into 4 dimensions (i.e., resource commitment, local responsiveness, information flow, and control flexibility). Moreover, items about information flow [39] were not associated with sales and ROI even though they are appropriate items for this study due to previous findings of the effectiveness of informal communication in achieving cooperation between HQ and subsidiary/agent (Chryssochoidis and Wong, 1998). However, as mentioned above, these items are related to subsidiary performance (e.g., sales and profit) not timeliness in NPD and INPR or new product success. The representative items to measure HQ-subsidiary/agent relationship in relation to timeliness construct were developed by Chryssochoidis and Wong (1998). As the construct of internal communication between HQ and subsidiaries and between subsidiaries themselves, five items[40] were used. Gupta *et al.* (1999) also measured HQ-subsidiary communication in terms of the frequency of personal interaction (i.e., face-face meetings, telephone conversations, routine and periodic formal reporting, and written letters and memos) between headquarters and subsidiary.

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[39] (1) in your capacity as a general manager, how many email/phone/fax exchanges do you have with headquarters on average per day, (2) in that capacity, how many email/phone/fax exchanges do you have with peer subsidiaries in other countries on average per day, (3) the head office does not define procedure for sharing information with the subsidiary, and (4) information flow between our subsidiary and the headquarters is slow and not transparent.

[40] (1) extensive use of direct contact, meetings and interaction between HQ and subsidiaries/agents, (2) extensive use of interdepartmental permanent committees between HQ and subsidiaries/agents, (3) extensive use of interdepartmental temporary task forces between HQ and subsidiaries/agents, (4) extensive use of the use of a matrix system, and (5) extensive use of a set of shared goals, values and beliefs shaping behavior.

Table 4.5 Scale Items for the HQ-subsidiary/agent Relationship

Construct	Scale Items
HQ-subsidiary/agent Relationship	'HQ-subsidiary/agent Relationship' is defined as HQ-subsidiary/agent cooperation which means complementary coordinated actions taken by the headquarters and subsidiary/agent.
	(1) People from the marketing operations at both headquarters and our overseas subsidiaries/agents regularly interacted (Hewett and Bearden, 2001).
	(2) There was open communication between the marketing operations at headquarters and our overseas subsidiaries/agents (Hewett and Bearden, 2001).
	(3) The marketing operations at headquarters and our overseas subsidiaries/agents had similar goals (Hewett and Bearden, 2001).
	(4) Overall, our overseas subsidiaries/agents' marketing departments were satisfied with its interaction with the marketing operation at headquarters (Hewett and Bearden, 2001).
	(5) There was a give-and-take relationship between the marketing operations at headquarters and our overseas subsidiaries/agents (Hewett and Bearden, 2001).

For the construct of the HQ-subsidiary cooperation, Hewett and Bearden (2001) measured it with 5 items[41]. Items for measuring the construct of HQ-subsidiary/agent relationship will be employed in this study in line with a study by Hewett and Bearden (2001). The multiple items measured by Chryssochoidis and Wong (1998) and Gupta *et al.* (1999) may not be appropriate items for this study because information flow (i.e., communication) between HQ and subsidiary does not influence performance (i.e., sales and ROI) (Luo, 2003). However, items measured by Hewett and Bearden (2001) focus on cooperation between HQ and subsidiary by adapting a scale based on Song, Montoya-Weiss, and Schmidt's (1997a) study of cross-functional cooperation. Like cross-functional cooperation as an antecedent factor of performance (e.g., time efficiency and performance (Song *et al.,* 1997a; Olson *et al.,* 2001), HQ-subsidiary cooperation is an antecedent factor of subsidiary product performance (e.g., market share, sales and ROI) (Hewett and Bearden, 2001). The complete scale for HQ-

[41] (1) people from the marketing operations at both headquarters and your subsidiary regularly interact, (2) there is open communication between the marketing operations at headquarters and your subsidiary, (3) the marketing operations at headquarters and your subsidiary have similar goals, (4) overall, your subsidiary's marketing operation is satisfied with its interaction with the marketing operation at headquarters, and (5) there is a give-and-take relationship between the marketing operations at headquarters and your subsidiary.

subsidiary/agent relationship is provided in Table 4.5. It was measured by an 11-point, twelve-item scale. The items used were anchored at 0 = "strongly disagree" to 10 = "strongly agree."

4.4.3.5 Measures of Timeliness in NPD and INPR

Cooper and Kleinschmidt (1994) pointed out that measuring timeliness has a number of problems. First, when does the clock start ticking? That is, what time frames are measured? Most projects may take months, even years between idea generation and the commencing of a serious development effort. When researchers attempt to measure timeliness, they may face a difficulty in measuring timeliness because "a real project" is not obvious. Second, while other measures of new product performance are relative measures (e.g., market share), time is an absolute measure such as months or years. When researchers try to compare projects via an absolute measure, they cannot conclude that project B which was done in twelve months is more time efficient than project A which was done in twenty months. Therefore, Cooper and Kleinschmidt (1994) emphasized that relative measures are much more convenient because they enable two dissimilar projects to be compared to each other. They developed a timeliness construct by developing two measures[42]. While Cooper and Kleinschmidt (1994) measured timeliness in NPD, Chryssochoidis and Wong (1998) measured it in INPR as well as NPD. In order to investigate INPR timeliness, respondents were asked to identify it in foreign markets. That is, Chryssochoidis and Wong (1998) employed two different measures of timeliness in INPR[43].

Other constructs in relation to the competitive nature of speed, time-to-market or speed-to-market and NPD cycle time have been used by several researchers (e.g.,

[42] (1) staying on schedule; the degree to which the project adhered to its time schedule, and (2) time efficiency; the degree to which the project was done in a time efficient manner.
[43] (1) a measure of time in months: respondents were requested to indicate the planned (i.e., scheduled/anticipated) time period and actual time spent on rollout of the investigated products across the key and target foreign markets, and (2) a relative perceptual measure.

(Datar *et al.,* 1996; 1997a; b; Lynn *et al.,* 1999; Sherman *et al.,* 2000). However, this study has as an objective analysis of the rollout time of new products in foreign markets as well as timeliness in NPD. Moreover other time dimensions (e.g., NPD cycle time) is an absolute measure (Cooper and Kleinschmidt, 1994).

Table 4.6 Scale Items for Timeliness in NPD and INPR

Construct	Scale Items
NPD timeliness	'NPD timeliness' is defined as the time required to complete the development of the new product relative to its anticipate time frame. (1) Please indicate the degree to which the project was done in a time-efficient manner by circling a number from zero (0) to ten (10) (0 = very slowly and inefficiently, 10 = very quickly and efficiently) (2) Please indicate the degree to which the project adhered to the time schedule by circling a number from minus 5 (-5) to plus 5 (+5). (-5 = far behind schedule, 0 = stayed on schedule, +5 = ahead of schedule)
INPR timeliness	'INPR timeliness' is defined as the actual availability of the new product within- or faster than-the planned (scheduled/anticipated) time frame for product availability in the firm's target country-markets. (1) Please indicate the degree to which the actual availability of the new product for sale in the firm's target country-markets was achieved in a time-efficient manner by circling a number from zero (0) to ten (10) (0 = very slowly and inefficiently, 10 = very quickly and efficiently) (2) Please indicate the adherence of the new products to the rollout schedule by circling a number from minus 5 (-5) to plus 5 (+5). (-5 = far behind schedule, 0 = stayed on schedule, +5 = ahead of schedule)

In addition, if the current study adapts two items measured by Chryssochoidis and Wong (1998), one (i.e., a measure of time in months) of them may be not appropriate for this study because it is an absolute measure (i.e., months or years). Thus, this measure is not consistent with other measures of the ten constructs (e.g., new product performance) which are employed by this study. Moreover Chryssochoidis and Wong (1998) reported that a relative perceptual measure (i.e., the degree to which the project adhered to time schedule) was clearly understood by respondents and encompassed the importance of adhering to schedule and time efficiency. Accordingly, in this study measuring timeliness in NPD and INPR will use items provided by Cooper and Kleinschmidt (1994); (1) staying on schedule; the degree to which the project adhered to its time schedule, and (2) time efficiency; the degree to which the project was done in a time efficient manner. The complete scale for Timeliness in NPD and INPR is provided in Table 4.6.

4.4.3.6 Measures of Proficiency in NPD activities

Like skills and resources synergy constructs, those of proficiency in NPD activities can be classified into marketing proficiency and technical proficiency. Proficiency of marketing activities refers to how well marketing-related activities are conducted during a particular NPD project (Song *et al.,* 1997b). Successful NPD entails the proficient execution of numerous marketing activities, including: (1) determining marketing characteristics and trends, (2) conducting a detailed study of market potential, customer preferences, purchase process, etc., (3) appraising competitors and their products-both existing and potential, (4) selecting customers for testing market acceptance, (5) submitting products to customers for in-use testing, (6) specifying activities and tentative plans of the product commercialization phase, (7) executing test marketing programs in line with the plans for commercialization, (8) interpreting the findings from in-house and customer trials, test markets, and trade surveys, (9) completing the final plans for marketing, and (10) launching and introducing the product into the marketplace - selling, promoting and distributing. With respect to marketing proficiency, Song and Parry (1997b) and Song and Montoya-Weiss (2001) measured marketing proficiency with 6 items[44]. As for the construct of technical proficiency,

[44] (1) determining market characteristics and trends, (2) appraising competitors and their products-both existing and potential, (3) identifying "appeal" characteristics that would differentiate and sell the product, (4) executing test marketing programs in line with the plans for commercialization, (5) conducting a market study or market research - a detailed study of market potential, customer preferences, purchase process, etc., (6) launching and introducing the product into the marketplace-selling, promotion and distribution.

Song and Parry (1997b) and Song and Montoya-Weiss (2001) measured it with 6 items[45].

Table 4.7 Scale Items for Marketing Proficiency and Technical Proficiency

Construct	Scale Items
Marketing proficiency	'Marketing Proficiency' is defined as how well marketing-related activities (e.g., evaluating consumers and competitors, determining market characteristics and trends, carrying out marketing research, test marketing, and executing product launch) were conducted during the development of this particular new product.
	(1) determining market characteristics and trends (Song and Parry, 1997b; Song and Montoya-Weiss, 2001)
	(2) appraising competitors and their products-both existing and potential (Song and Parry, 1997b; Song and Montoya-Weiss, 2001)
	(3) identifying "appeal" characteristics that would differentiate and sell the product (Song and Parry, 1997b; Song and Montoya-Weiss, 2001)
	(4) executing test marketing programs in line with the plans for commercialization (Song and Parry, 1997b; Song and Montoya-Weiss, 2001)
	(5) conducting a market study or market research - a detailed study of market potential, customer preferences, purchase process, etc. (Song and Parry, 1997b; Song and Montoya-Weiss, 2001)
	(6) launching and introducing the product into the marketplace-selling, promotion and distribution (Song and Parry, 1997b; Song and Montoya-Weiss, 2001)
Technical proficiency	'Technical Proficiency' is defined as how well technical-related activities (e.g., conducting engineering and manufacturing evaluations, product testing, determining product specifications, prototyping, and building the final product) were conducted during the development of this particular new product.
	(1) conducting preliminary engineering, technical and manufacturing assessments (Song and Parry, 1997b; Song and Montoya-Weiss, 2001)
	(2) building of the product to designated or revised specifications (Song and Parry, 1997b; Song and Montoya-Weiss, 2001)
	(3) evaluating laboratory tests to determine basic performance against specifications (Song and Parry, 1997b; Song and Montoya-Weiss, 2001)
	(4) executing prototype or "in house" sample product testing (Song and Parry, 1997b; Song and Montoya-Weiss, 2001)
	(5) determining the final product design and specifications (Song and Parry, 1997b; Song and Montoya-Weiss, 2001)
	(6) working continuously for cost reduction and quality control (Song and Parry, 1997b; Song and Montoya-Weiss, 2001)

[45] (1) determining market characteristics and trends, (2) appraising competitors and their products-both existing and potential, (3) identifying "appeal" characteristics that would differentiate and sell the product, (4) executing test marketing programs in line with the plans for commercialization, (5) conducting a market study or market research - a detailed study of market potential, customer preferences, purchase process, etc., (6) launching and introducing the product into the marketplace-selling, promotion and distribution.

The constructs of marketing and technical proficiency in this study will be measured with the multiple-item scale used by the above researchers. In Song and Parry (1997b) and Song and Montoya-Weiss (2001), it was developed specifically for measuring proficiency in NPD activities as well as being derived and adapted from existing validated scales. If this study uses these multiple-items, reliability and validity will be ensured because Song and Parry (1997b) and Song and Montoya-Weiss (2001) have already reviewed the measurement items. Furthermore, this multiple-item scale is a representative measurement in relation to new product performance and timeliness construct. Therefore, this study will measure the construct of marketing and technical proficiency based on items provided by Song and Parry (1997b) and Song and Montoya-Weiss (2001). The complete scales for marketing proficiency and technical proficiency are provided in Table 4.7. The items used were anchored at 0 = "strongly disagree" to 10 = "strongly agree."

4.4.3.7 Measures of Competitive Intensity

As for the construct of competitive intensity, multiple-items scales have been used for measuring moderator variables[46] (Jaworski and Kohli, 1993). However, these multiple items have been used for the relationship between market orientation and business performance constructs. Regarding the relationship between competition construct and new product performance and timeliness construct, the former has been measured using various items by Cooper and Kleinschmidt (1994); Song and Parry

[46] (1) competition in our industry is cutthroat, (2) there are many "promotion wars" in our industry, (3) anything that one competitor can offer, others can match readily, (4) price competition is a hallmark of our industry, (5) one hears of a new competitive move almost every day, and (6) our competitors are relatively weak.

(1996; 1997a, b). Song and Parry (1996; 1997a) employed 5 items[47]. Cooper and Kleinschmidt (1994) measured market competitiveness with 9 items[48].

Table 4.8 Scale Items for Competitive Intensity

Construct	Scale Items
Competitive intensity	'Competitive Intensity' is defined as the degree of competitive strength in a product market.
	(1) there was no price competition in target country-markets (Song and Parry, 1996; 1997a)
	(2) there were many competitors in target country-markets (Song and Parry, 1996; 1997a)
	(3) there was a strong, dominant competitor - with a large market share - in target country-markets (Song and Parry, 1996; 1997a)
	(4) potential customers were very loyal to competitors' products in target country-markets (Song and Parry, 1996; 1997a)
	(5) new product introductions by competitors were frequent in target country-markets (Song and Parry, 1996; 1997a)

In particular, the multiple items measured by Song and Parry (1996; 1997a) enable the study to ensure reliability and validity because several studies (e.g., Cooper, 1979; Song and Parry, 1997b) have measured them to provide better scales of competition intensity. In addition, they have measured the items to investigate the relationship between the construct of competitive intensity and product performance not business performance. Therefore, this study will use items provided by Song and Parry (1996; 1997a). The complete scales for competitive intensity are provided in Table 4.8. This construct was measured on an 11-point Likert type scale. All the items used were anchored at 0 = "strongly disagree" to 10 = "strongly agree."

[47] (1) there was no price competition in the market, (2) there were many competitors in this market, (3) there was a strong, dominant competitor - with a large market share - in the market, (4) potential customers were very loyal to competitors' products in this market, and (5) new product introductions by competitors were frequent in this market.

[48] (1) few or no competitors, (2) un-aggressive competitive activity, (3) absence of price competition, (4) no customer loyalty to competitors' products, (5) customers dissatisfied with competitors, (6) competitors relatively small and weak companies, (7) competitors' products not important to them, (8) no increase in price competitiveness during project, and (9) competitive aggressiveness did not increase during project.

4.4.3.8 Measures of Technology Change

For the construct of technological turbulence, Homburg *et al.*, (1999) used the following items; (1) the technology of our industry is changing rapidly, (2) technological changes provide big opportunities in our industry, (3) it is very difficult to forecast where the technology in our industry will be in the next two to three years, (4) a large number of new product ideas have been made possible through technological breakthroughs in our industry, and (5) technological developments in our industry are rather minor. However, the purpose of the above study is to investigate the direct effect of technological turbulence on marketing's influence within the firm.

There are few studies regarding the moderating effect of technology change in relation to new product success and timeliness constructs, a notable exception being studies by Song and Montoya-Weiss (2001) and Li *et al.* (1999). Song and Montoya-Weiss (2001) employed 6 items for the moderator variable of perceived technological uncertainty[49]. Li *et al.* (1999) used 3 items to test the impact of technology change on new product success in export markets[50]. The constructs of technology change in this study will be measured with the multiple-item scale used in these two studies because these items have been used to represent technological uncertainty as a moderator variable as well as an independent variable, impacting on a firm's new product success in export markets. The complete scales for technology change are provided in Table 4.9. This construct was measured on an 11-point Likert type scale. All the items used were anchored at 0 = "strongly disagree" to 10 = "strongly agree."

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[49] (1) the technology involved in this project was a "well-developed science," i.e., there was a well-developed body of scientific know-how, there were many well-known cause and effect relationships and the predictive state-of-the-art is very high, (2) the rates (speed and pace) of the changes in the technology employed in this project were very unpredictable, (3) the technology used in this product was changing rapidly, (4) the changes in R&D technology for this project was very unpredictable, (5) the technology involved in this project was an "undeveloped science," i.e., the technology was not well understood, the phenomena were not well-defined and the predictive state-of-the art was very low. There was much trial and error research, and (6) it was very difficult to predict where the technology used in this product will be in the next 2 to 3 years.

[50] (1) product life cycle is long/short in this product market, (2) the rate of new product introduction is fast in this product market, and (3) the rate of technology change is fast in this market.

Table 4.9 Scale Items for Technology Change

Construct	Scale Items
Technology change	'Technology Change' is defined as the speed of technology development in a product market. (1) the rates (speed and pace) of the changes in the technology employed in this project were very unpredictable (Song and Montoya-Weiss, 2001) (2) the technology used in this product was changing rapidly (Song and Montoya-Weiss, 2001) (3) the changes in R&D technology for this project was very unpredictable (Song and Montoya-Weiss, 2001) (4) the technology involved in this project was an "undeveloped science," i.e., the technology was not well understood, the phenomena were not well-defined and the predictive state-of-the art was very low. There was much trial and error research (Song and Montoya-Weiss, 2001) (5) product life cycle was short in target country-markets (6) the rate of new product introduction was fast in target country-markets (7) the rate of technology change was fast in target country-markets

4.4.3.9 Measures of Standardization

In measuring standardization, previous studies used items in line with marketing mix such as product, pricing, promotion and distribution. Shoham (1999) employed sixteen items[51] to measure standardization. Zou and Cavusgil (2002) used product standardization [52], promotion standardization [53] and standardized channel structure[54]. Lee and Griffith (2004) measured the construct to test the influence of

[51] Product standardization: (1) product design, (2) product quality, (3) service quality, (4) number of items in product line, and (5) number of product lines, promotion standardization: (1) advertising and promotion budget size, (2) advertising and promotion budget setting process, (3) media allocation, and (4) advertising and promotion content, distribution standardization: (1) physical distribution, (2) channels of distribution, and (3) sales force management, and pricing standardization: (1) price, (2) currency, (3) payment security, and (4) credit terms.

[52] (1) we adopt a standardized core product across all major markets in the world, (2) globally standardized components make up a significant percentage of the total cost of our product, (3) main features of our product are standardized across major markets in the world, and (4) the product designs we use in different country are very similar.

[53] (1) execution of our advertising varies greatly form one country market to another, and (2) we use very different techniques for sales promotion in different country markets.

[54] We develop similar channel structure for distributing any product in different country markets.

export marketing strategies on performance. That is, product adaptation[55], export pricing adaptation[56], export channel strategy[57] and export promotional strategy[58] were measured. The extent of international pricing strategy standardization was measured in accordance with five items[59] (Theodosiou and Katsikeas, 2001). Hewett and Bearden (2001) and Subramaniam and Hewett (2004) employed items in line with a standardization-adaptation balance in terms of product features being both adapted and standardized[60]. However, a thorough review of the literature revealed that there were only a limited number of developed scales measuring product and promotion standardization or adaptation (Zou *et al.*, 1997). That is, most previous studies automatically treat standardization of the overall marketing programme or the 4-Ps as unidimensional constructs.

Accordingly, it is necessary to develop a new measure by considering the standardization of technical-related activities as well as marketing-related activities. According to Jain (1989), marketing standardization is classified into the marketing programme and the marketing process[61]. Technical activities are a selected set of activities which go beyond simply producing the goods, for instance, process engineering and improvement, after-sales service, decision making on procurement and distribution and, ultimately, product development (Meijboom and Vos, 1997). The idea was to get an indication of the manifestation of a standardization-adaptation balance in terms of marketing and technical-related activities. Therefore, this study will use new

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[55] (1) how much the exporter considers foreign customers' tastes for developing export products, (2) to what extent products for export are differentiated from those for the domestic market and (3) to what extent export products are differentiated.

[56] (1) the degree to which exporters consider the market demand and customer's response of foreign markets in determining export prices, and (2) to what extent exporters consider competition in the foreign market when determining export prices.

[57] the degree to which an exporter employed direct versus indirect channels.

[58] (1) the ratio of overseas advertising expenditures to total exports, (2) the degree to which the exporter provides buying allowances or rebates for overseas distributors or retailers, and (3) the extent of sales promotions toward foreign customers.

[59] to compare the pricing policy followed by the subsidiary with that pursued by the parent company in its home market; (1) selling price to trade customers, (2) selling price to end users, (3) profit margins to trade customers, (4) profit margins to end users, and (5) sales terms.

[60] the extent to which headquarters has developed standardized product design processes that it requires you to use in your market versus allowing your subsidiary's marketing operation to develop and implement market- or country specific product design processes.

[61] Marketing programme refers to various aspects of the marketing mix, while marketing process relates to the tools that aid in the development and implementation of the marketing programme.

items to measure standardization. The complete scales for standardization are provided in Table 4.10. This construct was measured on an 11-point Likert type scale. All the items used were anchored at 0 = "strongly disagree" to 10 = "strongly agree."

Table 4.10 Scale Items for Standardization

Construct	Scale Items
Standardization	'Standardization (conversely, customization)' refers to using a common programme and process on a worldwide basis. Marketing-related activities refer to programme(i.e., various aspects of the marketing mix, which can be classified as product design, product positioning, brand name, packaging, retail price, basic advertising message, sales promotion, role of salesforce, management of salesforce type of retail outlets, and customer service) and process (i.e., tools that aid in programme development and implement). Technical activities are a selected set of activities which go beyond simply producing the goods, for instance, process engineering and improvement, after-sales service, decision making on procurement and distribution and, ultimately, product development. (1) Our company tended to standardize marketing-related activities over the countries at which the new product was targeted. (2) Our company tended to standardize technical-related activities over the countries at which the new product was targeted.

4.4.3.10 Measures of New Product Performance

The construct of new product performance has been measured in various ways. Both academics and firms focus on revenue goals, profit goals, and time-to-market success measures (Griffin and Hauser, 1996). Many academic researchers employ firm-level measures (% of sales from new products, success/failure rate) and process measures (technical success, subjective success, completion within budget) as additional measures of success, whereas firms prefer to use customer measures (market share, volume, customer satisfaction) and financial measures (margins). These measurements are not an absolute but a relative measure. For example, profit is measured relative to a cut-off criterion, relative to investment (ROI), or versus objectives. Sales are measured relative to objectives or compared to competitors (market share). Song *et al.* (1997b) used the profit-based performance of the new product. It reflects the level of success achieved by a new product in the marketplace. The new product's relative success in terms of profits was assessed, as compared to (1) the firm's other new products, (2) competing products, and (3) the firm's profit objectives for the new product. Like a study by Song *et al.* (1997b), one by Song and Parry (1997b) employed multiple-item scales by including profit and sales[62].

Recently, measuring product financial performance, Song and Montoya-Weiss (2001) used only ROI[63]. Although three studies (i.e., Song *et al.,* 1997b; Song and Parry, 1997b; Song and Montoya-Weiss, 2001) measured multiple items to investigate the construct of new product performance, these items mainly focus on profit. However, the multiple items measured by Song and Parry (1997a) include various measures of new product success (e.g., profit, sales and market share). Accordingly, in the current study existing multiple-items scales such as profit, sale and market share will be adopted based on Song and Parry (1997a). The complete scales for new product performance

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[62] (1) how successful was this product from an overall profitability standpoint? (2) relative to your firm's other new products, how successful was this product from a sales volume standpoint?, (3) relative to your firm's other new products, how successful was this product from a profitability standpoint? (4) relative to your firm's objectives for this product, how successful was this product from a profitability standpoint?

[63] (1) the return on investment (ROI) for the first year of the product introduction, (2) the return on investment (ROI) for the second year of the product introduction, and (3) the return on investment (ROI) for the third year of the product introduction.

are provided in Table 4.11. This construct was measured on an 11-point Likert type scale.

Table 4.11 Scale Items for New Product Performance

Construct	Scale Items
New product performance	(1) How successful was this selected project from an overall profitability standpoint? (0 = a great financial failure, i.e., far less than our minimum acceptable profitability criteria, 10 = a great financial success, i.e., it far exceeded our minimum acceptable profitability criteria)
	(2) Relative to your firm's other new products, how successful was this selected project in terms of profits? (0 = far less than our other new products, 10 = it far exceeded our other new products)
	(3) Relative to competitors' products, how successful was this selected project in terms of profits? (0 = far less than the competing products, 10 = it far exceeded the competing products)
	(4) Relative to your firm's objectives for this selected project, how successful was this selected project in terms of profits? (0 = far less than the objectives, 10 = it far exceeded the objectives)
	(5) Relative to your firm's other new products, how successful was this selected project in terms of sales? (0 = far less than our other new products, 10 = it far exceeded our other new products)
	(6) Relative to competitors' products, how successful was this selected project in terms of sales? (0 = far less than the competing products, 10 = it far exceeded the competing products)
	(7) Relative to your firm's objectives for this selected project, how successful was it in terms of sales? (0 = far less than the objectives, 10 = it far exceeded the objectives)
	(8) Relative to your firm's other new products, how successful was this selected project in terms of market share? (0 = far less than our other new products, 10 = it far exceeded our other new products)
	(9) Relative to competitors' products, how successful was this selected project in terms of market share? (0 = far less than the competing products, 10 = it far exceeded the competing products)
	(10) Relative to your firm's objectives for this selected project, how successful was it in terms of market share? (0 = far less than the objectives, 10 = it far exceeded the objectives)

4.4.4 Response Form

A structured questionnaire, which specifies the set of response alternatives and the response format, will be used in this study. A questionnaire works best with standardized questions that will be interpreted the same way by all respondents. Although interviewer-administered questionnaires have higher response rates than self-administered ones (Saunders *et al.,* 2003), they may contain one source of bias because an interviewer whose appearance, dress, manner of speaking, failure to follow instructions, and so on may influence responses (McDaniel and Gates, 1993). Also, an interviewer-administered questionnaire in a relatively large-scale sample size may be an impractical method bearing in mind the time and costs potentially involved. Self-administered questionnaires[64], therefore, will be used in this study. They can be classified into those asking open-ended and those asking close-ended questions. This study adopts the use of an open-ended as well as a close-ended questionnaire because most types of questionnaire include a combination of open and closed questions (Saunders *et al.,* 2003). However, respondents may spend much time in responding to open-ended questions. Open-ended questions are good first questions in a research instrument because they enable the respondents to express general attitudes (Malhotra and Birks, 2000). Accordingly, the first question of the research instrument is constructed as an open question. The questionnaire is mainly constructed with closed questions regarding the twelve constructs the main reason behind which is to make it easier for the respondent and to encourage a high response rate.

[64] They are delivered and returned electronically using either email or the Internet (on-line questionnaire), posted to respondents who return it by post after completion (postal or mail questionnaire), or delivered by hand to each respondent and collected later (delivery and collection questionnaire) (Saunders *et al.,* 2003).

4.4.5 The Sequence of Questions

The self-administered questionnaire contains in six parts (see Appendix 4.1). The first part (A1 – A9) of the questionnaire was designed to capture general information pertaining to Korean companies' operations in terms of a project which is the respondents' core product as well as being an export product. This information from respondents will be utilized to confirm the purpose behind the research which is to ascertain respondents' opinions on the selected project namely respondents' core product. The questionnaire was designed to prompt respondents to indicate the following: their company' core products for export (A1); CEO's strategy for rollout in overseas markets (A2); company's size (A3); number of exporting years (A4); number of business years regarding selected new product (A5); % of company's sales in overseas markets (A6); % of company's investment in overseas markets (A7); mode of entry overseas (A8); and the target countries for the export (A9).

The second part (B1 – B6) of the questionnaire was designed to capture in-depth information on not only the company's internal factors for NPD and INPR timeliness but also proficiency in NPD activities as mediating variables using the Likert scale. The questionnaire prompts respondents, first of all, to indicate the degree to which their company undertook cross-functional linkages in relation to the development of their core products (B1). Respondents were also requested to indicate the degree of technical synergy (B3) as well as marketing synergy (B2). They were also asked to indicate the extent of their companies' engagement in proficiency in NPD activities relating to their core products (B4; B5). Respondents, finally, were requested to indicate the HQ-subsidiary/agent relationship (B6).

The third part (C1 – C2) of the questionnaire was designed to examine the extent of the influence of external environments on Korean companies' NPD and INPR timeliness using the Likert scale. The third hypothesis is comprised of five sub-hypotheses (i.e., H5 a, b, c, d and e). The extent of influence of competitive intensity was assessed based on a set of 5 questions in section C1 of the questionnaire. From the indications, the moderating effect of competitive intensity on the relationships between key determinants and timeliness in NPD and INPR and between timeliness in NPD and INPR and new product performance will be analyzed. The fourth hypothesis (i.e., H6 a, b, c, d and e) examines the moderating effect of technology change. The impact of technology change on timeliness in NPD and INPR will be assessed based on the questions being asked in section C2 of the questionnaire.

The fourth part (D1 – D2) of the questionnaire was designed to capture the information of timeliness in NPD and INPR. The proposed hypothesis states that proficiency of marketing and technical activities mediates the relationships between key determinants and timeliness in NPD and INPR. To test these hypotheses, the second part (B1 – B6) and the fourth part (D1 – D2) of the questionnaire will be used. The direct effects of key determinants (B1 – B3; B6) on timeliness in NPD and INPR (D1 – D2) will be tested. The fifth part (E1 – E2) of questionnaire was designed to capture information on standardization. The proposed hypothesis examines the moderating effect of standardization (E1 – E2) on the relationship between NPD timeliness (D1) and INPR timeliness (D2). Finally, the sixth part (F1 – F10) of questionnaire was designed to capture information on new product performance (i.e., the selected project) in terms of profit, sales and market share.

4.4.6 The Translation of Questionnaire

The primary language in South Korea is Korean. A questionnaire was devised in English. To collect data from Korean companies, this experiment needs to adopt a Korean-language questionnaire. It is a necessary procedure to use it for Korean respondents so as to ensure that they can clearly understand the questions and respond accordingly. To avoid any miscommunication from Korean respondents, professional translators were employed to translate the initial English-language questionnaire to a Korean-language one. The questionnaire was developed through two translators, both bilingual in Korean and English, but whose native language is Korean. Efforts were made to enhance equivalence, and not just literal translation in translating the questionnaire. The translation process also involved the current researcher discussing the Korean-version questionnaire with the translators in order to check ambiguous meanings and reduce translating errors before it was deemed acceptable. Discrepancies in the translation were carefully inspected and corrected to ensure translation equivalence of the questionnaire by discussion between the current researcher and translators. Some rewording of questions was necessary to accommodate phraseology commonly used in South Korea.

After completing the pretesting of the questionnaire, it was translated from the Korean-version back into an English-version as well. The translation procedures followed the cross-national research outlined by Craig and Douglas (1999). It was possible to ensure equivalent meaning in the translated version by translating the original questionnaire into Korean using a back-translation procedure. When the questionnaire was finished the retranslated English language version, it needed to match with the original English language version. There were no critical differences between them. Consequently, the final Korean language version questionnaire was closer to the original meaning in English after minor revision was completed. The questionnaire was printed in Korean for the survey of Korean manufacturing companies.

4.5 The Pretest

4.5.1 Personal Interview Pretest

After completing the design of the Korean-version instrument, pre-tests[65] namely personal interview and a pilot test were conducted. Personal interview pretests enable the researcher to notice reactions, hesitations, and other cues by the respondents that could not be obtained via telephone or mail (Hunt *et al.,* 1982). The pretest must use respondents who are as similar as possible to the target respondents (Tull and Hawkins, 1976). With respect to the size of the pretest sample, Ferber and Verdoorn (1962) suggest that a sample of 12 is satisfactory. Consequently, a pre-test was completed using two academic and eight industry experts.

Items pertaining to the questionnaire itself that can and should be pretested include length, layout, the format for the questions used, the number of lines to leave for replies, and the sequencing of questions (Hunt *et al.,* 1982). For enhancement of the construct validity of the survey measures, the current researcher asked them to complete the questionnaire and indicate any ambiguity regarding the phrasing of the items. Interviewees were also asked to comment on the overall respondent burden. According to a study by Hunt *et al.,* (1982), personal interview pretests may be conducted by the debriefing method or by the protocol method. In the debriefing method, the respondent is asked to fill out the questionnaire completely while the interviewer makes careful observations. After the questionnaire is completed, the interviewer probes the respondent for any potential problems with the format of the questionnaire and with individual questions. In the protocol method, the subject is asked to think aloud as he or she is filling out the questionnaire. The interviewer records the concurrent verbalizations or makes careful notes of them. Therefore, the industrial and academic experts examined the questionnaire in terms of two procedures: (1) protocol and (2) debriefing methods.

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[65] Three methods often discussed in pretesting are personal interviews, telephone interviews, and mail self-reports (Hunt *et al.,* 1982). Most writers suggest that the first series of pretests should be conducted by personal interview even if the questionnaire ultimately will be administered by telephone or through the mail (Boyd *et al.,* 1977).

Table 4.12 Respondents' Recommendations for Individual Question Items

Question	Original Questions	Recommendation from the academic and industrial experts
A2	For the selected international new product development project, please indicate whether your CEO's strategy for rollout in overseas markets was simultaneous or sequential by circling the appropriate number, 1 or 2, below. 1.CEO's strategy for rollout in overseas markets: simultaneous 2.CEO's strategy for rollout in overseas markets: sequential	CEO's strategy for rollout in overseas markets: 1. simultaneous, 2. sequential
A3-1	Number of employees: (1) < 50 (2) 50 to 500 (3) > 500	In the revised questionnaire, I omitted this as I could collect this information from each company's website without asking them.
A3-2	Annual sales turnover: (1) < US$10million (2) US$10 to $100 million (3) > US$100million	
A4	Please indicate the number of years your company has been operating in the selected new product: 1. < 3 years 2. 3 to 7 years 3. 7 to 10 years 4. > 10 years	Please state the number of years your company has been operating in the selected new product: (____________)years
A5	What percentage of your company's sales is generated from overseas markets (i.e. export)? 1. < 25% 2. 25% to 49% 3. 50% to 75% 4. > 75%	What percentage of your company's sales is generated from overseas markets (i.e. export)? (____________)%
A7	Please answer the following two questions: (i) For the new product development project you have selected, please tick the countries at which the new product was targeted. (ii) For the new product development and international market rollout project that you have selected, please rank the countries in which the new product was launched accordingly to the order of entry into those markets.	A8. For the new product development and international market rollout project that you have selected, please rank the countries in which the new product was launched accordingly to the order of entry into those markets.
D1-2	(-5 = slow; inefficient; took too long, 0 = stayed on schedule, +5 = done fast; in a very time-efficient manner)	(-3 = far behind schedule, 0 = stayed on schedule, +3 = ahead of schedule)
D4-2	(-5 very long; far behind schedule, 0 = stayed on schedule, +5 very fast; ahead of schedule)	(-3 = far behind schedule, 0 = stayed on schedule, +3 = ahead of schedule)

Based on this pre-test, consultation with experts contributed to the revision of the questionnaire. When items were evaluated through interviews with them, most of the questionnaire items corresponded to the constructs exemplified in the conceptual framework which were largely drawn from North American and European studies.

Regarding layout and the format for the questions, questionnaires should have specific sets of directions for each group or section of items (Carroll, 1994). In the process of interviews, minor changes to the wording of the questions were introduced. The results of interview were used to change the Likert scale as well as shorten the questionnaire and provide insights into how respondents understood the questions.

They suggested that clear shape and structure in a questionnaire are important because clear layout of questions and answer formats, appropriate font size and type and appropriate number of questions per page enable informants to complete the questionnaire more easily (Schaefer and Dillman, 1998). They said that the visual appearance of questionnaires is also important. Therefore, clear answer formats as well as putting boxes around groups of questions were made because this makes a difference in whether the respondent will respond (Carroll, 1994). Also, the important words and sentences were colored to emphasize their meaning to respondents. To decrease antagonistic feelings from respondents, the questions regarding their information were placed at the back of questionnaire. They also provided suggestions for improvement of the questionnaire. With respect to length, they commonly recommended that it needed to be shorter. The results of interview were used to shorten the questionnaire because this can improve response rates overall (Dillman *et al.,* 1993; Deutskens *et al.,* 2004). To shorten items for the questionnaire, 2 questions (number of employees and annual sales turnover) were deleted because the current researcher could collect this information from targeted companies' websites without asking them. Two questions (A4 and A5) were also changed to open-ended questions. In A7, the original questionnaire contained two questions but the revised one consisted of 1 question in line with the recommendation from interviewees. In the fourth part of the questionnaire, the anchored scale (D1-2 and D2-2) was described. Recommendations from the academic and industrial experts for individual question items are presented in Table 4.12.

The scale of item was another consideration in a questionnaire. There was an issue as to whether the same scales could be used in surveys of Korean manufacturers. However, it often makes sense to use or adapt existing scales rather than developing my own scales (Saunders *et al.,* 2003). They also pointed out the eleven-point Likert scale in the questionnaire. In rating or scale questions, Likert scales require a respondent to indicate a degree of agreement or disagreement with each of several items (Menezes and Elbert, 1979). As described in the former part of this chapter, each question in the questionnaire was given 0 to 10 points according to the eleven-point Likert scale to represent importance. The scales relied on previous research. However, interviewees recommended the seven-point Likert scale instead of the eleven-point one to get effective statistical results from the sample. Based on their suggestions, this study adopted a seven-point Likert-type scale, where 1 = strongly disagree and 7 = strongly agree. Accordingly, each question in the questionnaire was assigned a score of 1 to 7 points to represent importance. The most common approach in the Likert-style rating scale is a four-, five-, six- or seven-point rating scale (Saunders *et al.,* 2003).

They also commented on survey methods such as the postal, telephone, fax, drop and collect survey, and web-based methods. Among them, the drop-and-collect survey (DCS) method which involves the researcher(s) and/or properly trained field assistants in personally delivering—and later collecting—the survey instrument (the questionnaire) either directly to the target respondent or indirectly via a gatekeeper (e.g., a secretary) (Ibeh *et al.,* 2004) was recommended by them. They suggested that the DCS method has higher effectiveness than alternative survey methods because it has a more favorable response rate. Previous studies also reported that very high response rates were achieved by the DCS method in their studies, e.g., 75% (Papadopoulos *et al.,* 1994), 80% (Lin and Germain, 1998) and 83% (d'Astous and Ahmed, 1999).

4.5.2 A Pilot Study

The revised questionnaire was used in the next pretest phase of the study. As a subsequent pretest, a pilot study was conducted to pretest and purify the measurement scales. The purpose of the pilot test is to refine the questionnaire so that respondents will have no problems in answering the questions and there will be no problems in recording the data (Saunders *et al.,* 2003). To test the reliability and validity of the measures, it was necessary to carry out the pilot study with a small sample. According to interviewees' suggestion, the DCS method was employed as a pilot study because the instruments in a pilot study need to be tested using the actual method to be adopted in the main survey (Churchill and Iacobucci, 2002). In a subsequent pretest, the questionnaire was pretested in South Korea, with 100 randomly drawn companies from top 1,000 Korean manufacturing companies. 59 firms had agreed to participate. After contacting the target respondents by telephone, the current researcher visited them to drop the questionnaires together with a personalized covering letter outlining the objectives of the study and explaining that all information obtained would be treated in confidence. A well-crafted introductory letter can increase the response rate (Schaefer and Dillman, 1998) because it is easy for respondents to complete, avoids confusion about what or how to answer questions. The number of contacts made with sampled individuals is a powerful factor for enhancing response rate (McColl *et al.*, 2002). Consequently, a minimum of four visits were targeted for every respondent (Ibeh *et al.*, 2004).

The pilot study collected 49 surveys (response rate = 83 %). However, in the 49 questionnaires that were collected, many respondents rejected the answers on the items relating to the construct of cross-functional linkages. This was due to the fact that many manufacturing companies do not operate R&D function or department such as R&D laboratories. Consequently, only 33 questionnaires were usable. This implies that, in the final survey, greater care would be needed to target firms which have R&D functions or departments. After the retrieval of the pilot-test questionnaires, the data were coded and analyzed using the SPSS 12.0 package software of statistics to find any unanticipated difficulties. The results of the Korean-based pilot study indicated that measures loaded strongly on their corresponding constructs and showed an acceptable level of reliability. Cronbach's alpha was used to determine the internal consistency of the instrument. All scales were highly reliable and consistent, namely Cross-functional linkages (4 items): $\alpha = .799$, Marketing Synergy (8items): $\alpha = .881$, Technical Synergy (6 items): $\alpha = .936$, Marketing Proficiency (6 items): $\alpha = .748$, Technical Proficiency (6items): $\alpha = .884$, The HQ-subsidiary/agent relationship (5 items): $\alpha = .854$, NPD timeliness (2 items): $\alpha = .843$, INPR timeliness (2 items): $\alpha = .893$, Performance (10 items): $\alpha = .941$, Competition Intensity (5 items): $\alpha = .652$, Technology Change (7 items): $\alpha = .737$, and Standardization (2 items): $\alpha = .772$. Based on the pilot study some of the items were also modified before administering the large-scale survey. That is, the result of the reliability analysis showed that if Question C11 in the construct of competition intensity was deleted, the Cronbach's α rose to 0.706. The detailed work on translation and in-depth discussion with academic and practical experts, coupled with the results of the pilot test, confirmed the general appropriateness of the instrument and data collection method.

4.6 Main Survey

In the large-scale survey, respondents were drawn from Korean manufacturing companies. The selection of Korean manufacturers is based on the following considerations. First, this study is restricted to manufacturers who export their new products to foreign country-markets in order to measure two constructs (i.e., INPR timeliness and performance in target-country markets). Based on this consideration, 8,403 manufacturing companies were identified from the Korean Chamber of Commerce and Industry. Second, the current study seeks to avoid problems ascribed to the measurement of cross-functional linkages. That is, many South Korean manufacturers are operating their businesses without an R&D department namely an R&D group or laboratory. As such, this study is focused on manufacturers who have an R&D department to measure the construct of cross-functional linkages. Among the 8,403 manufacturers, 254 firms were identified.

However, the number of selected companies was not sufficient to carry out the main survey when considering the rate of rejection of participation in the survey as well as typical response rates. Therefore, it was necessary to base the sample unit not on the company but the NPD project. Large manufacturers can develop a successful stream of new products over many years as well as a single product efficiently. They usually have at least several product lines and constantly undertake multiple development projects to add new product lines or to replace existing products (Nobeoka, 1995). The number of projects drawn from the 254 firms which have R&D functions was 814. In a previous part (4.3.2) of this chapter, sample size for this research was 1,064 on the basis of an expected response rate (i.e., 10-20 per cent) for postal surveys. However, a favourable response rate achieved by the DCS method has enabled me to reduce the sample size from 1,064 to 814.

Six well-trained field assistants and two field supervisors were employed in the DCS. Key informants were largely senior-ranking executives or managers in a firm's strategic product planning department or product management unit/function. The assistants were given the names of contacts within their target firms. They rang the assigned informants, introduced themselves, and made an appointment to deliver the research instrument. To increase response rates, respondents were given a gift (approximately £ 5) as an incentive to complete and return the questionnaire (Church, 1993). Also, a copy of the survey results would be sent to them. Research assistants personally contacted or visited potential respondents and asked them to participate in the survey. The assistants delivered the questionnaires to the respondents and collected them later. A minimum of four visits were also planned for every sampled firm (Ibeh *et al.*, 2004).

4.6.1 Response Rate

Of the 366 projects from 197 firms that had initially agreed to participate, data on 244 projects from 126 firms were collected. After eliminating 12 cases that indicated incomplete answers and the same numbers throughout the questionnaire, this study yielded 232 completed, usable questionnaires (a 63% response rate) for the ensuing data analysis.

4.6.2 Non Response Bias

The issue of nonresponse bias is commonly raised in connection with survey methodology (Armstrong and Overton, 1977). Nonresponse is a problem because it raises the question of whether those who respond are somehow different from those who do not respond (Churchill and Iacobucci, 2002). Following Armstrong and Overton (1977), a nonresponse bias check was conducted by comparing early with late respondents. The assumption here is that late respondents are more likely to show characteristics of non-respondents than those of early respondents (Armstrong and Overton, 1977). The final sample was evenly spilt into early respondents (62 percent of the sample; 144 samples) and late respondents (38 percent of the sample; 88 samples), depending on the dates responses were received.

Table 4.13 Nonresponse Bias

Independent Samples Test						
		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Cross-functional linkages	Equal variances assumed	2.008	.158	.703	230	.483
	Equal variances not assumed			.678	163.385	.499
Marketing synergy	Equal variances assumed	.751	.387	.625	230	.532
	Equal variances not assumed			.615	174.086	540
Marketing proficiency	Equal variances assumed	.407	.524	.738	227	.461
	Equal variances not assumed			.725	169.649	.469
Technology synergy	Equal variances assumed	.019	.892	1.003	229	.317
	Equal variances not assumed			.995	177.381	.321
Technical proficiency	Equal variances assumed	.049	.825	-1.084	229	.280
	Equal variances not assumed			-1.086	185.697	.279
The HQ-subsidiary/agent relationship	Equal variances assumed	.024	.878	.436	221	.663
	Equal variances not assumed			.435	173.871	.664
NPD timeliness	Equal variances assumed	.590	.443	-.720	218	.472
	Equal variances not assumed			-.704	165.342	.483
INPR timeliness	Equal variances assumed	1.863	.174	.106	220	.916
	Equal variances not assumed			.103	166.346	.918
Competitive intensity	Equal variances assumed	.968	.326	.314	230	.754
	Equal variances not assumed			.306	168.977	.760
Technology change	Equal variances assumed	.630	.428	.539	229	.590
	Equal variances not assumed			.526	169.427	.600
Standardization	Equal variances assumed	2.274	.133	-.589	226	.556
	Equal variances not assumed			-.568	157.358	.571
New product performance	Equal variances assumed	1.139	.287	.563	228	.574
	Equal variances not assumed			.553	172.125	.581

In this study, early and late responses were compared along key dimensions (i.e., cross-functional linkages, marketing synergy, technology synergy, marketing proficiency, technical proficiency, the HQ-subsidiary/agent relationship, NPD timeliness, INPR timeliness, standardization, competitive intensity, technology change and new product performance). The results of the t-tests performed across all variables of interest are shown in Table 4.13. An independent samples t-test indicated that there were no significant differences at the 5% significance level. These results imply that no detectable response bias exists in the sample and that the results are generalizable within the boundary of the sample frame.

4.7 Summary

This chapter has provided a detailed description of the method employed in this research. The development of the questionnaire for this study is based on the procedures outlined by the literature. Twelve constructs, containing multi-item measures, were used to test the proposed hypotheses. These multiple items for each construct were adopted and developed on the basis of the literature. Specifically, the DCS method was employed to collect data for the study. Based on a pretest and pilot test the research instrument was defined. The questionnaires were delivered to the key informants within target Korean manufacturing companies (i.e., 366 projects of 197 companies), yielding 244 completed questionnaires of which 232 were useable for the actual data analysis to test my hypotheses. A comparison of early and late respondents was done and non-response bias did not appear to be a problem.

Chapter Five: Data Analysis and Results

5.1 Introduction

This chapter presents an analysis of the survey results and quantitative findings. It starts with a description of the profile of the sample of manufacturing companies in South Korea that provided data for the current study. The order of market entry for focal new products launched by sample companies is presented. The next section reports on the data analysis and hypotheses tests using structural models and regression analyses.

To examine the suitability of the scales, a number of empirical tests were conducted. An exploratory factor analysis (EFA) was performed followed by a confirmatory factor analysis (CFA). In every case, only one factor was extracted by EFA, thus providing evidence of unidimensionality. Internal reliability (Cronbach's alpha) for all the scales was also acceptable because all the values exceed the 0.70 rule suggested by Nunnally (1978). In an assessment of the measurement model (CFA), the process of evaluating this resulted in the deletion of 29 of 62 items. Based on several overall model fit indices, the final measurement model was found to be adequate. Using this model, reliability and validity were evaluated for this study. With respect to reliability, composite reliability (CR) and average variance extracted (AVE) were tested. Convergent validity was assessed by examining the significance of item loadings through *t*-tests. CR and AVE were also used to assess convergent validity. Discriminant validity was assessed by comparing the average variance extracted (AVE) with the squared correlation between constructs.

Subsequent to the assessment of the measurement model, a structural model was evaluated in order to test the hypotheses that were postulated in the proposed conceptual framework. The framework was also tested using regression analyses. The above analyses and results are presented in the following parts.

5.2 Data Analysis

5.2.1 Response Profile

Table 5.1 Response Characteristics

Firm Descriptors	Level	Frequency		Total	Mean (Std. Deviation)
Number of company employees	Less than 250	23	(9.9%)	N=232 (100%)	4,707 (11,548)
	251 to 500	22	(9.5%)		
	501 to 1000	49	(21.1%)		
	1001 to 1500	47	(20.3%)		
	1501 to 3000	33	(14.2%)		
	3001 to 5000	33	(14.2%)		
	Over 5000	25	(10.8%)		
Annual turnover [a] (US dollars)	Less than 200 million	38	(16.4%)	N=232 (100%)	3,386 million (9,452 million)
	200.1 to 500 million	49	(21.1%)		
	500.1 to 1000 million	32	(13.8%)		
	1000.1 to 1500 million	27	(11.6%)		
	1500.1 to 2000 million	38	(16.4%)		
	2000.1 to 6000 million	26	(11.2%)		
	Over 6000 million	22	(9.5%)		
Type of industry sector	Metals and Fabricated metal products	34	(14.7%)	N=232 (100%)	-
	Computers, Electrical and Electronics	50	(21.5%)		
	Motor vehicles and other transport equipment	32	(13.8%)		
	Chemicals and Chemical products	45	(19.4%)		
	Machinery and mechanical equipment	23	(9.9%)		
	Refined petroleum, Rubber and Plastic products	18	(7.8%)		
	Food, Beverages, Textiles and Paper products	30	(12.9%)		
CEOs' strategy for rollout in overseas markets	Simultaneous	64	(27.6%)	N=232 (100%)	-
	Sequential	140	(60.3%)		
	No response	28	(12.1%)		
Number of years company has been operating in the selected new product market	Less than 2	47	(20.3%)	N=232 (100%)	7.7 (6.6)
	2.1 to 5	65	(28.0%)		
	5.1 to 15	71	(30.6%)		
	Over 15	27	(11.6%)		
	No response	22	(9.5%)		
% of company's sales generated from overseas markets	Less than 5 %	24	(10.3%)	N=232 (100%)	35.9 (27.6)
	5.1 to 10 %	42	(18.1%)		
	10.1 to 30 %	51	(22.0%)		
	30.1 to 50 %	51	(22.0%)		
	Over 50%	52	(22.4%)		
	No response	12	(5.2%)		
Mode of entry into overseas markets	Subsidiary	91	(39.2%)	N=232 (100%)	-
	Licensing	9	(3.9%)		
	Joint Venture	28	(12.1%)		
	Direct investment	30	(12.9%)		
	Franchising	0	(0.0%)		
	Distributorship	56	(24.1%)		
	Others	14	(5.0%)		
	No response	4	(1.7%)		

a: 1,000 won (the unit of money in Korea) = 1 US dollar

Table 5.1 shows response characteristics namely the number of employees, sales turnovers, the type of industry sector, CEO's strategy for rollout in overseas markets, number of years of the company's operations in the selected new product market, % of company's sales in overseas markets, and mode of entry into overseas markets.

The sizes of company workforces range from less than two hundred and fifty to over five thousand. Mean (standard deviation) is 4,707 (11,548). Table 5.1 shows that 59.5% of the sample companies employ more than 1,000 workers. Particularly, although selected companies which have more than 5,000 employees comprise a small proportion (i.e., 25 companies, 10.8%), most of them have more than 10,000 employees (maximum is 61,899 employees). This implies that distribution from the central value is skewed because the median is 1,246 employees. In terms of annual turnover, companies range in size from those with turnovers of less than 200 million to those with over 6000 million (US dollars). Mean (turnover) is USD 3,386 million (standard deviation is 9,452 million). Half the sample (i.e., 48.7%) achieved at least USD 1 billion in turnover. The median is USD 953 million.

In addition, the selected companies belong to a range of industry sectors such as metals and fabricated metal products (14.7%), computers, electrical and electronics (21.5%), motor vehicles and other transport equipment (13.8%), chemicals and chemical products (19.4%), machinery and mechanical equipment (9.9%), refined petroleum, rubber and plastic products (7.8%) and food, beverages, textiles and paper products (12.9%). The selection of companies covering a wide range of industry sectors is appropriate for an investigation of the proposed hypotheses concerning NPD and INPR timeliness. South Korea is estimated to have become the world's 4th largest producer of electronics equipment (i.e., USD 90,285 million) in 2004. Also, the country's sales of semiconductors achieved 2nd place in 2004. Korea was the world's fifth-largest steel producing country last year, while it was placed 6th in world car production in 2003. Moreover, Korea ranked as the 12th largest exporter overall, taking 2.8 percent of total global exports (USD 253.845 billion). Imports in 2004 were USD 224.463 billion, making Korea the 13th largest importer in the world

The number of years which companies have been operating in the selected new product market was shown to be less than 5 for 48.3 % of them and more than 5 for 42.2 % (9.5 % did not respond). Mean (standard deviation) is 7.7 (6.6) years. In terms of the percentage of a company's total sales which are generated from overseas markets, 44.4% of them achieve a level of more than 30 %.

With respect to CEO's strategies for rollout in overseas markets, Table 5.1 shows that 60.3 % of South Korean manufacturers adopt a sequential strategy while 27.6 % of them use a simultaneous strategy (12.1 % did not respond). Moreover, when the selected companies were analysed in terms of industry sector, the motor vehicle and other transport equipment sector provides evidence that CEOs are more likely to prefer a simultaneous strategy for rollout of their new products in targeted foreign countries' markets (53.3%) than in other sectors (see Table 5.2).

Table 5.2 CEO's Strategy for Rollout in Overseas Markets by Type of Industry

Type of industry sector	CEO's strategy for rollout in overseas markets	
	Simultaneous	Sequential
Metals and Fabricated metal products	30.0%	70.0%
Computers, Electrical and Electronics	29.5%	70.5%
Motor vehicles and other transport equipment	53.3%	46.7%
Chemicals and Chemical products	29.3%	70.7%
Machinery and mechanical equipment	21.1%	78.9%
Refined petroleum, Rubber and Plastic products	25.0%	75.0%
Food, Beverages, Textiles and Paper products	25.0%	75.0%

5.2.2 The Order of Entry into Target-country Markets

Table 5.3 The Order of Entry into Target-country Markets

			Frequency					
Order of Entry	First target country	Country	USA	China	Japan	Taiwan	Germany	Other countries
		Count	64	52	31	13	9	51
		% of Total	29.1%	23.6%	14.1%	5.9%	4.1%	23.2%
	Second target country	Country	China	Japan	USA	UK	Germany	Other countries
		Count	33	26	23	13	12	103
		% of Total	15.7%	12.4%	11.0%	6.2%	5.7%	49.0%
	Third target country	Country	Japan	China	USA	Taiwan	Canada	Other countries
		Count	23	22	20	19	12	103
		% of Total	11.6%	11.1%	10.1%	9.5%	6.0%	51.8%
	Fourth target country	Country	China	India	USA	Japan	Taiwan	Other countries
		Count	16	14	12	12	11	97
		% of Total	9.9%	8.6%	7.4%	7.4%	6.8%	59.9%
	Fifth target country	Country	China	Australia	Indonesia	Singapore	USA	Other countries
		Count	16	8	8	7	6	79
		% of Total	12.9%	6.5%	6.5%	5.6%	4.8%	63.7%
	Sixth target country	Country	UK	Spain	Vietnam	France	Netherlands	Other countries
		Count	7	7	6	5	5	62
		% of Total	7.6%	7.6%	6.5%	5.4%	5.4%	67.4%
	Seventh target country	Country	Australia	China	India	Italy	Netherlands	Other countries
		Count	8	5	5	5	5	42
		% of Total	11.4%	7.1%	7.1%	7.1%	7.1%	60.0%
	Eighth target country	Country	Malaysia	Philippines	Canada	Brazil	Russia	Other countries
		Count	7	5	4	4	4	35
		% of Total	11.9%	8.5%	6.8%	6.8%	6.8%	59.3%
	Ninth target country	Country	Turkey	Germany	India	Indonesia	Italy	Other countries
		Count	5	4	3	3	3	29
		% of Total	10.6%	8.5%	6.4%	6.4%	6.4%	61.7%
	Tenth target country	Country	New Zealand	Australia	India	Indonesia	Brazil	Other countries
		Count	4	3	3	3	2	23
		% of Total	10.5%	7.9%	7.9%	7.9%	5.3%	60.5%
	Eleventh target country	Country	Taiwan	Malaysia	Philippine	Iran	Australia	Other countries
		Count	5	3	3	2	1	17
		% of Total	16.1%	9.7%	9.7%	6.5%	3.2%	54.8%
	Twelfth target country	Country	Brazil	Iran	Turkey	Spain	Poland	Other countries
		Count	3	2	2	2	2	15
		% of Total	11.5%	7.7%	7.7%	7.7%	7.7%	57.7%
	Thirteenth target country	Country	Russia	Chile	Turkey	Japan	China	Other countries
		Count	2	2	2	2	2	11
		% of Total	9.5%	9.5%	9.5%	9.5%	9.5%	52.4%
	Fourteenth target country	Country	Hong Kong	Turkey	Malaysia	India	Taiwan	Other countries
		Count	3	2	2	2	2	7
		% of Total	15.8%	10.5%	10.5%	10.5%	10.5%	36.8%
	Fifteenth target country	Country	Mexico	Greece	Canada	Philippine	Taiwan	Other countries
		Count	4	2	2	2	2	7
		% of Total	21.1%	10.5%	10.5%	10.5%	10.5%	36.8%

Table 5.3 summarizes the order of entry into target-country markets of respondents from the first target country to the fifteenth. By and large Korean

manufacturing companies regard the USA as their first target market (29.1%), followed by China (23.6%), Japan (14.1%), Taiwan (5.9%) and Germany (4.1%). China was regarded as a second target market by 15.7% of Korean manufacturing companies followed by Japan (12.4%) and USA (11.0%). Japan was considered a third target market by 11.6% followed by China (11.1%) and USA (10.1%). Hence, the primary target-country markets (i.e., the first, second and third target country) are comprised of 3 countries (i.e., USA, China and Japan). These results reflect the fact that market size is, perhaps, an important influence on order of entry into target markets. The increasing importance of China seems particularly to be founded on its fast expanding market as well as its proximity. Moreover, China was the fourth target market for 9.9% of the sample being followed by India (8.6%) and USA (7.4%).

In contrast, as sixth target market, European countries tend to be selected by Korean companies. From eighth target market onward, Korean manufacturers tend to select a range of target-country markets namely South Asian (e.g., Malaysia, the Philippines, Indonesia and Hong Kong), Middle Eastern (e.g., Turkey and Iran), Latin American (e.g., Brazil, Mexico and Chile) and other European countries (e.g., Russia, Poland and Greece).

5.2.3 Measured Variables – Descriptive Information

Table 5.4 Mean and Standard Deviation of Measured Variables

Latent Variable	Item Reference	Mean	Standard deviations
Cross-functional linkages	CFL1;The degree of integration between R&D and manufacturing was high.	5.1466	1.34360
	CFL2; The development of this product involved frequent interaction between customers and our cross-functional product development team – it was a truly a cross-functional team effort	5.1207	1.20357
	CFL3; The degree of integration between marketing and R&D was high.	5.0517	1.24034
	CFL4; The degree of integration between marketing and manufacturing was high.	4.9138	1.29648
Marketing Synergy	MS1; Our company's marketing research skills were more than adequate for this selected project.	4.3922	1.14587
	MS2; Our company's salesforce skills were more than adequate for this selected project.	4.6422	1.12297
	MS3; Our company's distribution skills were more than adequate for this selected project.	4.6164	1.19316
	MS4; Our company's advertising/promotion skills were more than adequate for this selected project.	4.0043	1.35640
	MS5; Our company's marketing research resources were more than adequate for this selected project.	4.1767	1.38601
	MS6; Our company's salesforce resources were more than adequate for this selected project.	4.5819	1.22818
	MS7; Our company's distribution resources were more than adequate for this selected project.	4.4483	1.25076
	MS8; Our company's advertising/promotion resources were more than adequate for this selected project.	4.0948	1.27906
Marketing Proficiency	MP1; Our company correctly determined market characteristics and trends.	4.9221	1.24166
	MP2; Our company correctly appraised competitors and their products – both existing and potential.	5.0390	1.19537
	MP3; Our company correctly identified "appeal" characteristics that would differentiate and sell the product.	4.8783	1.16834
	MP4; Our company correctly conducted a market study or market research – a detailed study of market potential, customer preferences, purchase process, etc.	4.6407	1.20718
	MP5; Our company correctly executed test marketing programs in line with the plans for commercialization.	4.3261	1.32912
	MP6; Our company correctly launched and introduced the product into the marketplace – selling, promotion and distribution.	4.5130	1.30076
Technical Synergy	TS1; Our company's R&D skills were more than adequate for this selected project.	4.8874	1.18151
	TS2; Our company's engineering skills were more than adequate for this selected project.	4.9048	1.20489
	TS3; Our company's manufacturing skills were more than adequate for this selected project.	5.0000	1.16843
	TS4; Our company's R&D resources were more than adequate for this selected project.	4.7446	1.16457
	TS5; Our company's engineering resources were more than adequate for selected this project.	4.8052	1.13871
	TS6; Our company's manufacturing resources were more than adequate for this selected project.	4.8615	1.16762
Technical Proficiency	TP1; Our company correctly conducted preliminary engineering, technical and manufacturing assessments.	4.7328	1.17961
	TP2; Our company correctly built the product to designated or revised specifications.	5.1853	1.20070
	TP3; Our company correctly evaluated laboratory tests to determine basic performance against specifications.	5.2845	1.21894
	TP4; Our company correctly executed prototype or "in house" sample product testing.	5.3491	1.25308
	TP5; Our company correctly determined the final product design and specifications.	5.3680	1.25060
	TP6; Our company correctly and continuously worked for cost reduction and quality control.	5.4286	1.11623
HQ-subsidiary/agent Relationship	HQSR1; People from the marketing operations at both headquarters and our overseas subsidiaries/agents regularly interacted.	4.9509	1.30961
	HQSR2; There was open communication between the marketing operations at headquarters and our overseas subsidiaries/agents.	4.9420	1.30581
	HQSR3; The marketing operations at headquarters and our overseas subsidiaries/agents had similar goals.	5.0673	1.25560
	HQSR4; Overall, our overseas subsidiaries/agents' marketing departments were satisfied with its interaction with the marketing operation at headquarters.	4.7054	1.21750
	HQSR5; There was a give-and-take relationship between the marketing operations at headquarters and our overseas subsidiaries/agents.	4.7857	1.28061

Latent Variable	Item Reference	Mean	Standard deviations
NPD Timeliness	NPDT1; The degree to which the project was done in a time-efficient manner	4.3421	1.31296
	NPDT2; The degree to which the project adhered to the time schedule	3.7009	1.34090
INPR Timeliness	INPRT1; The degree to which the actual availability of the new product for sale in the firm's target country-markets was achieved in a time-efficient manner	4.1957	1.22954
	INPRT2; The adherence of the new products to the rollout schedule	3.5856	1.28668
Competitive Intensity	COM1; There were many competitors in target country-markets.	5.3664	1.67469
	COM2; There was a strong, dominant competitor - with a large market share - in target country-markets.	5.3836	1.48128
	COM3; Potential customers were very loyal to competitors' products in target country-markets.	4.9052	1.38000
	COM4; New product introductions by competitors were frequent in target country-markets.	4.7026	1.43319
Technology Change	TECH1; The rates (speed and pace) of changes in the technology employed in this project were very fast.	4.3534	1.43701
	TECH2; The technology used in this product was changing rapidly.	4.4741	1.46805
	TECH3; Changes in R&D technology for this project were very unpredictable.	3.8793	1.37797
	TECH4; The technology involved in this project was an "undeveloped science," i.e., the technology was not well understood, the phenomena were not well-defined and the predictive state-of-the-art was very low. There was much trial and error research.	3.5758	1.53286
	TECH5; Product life cycle was short in target country-markets.	3.6466	1.52187
	TECH6; The rate of new product introduction was fast in target country-markets.	4.2155	1.47302
	TECH7; The rate of technology change was fast in target country-markets.	4.0606	1.51392
Standardi- -zation	STAN1; Our company tended to standardize marketing-related activities over the countries at which the new product was targeted.	4.4211	1.36601
	STAN2; Our company tended to standardize technical-related activities over the countries at which the new product was targeted.	4.8070	1.34313
New Product Performance	NPP1; How successful was this selected project from an overall profitability standpoint?	4.5043	1.29601
	NPP2; Relative to your firm's other new products, how successful was this selected project in terms of profits?	4.4783	1.25971
	NPP3; Relative to competitors' products, how successful was this selected project in terms of profits?	4.4148	1.35334
	NPP4; Relative to your firm's objectives for this selected project, how successful was this selected project in terms of profits?	4.3843	1.36398
	NPP5; Relative to your firm's other new products, how successful was this selected project in terms of sales?	4.5783	1.30181
	NPP6; Relative to competitors' products, how successful was this selected project in terms of sales?	4.5348	1.23843
	NPP7; Relative to your firm's objectives for this selected project, how successful was it in terms of sales?	4.5345	1.24790
	NPP8; Relative to your firm's other new products, how successful was this selected project in terms of market share?	4.4871	1.35154
	NPP9; Relative to competitors' products, how successful was this selected project in terms of market share?	4.4181	1.35870
	NPP10; Relative to your firm's objectives for this selected project, how successful was it in terms of market share?	4.4224	1.34294

Table 5.4 shows the means and standard deviations of measured variables. The most frequent measure of central tendency is the mean, which includes all data values in its calculation (Saunders *et al.*, 2003). The measure of location is a measure of central tendency because it tends to describe the center of distribution (Malhotra, 1999). The mean of each observed variable as a measure of location has been presented. The

standard deviation is also presented to describe the extent of spread of quantifiable data. As a measure of variability, standard deviation refers to the extent to which the data values for a variable are spread around their mean (Saunders *et al.,* 2003). That is, when the data is pretty tightly bunched together and the bell-shaped curve is steep, the standard deviation is small. When the data is spread apart and the bell curve is relatively flat, the standard deviation is relatively large.

5.2.4 Dimensionality

5.2.4.1 Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity

Prior to conducting the factor analysis, formal statistics such as the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity are available for testing the appropriateness of the factor model. The index of KMO measure compares the magnitudes of the observed correlation coefficients to the magnitudes of the partial correlation coefficients (Malhotra, 1999). Bartlett's test of sphericity indicates whether the correlation matrix is an identity matrix, which would indicate that the variables are unrelated (Malhotra, 1999). The test statistic for sphericity is based on a chi-square transformation of the determinant of the correlation matrix. The significance level is 0.00, which shows that the data are suitable for factor analysis.

In order to examine the appropriateness of conducting factor analysis on the data, The Bartlett test of sphericity and the KMO measure of sample adequacy were carried out. The results are presented in Table 5.5. High values of the KMO measure (between .5 and 1.0) indicate factor analysis is appropriate while values below .5 imply that factor analysis may not be appropriate (Malhotra, 1999). In this study, the KMO measure, which has high values (.5 to .895), showed acceptable sampling adequacy. Also, the Bartlett's test (p=0.000) indicates the statistical probability that the correlation matrix has significant correlations among at least some of the variables. For example, the approximate chi-square statistic on the construct of marketing synergy is 1293.183 with 28 degrees of freedom which is significant at the .05 level. On the basis of the KMO measure and Bartlett's test of sphericity, two statistics showed that factor analysis could be appropriately carried out on the data sets since the Bartlett test indicates that the variables are collinear, and the KMO results indicate that the variables are measuring a common measure.

5.2.4.2 Exploratory Factor Analysis and Unidimensionality

In this section, unidimensionality of each dimension was examined through Exploratory Factor Analysis (EFA). EFA commonly refers to an unrestricted model. The unrestricted model is contrasted to a restricted model commonly referred to as confirmatory factor analysis (Kaplan, 2000). EFA of items is a useful scale development technique to reduce a large number of items to a more manageable set (Chandon *et al.*, 1997). The data were initially factor analysed and there followed a computation of reliability estimates for the measures. Confirmatory factor analysis (CFA) then had to be undertaken for each construct (Grace and O'cass, 2004). In this study, each of the constructs was operationalised using multi-item scales. Therefore, the verification of the unidimensionality of all constructs was carried out before assessing the reliabilities of the constructs (Gerbing and Anderson, 1988).

Factor analysis is a general name denoting a class of procedures primarily used for data reduction and summarization (Malhotra, 1999). The purpose of factor analysis is to determine the construct validity of the factor scale. To identify underlying dimensions, or factors, factor analysis explains the correlations among a set of variables (Malhotra, 1999). Specifically, EFA was used to verify the number of dimensions conceptualised or assess the unidimensionality of the scale items. EFA determined the existence of one factor. That is, factor analysis indicated all items loaded on the same factor. To assess the internal consitency of the scales that measure the domain of each construct and to purify the scales, EFA was run (SPSS for Windows 12.0).

In Table 5.5, I have presented the items and the corresponding factor loading, eigenvalue, percentage of variance explained by the factor. The factor loadings represent the correlations between the factors and the variables (Malhotra, 1999). A factor loading with a large absolute value indicates that the factor and the variable are closely related. When conducting EFA, only the first eigenvalue was greater than 1.00, supporting the contention that these scales are unidimensional (Germain *et al.,* 1994). The eigenvalue for a factor indicates the total variance attributed to that factor (Malhotra, 1999). Each construct was taken, one by one, and a principle component analysis with Varimax rotation and eigenvalue = 1 was performed on construct items.

In every case, only one factor was extracted, thus providing evidence of unidimensionality (see Table 5.5). For example, all four items on cross-functional linkages loaded on a single factor, using eigenvalue > 1 criterion. The single factor explained 75.23 percent of the total variance, and factor loadings ranged from 0.830 to 0.909. In this study, EFA on the data supported the unidimensionality of the scale.

However, EFA does not provide an explicit test of unidimensionality because each factor is defined as a weighted sum of all the available items in that dimension (Gerbing and Anderson, 1988). Only CFA, in which each factor is related to only a subset of indicators, offers a rigorous evaluation of dimensionality and internal consistency (Chandon *et al.*, 1997). According to a study by Grace and O'cass (2004), CFA has to be then conducted to determine if the dimensions, measured by the items, are unidimensional. Therefore, all items will be subjected to a CFA (i.e., the measurement model) using SIMPLIS LISREL to assess their internal consistency and construct validity in the following section.

Table 5.5 The Results of EFA

Factors	Eigen value	% of Variance	Variables loading on factor	Factor loadings	KMO Test	Bartlett's Test
Factor 1: Cross-functional Linkages	3.009	75.230	CFL1	.861	.814	Approx. Chi-Square: 541.778 Df: 6 Sig.: .000
			CFL2	.830		
			CFL3	.909		
			CFL4	.867		
Factor 2: Marketing Synergy	5.275	65.943	MS1	.784	.887	Approx. Chi-Square: 1293.183 Df: 28 Sig.: .000
			MS2	.780		
			MS3	.804		
			MS4	.841		
			MS5	.852		
			MS6	.808		
			MS7	.803		
			MS8	.822		
Factor 3: Marketing Proficiency	4.002	66.699	MP1	.853	.866	Approx. Chi-Square: 841.049 Df: 15 Sig.: .000
			MP2	.850		
			MP3	.794		
			MP4	.860		
			MP5	.741		
			MP6	.795		
Factor 4: Technical Synergy			TS1	.835	.887	Approx. Chi-Square: 1115.285 Df: 15 Sig.: .000
			TS2	.907		
			TS3	.873		
			TS4	.861		
			TS5	.888		
	4.519	75.318	TS6	.841		
Factor 5: Technical Proficiency	4.192	69.867	TP1	.768	.895	Approx. Chi-Square: 916.715 Df: 15 Sig.: .000
			TP2	.855		
			TP3	.892		
			TP4	.887		
			TP5	.852		
			TP6	.750		
Factor 6: HQ-subsidiary/ agent Relationship	3.873	77.468	HQSR1	.882	.873	Approx. Chi-Square: 867.737 Df: 10 Sig.: .000
			HQSR2	.901		
			HQSR3	.843		
			HQSR4	.891		
			HQSR5	.883		
Factor 7: NPD Timeliness	1.561	78.056	NPDT1	.883	0.500	Approx. Chi-Square: 82.239 Df: 1 Sig.: .000
			NPDT2	.883		
Factor 8: INPR Timeliness	1.549	77.436	INPRT1	.880	0.500	Approx. Chi-Square: 78.632 Df: 1 Sig.: .000
			INPRT2	.880		
Factor 9: Competition Intensity	2.569	64.215	COM1	.782	0.729	Approx. Chi-Square: 337.549 Df: 6 Sig.: .000
			COM2	.859		
			COM3	.848		
			COM4	.708		

Factors	Eigen value	% of Variance	Variables loading on factor	Variable loadings	KMO Test	Bartlett's Test
Factor 10: Technology Change	4.074	58.202	TECH1	.821	.843	Approx. Chi-Square: 863.550 Df: 21 Sig.: .000
			TECH2	.835		
			TECH3	.752		
			TECH4	.638		
			TECH5	.671		
			TECH6	.742		
			TECH7	.854		
Factor 11: Standardization	1.698	84.782	STAN1	.921	.500	Approx. Chi-Square: 150.341 Df: 1 Sig.: .000
			STAN2	.921		
Factor 12: New Product Performance	6.970	69.695	NPP1	.819	.930	Approx. Chi-Square: 2042.105 Df: 45 Sig.: .000
			NPP2	.830		
			NPP3	.815		
			NPP4	.823		
			NPP5	.839		
			NPP6	.860		
			NPP7	.839		
			NPP8	.832		
			NPP9	.841		
			NPP10	.850		

5.2.5 Scale Reliability

Following Gerbing and Anderson (1988), the reliabilities of this study's constructs were assessed after verifying the unidimensionality of all constructs. Reliability refers to the extent to which a scale produces consistent results if measurements are made repeatedly (Malhotra, 1999). The most common method of testing the reliability of a questionnaire is to measure Cronbach's alpha, which would generally suggest an unsatisfactory level of reliability if its value was less than 0.7. Moreover, a more common approach to evaluating internal consistency, which concerns the degree to which the items of a measure reflect a single latent variable, involves computing coefficient alpha (Hoyle and Smith, 1994). Table 5.6 shows the result of reliability analysis. In the present sample, internal reliability (Cronbach's alpha) for all the scales was acceptable and ranged from 0.71 for INPR Timeliness to 0.95 for performance, indicating satisfactory internal consistency reliability for the measurements as suggested by Nunnally (1978)[66].

Table 5.6 Reliability

Latent Variable (Item Reference)	Cronbach's Alpha
Cross-functional linkages (CFL1, 2, 3, and 4)	0.889
Marketing Synergy (MS1, 2, 3, 4, 5, 6, 7, and 8)	0.926
Technical Synergy (TS1, 2, 3, 4, 5, and 6)	0.934
Marketing Proficiency (MP1, 2, 3, 4, 5, and 6)	0.898
Technical Proficiency (TP1, 2, 3, 4, 5, and 6)	0.913
HQ-subsidiary/agent Relationship (HQSR1, 2, 3, 4, and 5)	0.927
NPD Timeliness (NPDT1 and 2)	0.719
INPR Timeliness (NPDT 1 and 2)	0.708
Competition Intensity (COM 1, 2, 3, and 4)	0.809
Technology Change (TECH1, 2, 3, 4, 5, 6, and 7)	0.877
Standardization-customization (STAN1 and 2)	0.822
New Product Performance (NPP1, 2, 3, 4, 5, 6, 7, 8, 9, and 10)	0.951

[66] Nunnally (1978) suggests that all the values exceed the 0.70 rule.

5.2.6 Measurement Model (Confirmatory Factor Analysis)

5.2.6.1 Introduction

Structural equation modeling (SEM) is a powerful statistical technique that combines the measurement model (confirmatory factor analysis) and the structural model (regression or path analysis) into a simultaneous statistical test. These two complementary models namely the measurement model, of which factor analysis is an example, and the structural model, which concerns relations among independent and dependent variables and of which the general linear model is an example (Hoyle and Smith, 1994). Unlike the goal of analysis of variance (ANOVA) or multiple regression, which is to model individual observations, the primary aim of structural equation modeling is to model covariances, and it entails proposing a set of relations (i.e., a model) and evaluating their consistency with the relations manifest in an observed covariance matrix (Bollen, 1989).

Specifying the measurement model consists of assigning indicators to a specific latent variable or construct (Garver and Mentzer, 1999). A confirmatory factor analysis (CFA) model, or confirmatory measurement model, specifies the posited relations of the observed variables to the underlying constructs, with the constructs allowed to intercorrelate freely (Anderson and Gerbing, 1988). That is, the measurement model concerns the relations between observed and latent variables. In order to test the posited structural model, measurements for each construct have to be obtained. This process systematically guides refinement and modifications and assures that the constructs will possess both internal and external consistency (Steenkamp and van Trijp, 1991). This is consistent with previous literature (e.g., Jöreskog and Sörbom, 1993; MacCallum, 1986) which suggests a thorough investigation of the measurement model prior to the construction of a structural model. Therefore, the current study followed the procedures and tested the measurement model first, and followed this by testing the structural model. Subsequent to the assessment of the measurement model, a structural model is evaluated in order to test the hypotheses that were postulated earlier (Nahm *et al.,* 2004). This should be done in order to avoid the possible interactions between the measurement and structural models (Matsuno and Mentzer, 2000; Koufteros *et al.*, 2005). If the structural model fits the data adequately, the t-values of the structural coefficients (i.e., Gamma and Beta) can be used to test the research hypotheses (Nahm *et al.*, 2004).

As mentioned earlier, the measurement model specifies the rules of correspondence between manifest and latent variables. That is, the purpose of a measurement model is to describe how well the observed indicators serve as a measurement instrument for the latent variables (Jöreskog and Sörbom, 1993). Evaluation of the measurement model is an assessment of the degree to which a set of ratings or questionnaire responses is consistent with the theoretical definition of the variable or construct researchers were designed to measure. The key concepts of a measurement model are measurement, reliability, and validity (Jöreskog and Sörbom, 1993). With respect to reliability, the literature has presented construct reliability and average variance extracted (AVE) (Fornell and Larker, 1981). A validity test can be also considered to be a discriminant validity test as well as a convergent validity test for this study.

5.2.6.2 Goodness-of-Fit Measures

A number of goodness-of-fit measures have been proposed and studied in the literature. The overall fit of a model can be assessed using fit indices such as the ratio of chi-square to degree of freedom, Bentler and Bonnet's (1980) Non-Normed Fit index (NNFI), Bentler's (1990) Comparative Fit Index (CFI), Root Mean Square Residual (RMR) (Jöreskog and Sörbom, 1993) and the root mean square error of approximation (RMSEA) (Browne and Cudeck, 1993). As typically used, the model is rejected if the χ^2 is large relative to the *df*, and accepted if the χ^2 is nonsignificant or small (Marsh *et al.*, 1988). Criteria for evaluation of model fit can be found in Byrne (1998) and Hu and Bentler (1999). The goodness of fit index (GFI) and the adjust GFI (AGFI) indice range from zero to 1.00, with a value close to 1.00 indicating a good fit. The RMR indicates the average discrepancy of the elements in the sample and hypothesised covariance matrices. The RMR values range from zero to 1.00. Given a good fit between the hypothesised model and the observed data, the RMR value will be small (this value should be < 0.05). However, incorrect models can also have RMR values < 0.05.

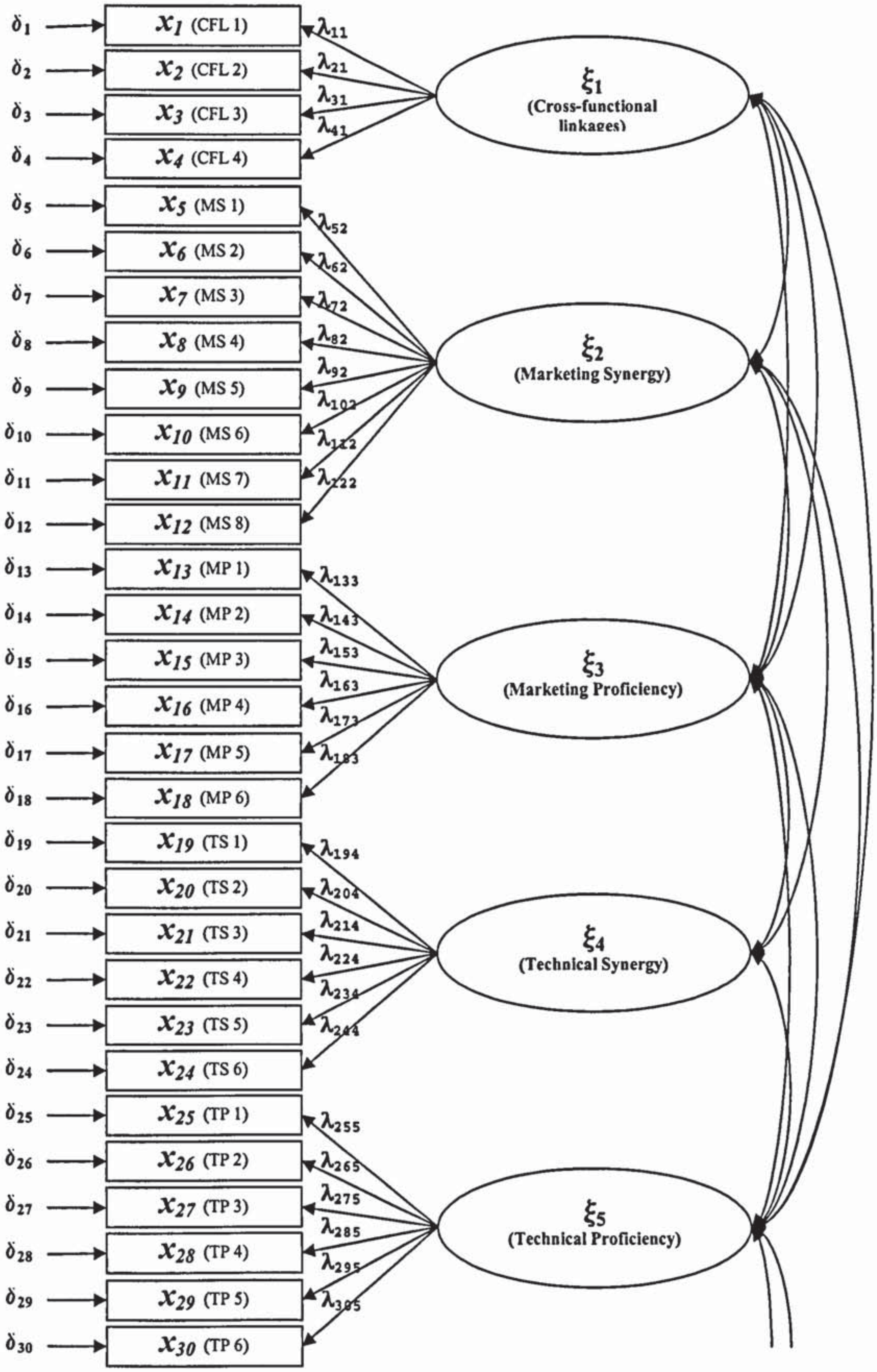
Model rejections using rules of thumb frequently suggested in the literature are as follows; for GFI and CFI, values less than .90 imply bad model fit; for RMSEA, values greater than .08 imply bad model fit; for the chi-square and close fit tests, p values less than .05 imply bad model fit. According to Jaccard and Wan (1996), the traditional chi-square test was suspect because it could be seen that the CFI performed best, followed by the GFI and RMSEA statistics. Therefore, it is important not to rely too heavily on a single index in determining model fit (Byrne, 1998).

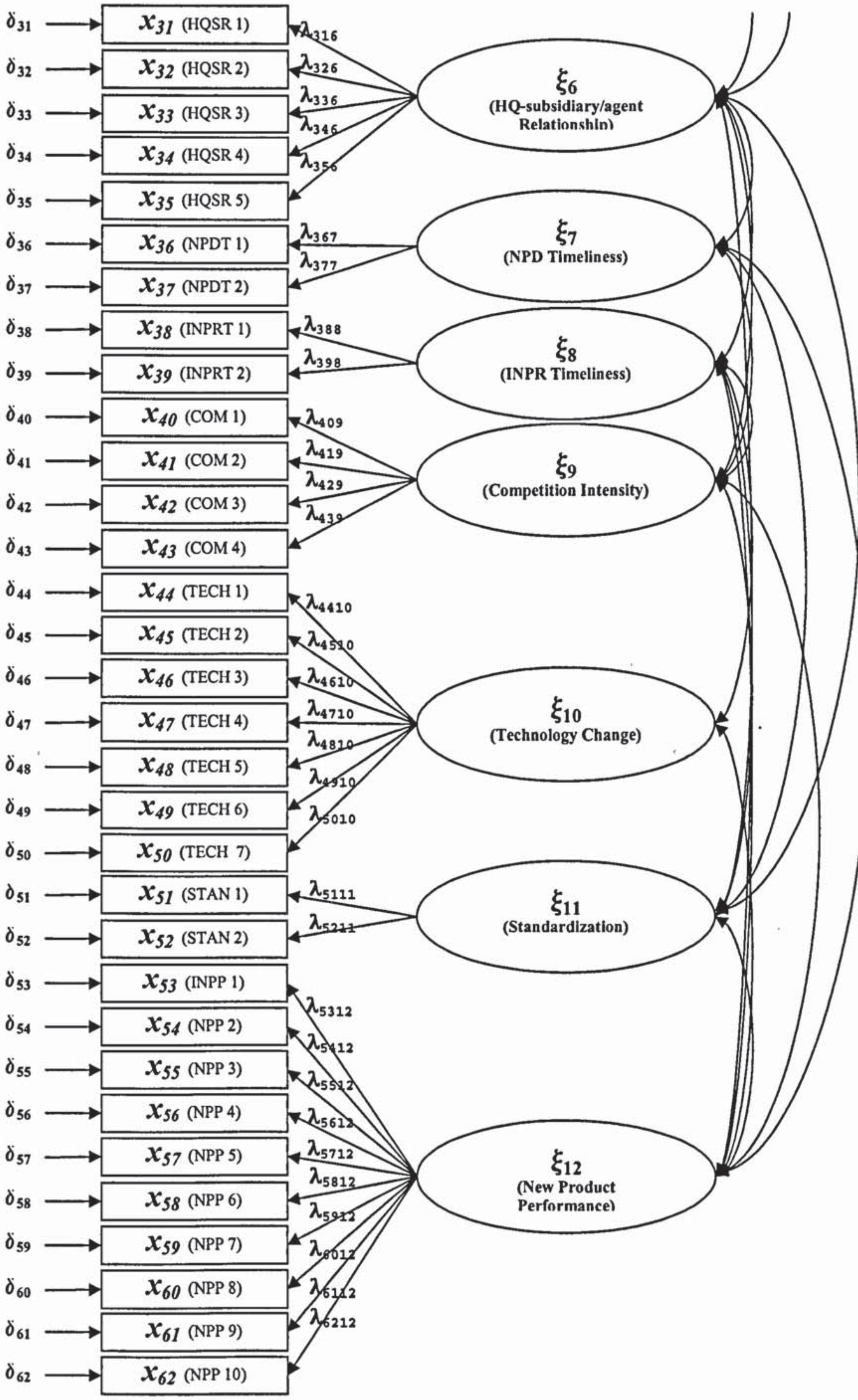
5.2.6.3 Assessment of Measurement Model

For the measurement model, a confirmatory factor analysis (CFA) was run on the covariance matrix of the 62 observed variables (items). Figure 5.1 shows the CFA model for antecedents and consequences of NPD and INPR timeliness including 3 moderator variables (i.e., competition intensity, technology change and standardization). Initially, a CFA using the SIMPLIS programme was conducted for twelve constructs (latent factors $\xi_1, \ldots, \xi_{12}$, i.e., cross-functional linkages, marketing synergy, marketing proficiency, technical synergy, technical proficiency, HQ-subsidiary/agent relationship, NPD timeliness, INPR timeliness, competition intensity, technology change, standardization, and new product performance). CFA was performed on the entire set of items simultaneously (Anderson *et al.,* 1987). The latent factor ξ_j represents a theoretical construct and the observed measures x_i are designed to be indicators of this construct (Jöreskog and Sörbom, 1993). A general rule of thumb is that measurement models have difficulty estimating over 5 parameters (indicators) for a given latent variable (Garver and Mentzer, 1999).

The overall model fit indices demonstrate a lack of fit. As for the measurement model, the chi-square value is 3784.68 (degree of freedom = 1763, p = 0.00000), the goodness-of-fit index (GFI) value is 0.654, non-normed fit index (NNFI) value is 0.809, the comparative fit index (CFI) value is 0.822, and the root mean square error of approximation (RMSEA) value is 0.070 (see Appendix 5.1). Initially specified measurement models almost invariably fail to provide acceptable fit (Anderson and Gerbing, 1988). If LISREL shows a bad fit for the model, respecification is necessary (Anderson and Gerbing, 1988; Steenkamp and Trijp, 1991). Standardized residual values $\geq |2.58|$ for any element may be considered as indication of possible model misspecification (Byrne, 1989; Marsh and Hocevar, 1985).

Figure 5.1 A Measurement Model (Confirmatory Factor Analysis)




δ31 x31 (HQSR 1)
δ32 x32 (HQSR 2)
δ33 x33 (HQSR 3)
δ34 x34 (HQSR 4)
δ35 x35 (HQSR 5)
δ36 x36 (NPDT 1)
δ37 x37 (NPDT 2)
δ38 x38 (INPRT 1)
δ39 x39 (INPRT 2)
δ40 x40 (COM 1)
δ41 x41 (COM 2)
δ42 x42 (COM 3)
δ43 x43 (COM 4)
δ44 x44 (TECH 1)
δ45 x45 (TECH 2)
δ46 x46 (TECH 3)
δ47 x47 (TECH 4)
δ48 x48 (TECH 5)
δ49 x49 (TECH 6)
δ50 x50 (TECH 7)
δ51 x51 (STAN 1)
δ52 x52 (STAN 2)
δ53 x53 (INPP 1)
δ54 x54 (NPP 2)
δ55 x55 (NPP 3)
δ56 x56 (NPP 4)
δ57 x57 (NPP 5)
δ58 x58 (NPP 6)
δ59 x59 (NPP 7)
δ60 x60 (NPP 8)
δ61 x61 (NPP 9)
δ62 x62 (NPP 10)
λ316 λ326 λ336 λ346 λ356
λ367 λ377
λ388 λ398
λ409 λ419 λ429 λ439
λ4410 λ4510 λ4610 λ4710 λ4810 λ4910 λ5010
λ5111 λ5211
λ5312 λ5412 λ5512 λ5612 λ5712 λ5812 λ5912 λ6012 λ6112 λ6212
ξ6 (HQ-subsidiary/agent Relationship)
ξ7 (NPD Timeliness)
ξ8 (INPR Timeliness)
ξ9 (Competition Intensity)
ξ10 (Technology Change)
ξ11 (Standardization)
ξ12 (New Product Performance)

5.2.6.4 Model Respesification

Model respecification or modification is mostly undertaken when the tested model experiences model misspecification shown by poor model fit or lack of unidimensionality. There are at least two reasons for modifying an SEM model: to improve fit and to test hypotheses. If the measurement model possesses an unacceptable fit, standardized residual and modification indices can help the researcher determine why the model is unacceptable (Jöreskog and Sörbom, 1981). An acceptable measurement of unidimensional constructs should reveal relatively small standardized residuals and modification indices (Anderson and Gerbing, 1988).

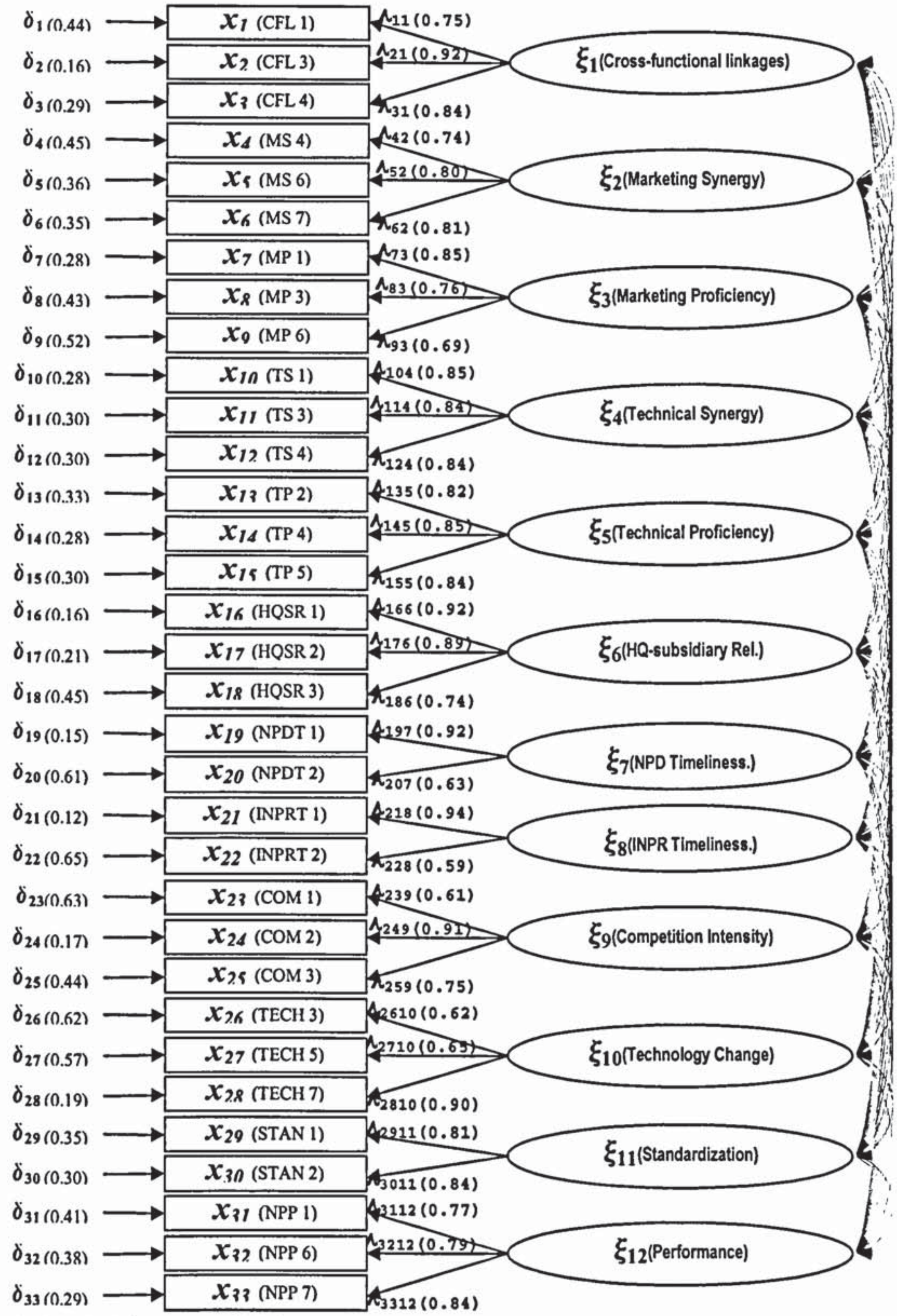
According to Ullman (2001), the three basic methods of model modification are the chi-square difference test, Lagrange multiplier tests (LM), and Wald tests. The chi-square difference test identifies that χ^2 value for the larger model is subtracted from the χ^2 value for the smaller nested model and the difference, also a χ^2, is evaluated with degrees of freedom equal to the difference between the degree of freedom in the two models. The LM test asks if the model is improved if one or more of the parameters are added to a model. That is, this method of model modification is analogous to forward stepwise regression. The Wald test asks which parameters, if any, could be deleted from a model. The Wald test is analogous to backward deletion of variables in stepwise regression where one seeks a nonsignificant change in the equation when variables are left out. In this study, the Wald test was applied.

There are several large residuals (i.e., $\geq|2.58|$). For example, Item TECH2 – The technology used in this product was changing rapidly – has the largest standard residuals (e.g 10.783 for Item TECH2 and Item TECH1; 5.265 for Item TECH2 and Item COM4; -3.048 for Item TECH2 and Item COM1). This implies that the overall model fit improves when the item with largest standard residuals is deleted (Anderson and Gerbing, 1988). Therefore, Item TECH2 was removed and then a CFA was carried out. The statistics still indicate a need for improvement in model fit (i.e., χ^2 = 3599.98, d.f. = 1703, p = 0.00000, GFI = 0.662, NNFI = 0.815, CFI = 0.827, RMSEA = 0.069). Accordingly further iterations were carried out successively dropping the item with the largest standard residuals and conducting a CFA until the statistics of overall model fit are satisfactory (see Appendix 5.1).

The process of model respecification resulted in the deletion of 29 items. The final model, which excludes Items TECH2, MS8, NPP10, 9, TECH6, 1, MP2, MS5, TP3, NPP8, 2, 3, 4, 5, TP6, TS2, MP5, TP1, MS3, TS5, HQSR5, 4, CFL2, MS1, 2, TS6, MP4, COM4, and TECH4, indicates that the chi-square value is 706.30 (degree of freedom = 429, p = 0.000). The final model shows a significant χ^2 (i.e., p values less than .05). A statistically significant chi-square causes rejection of the null hypothesis, implying imperfect model fit and possible rejection of the model (Jaccard and Wan, 1995). That is, the null hypothesis of perfect data-model fit is rejected at the 0.05 level of significance. However, Bentler and Bonett (1980) and Jöreskog and Sörbom (1981) noted that applications of the chi-square test are often unjustified in practice. To apply the test it must be assumed that (1) the observed variables are normally distributed, (2) the analysis is based on a sample covariance matrix rather than a sample correlation matrix, and (3) the sample size is large enough to justify the asymptotic properties of the chi-square test. At least one of these assumptions is generally violated in applications of the confirmatory factor model (Long, 1983). Moreover, the chi-square statistics are substantially affected by sample size (Marsh *et al.,* 1988). Therefore, Jöreskog and Sörbom (1981) suggested that the chi-square test be used as an indicator of how well the model reproduces the observed covariance matrix, rather than as a formal test of a hypothesis. An alternative to χ^2 (i.e., χ^2/df ratio) has been proposed. Byrne (1998) suggests that a χ^2/df ratio > 2.00 represents an inadequate fit. Consequently, the final model is adequate because the ratio of χ^2 to the degree of freedom is less than 2 (i.e., a χ^2/df ratio = 1.65). Moreover, the final model shows good alternative indices that Root Mean Square Error of Approximation (RMSEA) is 0.053, Non-Normed Fit index (NNFI) value is 0.913 and the comparative fit index (CFI) value is 0.929. Based on the several overall model fit indices, the final model is adequate. Figure 5.2 and Table 5.7 show the final items for each construct.

5.2.6.5 The Results of Measurement Model

Figure 5.2 The Results of Confirmatory Factor Analysis



χ^2 = 706.30 (d.f = 429, p = 0.000), GFI=0.844, NNFI=0.913, CFI=0.929, and RMSEA=0.053

Table 5.7 CFA Results for Measurement Model: Standardized Coefficient Loadings and *t*-values

Items	Standardized Factor Loadings (*t*-values)											
	Cross-functional linkages	Marketing Synergy	Marketing Prof	Technical Synergy	Technical Prof.	HQ-subsidiary Rel.	NPD Timeliness	INPR Timeliness	Competitive Intensity	Tech. Change	Standard -ization	New Product Performance
CFL1@	0.75(Fixed)											
CFL3	0.92(13.61)											
CFL4	0.84(12.88)											
MS4@		0.74(Fixed)										
MS6		0.80(11.47)										
MS7		0.81(11.61)										
MP1@			0.85(Fixed)									
MP3			0.76(12.95)									
MP6			0.69(11.48)									
TS1@				0.85(Fixed)								
TS3				0.84(15.46)								
TS4				0.84(15.45)								
TP2@					0.82(Fixed)							
TP4					0.85(14.63)							
TP5					0.84(14.38)							
HQSR1@						0.92(Fixed)						
HQSR2						0.89(19.10)						
HQSR3						0.74(13.91)						
NPDT1@							0.92(Fixed)					
NPDT2							0.63(7.66)					
INPRT1@								0.94(Fixed)				
INPRT2								0.59(7.54)				
COM1@									0.61(Fixed)			
COM2									0.91(8.50)			
COM3									0.75(8.75)			
TECH3@										0.62(Fixed)		
TECH5										0.65(7.97)		
TECH7										0.90(7.62)		
STAN1@											0.81(Fixed)	
STAN2											0.84(12.39)	
NPP1@												0.77(Fixed)
NPP6												0.79(11.64)
NPP7												0.84(12.18)
CR*	0.876	0.826	0.811	0.879	0.874	0.888	0.760	0.752	0.806	0.773	0.807	0.842
AVE**	0.704	0.614	0.591	0.708	0.700	0.727	0.621	0.615	0.587	0.540	0.677	0.640

Notes;

@: reference variable (indicator); The way to assign a unit of measurement for a latent variable is to fix a non-zero coefficient (usually one) in the relationship for one of its observed indicators.

Composite Reliability (CR)=(∑Completely Standardized Solution)²/{(∑Completely Standardized Solution)²+∑Measurement error}

** Average variance extracted (AVE)=∑(Completely Standardized Solution²)/{∑(Completely Standardized Solution²)+∑Measurement error}

5.2.6.5.1 Correlations and Descriptive Statistics

Descriptive statistics are used to describe the basic features of the data in a study. The descriptive statistics of the individual scales are contained in Table 5.8.

Table 5.8 Correlations and Descriptive Statistics (N=232)

Construct	1	2	3	4	5	6	7	8	9	10	11	12
1.Cross-functional linkages	1.00											
2.Marketing Synergy	0.57***	1.00										
3.Marketing Proficiency	0.57***	0.65***	1.00									
4.Technical Synergy	0.65***	0.74***	0.76***	1.00								
5.Technical Proficiency	0.54***	0.65***	0.76***	0.76***	1.00							
6.HQ-Subsidiary Relationship	0.55***	0.64***	0.76***	0.60***	0.60***	1.00						
7. NPD Timeliness	0.48***	0.52***	0.47***	0.46***	0.38***	0.45***	1.00					
8.INPR Timeliness	0.39***	0.56***	0.60***	0.48***	0.47***	0.51***	0.60***	1.00				
9.Competitive Intensity	-0.04	-0.08	0.14*	-0.01	0.11	0.10	-0.16*	0.02	1.00			
10.Technology Change	0.10	0.12	0.03	0.19*	0.05	-0.01	0.02	0.04	0.05	1.00		
11.Standardi--zation	0.51***	0.74***	0.63***	0.71***	0.70***	0.63***	0.39***	0.55***	0.04	0.10	1.00	
12. New Product Performance	0.31***	0.55***	0.66***	0.54***	0.50***	0.53***	0.34***	0.46***	0.11	0.07	0.52***	1.00
Mean	5.04	4.35	4.78	4.88	5.31	4.99	4.03	3.91	5.22	3.91	4.61	4.52
Standard deviation	1.16	1.09	1.05	1.04	1.11	1.16	1.17	1.10	1.29	1.17	1.25	1.10
Number of Items	3	3	3	3	3	3	2	2	3	3	2	3

* p<0.05
** p<0.01
*** p<0.005

Notes; I measured all constructs on seven-point scales. All significance tests are one-tailed.

5.2.6.5.2 Goodness-of-Fit Indices, Standardized Coefficient Loadings and *t*-values

Model respecifications were undertaken and as a result, several items were eliminated from this process. Table 5.7 shows the final items for each construct. The posited measurement model appears to be supported by various fit indices. Before testing for a significant relationship in the structural model, one must demonstrate that the measurement model has a satisfactory level of reliability and validity (Hoyle and Smith, 1994). This application corrects measures for unreliability and maintains the maximum flexibility in modeling the relations among independent and dependent variables. Reliability is defined in the classic sense as the proportion of true variance relative to total variance (Ullman, 2001). The question of validity is a multifaceted one that involves the evaluation of the internal characteristics of a measure as well as its relations with other measures (Hoyle and Smith, 1994).

The first step in the statistical process is to test constructs in the measurement model for unidimensionality (Steenkamp and van Trijp, 1991). Unidimensionality is a necessary condition for the analysis of construct reliability and validity (Garver and Mentzer, 1999). Scale unidimensionality is assessed by the overall fit of the confirmatory model (Garver and Mentzer, 1999; Kumar and Dillon 1987). That is, it is demonstrated when the indicators of a construct have acceptable fit on a one-dimensional or single factor measurement model. According to Garver and Mentzer (1999), an over-identified measurement model with the Comparative Fit Index (CFI) and the Non-Normed Fit Index (NNFI) of .90 or higher suggests unidimensionality. Furthermore, it is achieved if the root mean square error of approximation (RMSEA) is less than 0.08 (Garver and Mentzer, 1999). Accordingly, the results (i.e., CFI=0.929, NNFI=0.913 and RMSEA=0.053) of the measurement model provide evidence of unidimensionality of the scale.

The completely standardized coefficients, along with *t*-values, provide evidence of convergent validity. Convergent validity refers to the convergence among different methods designed to measure the same construct (Pedhazur and Schmelkin, 1991). It is assessed by examining the significance of item loadings through *t*-tests

(Dunn *et al.*, 1994; Nahm *et al.*, 2004). That is, it can be assessed from the measurement model by determining whether each indicator's estimated pattern coefficient on its posited underlying construct factor is significant (greater than twice its standard error) (Anderson and Gerbing, 1988). All standardized coefficient loadings in this model were significant at $P < 0.01$ (see Table 5.7). Therefore, support for convergent validity was offered through the highly significant loading estimates for each of the individual indicator items (Gerbing and Anderson, 1988).

5.2.6.5.3 The Results of Validity Tests

Table 5.9 AVE and Squared Correlation

Construct	AVE	Squared correlation											
		1	2	3	4	5	6	7	8	9	10	11	12
1.Cross-functional linkages	0.704	1.00											
2.Marketing Synergy	0.614	0.33	1.00										
3.Marketing Proficiency	0.591	0.32	0.43	1.00									
4.Technical Synergy	0.708	0.43	0.55	0.58	1.00								
5.Technical Proficiency	0.700	0.29	0.42	0.57	0.58	1.00							
6.HQ-Subsidiary Relationship	0.727	0.30	0.41	0.57	0.35	0.36	1.00						
7.NPD Timeliness	0.621	0.23	0.27	0.22	0.21	0.15	0.20	1.00					
8.INPR Timeliness	0.615	0.15	0.32	0.36	0.23	0.22	0.26	0.36	1.00				
9.Competitive Intensity	0.587	0.00	0.01	0.02	0.00	0.01	0.01	0.03	0.00	1.00			
10.Technology Change	0.540	0.01	0.01	0.00	0.04	0.00	0.00	0.00	0.00	0.00	1.00		
11. Standardization	0.677	0.26	0.54	0.39	0.50	0.49	0.40	0.15	0.30	0.00	0.01	1.00	
12. New Product Performance	0.640	0.10	0.31	0.43	0.29	0.25	0.28	0.11	0.21	0.01	0.01	0.27	1.00

Validity is the basis of the research process (Mentzer and Flint, 1997). The measurement model is assessed by convergent validity and discriminant validity (Campbell and Fiske 1959). Convergent validity is the extent to which the latent variable correlates to items designed to measure that same latent variable (Mentzer and Flint, 1997). It is also assessed by the internal consistency (e.g., reliability) of each measure and construct, and the average variance extracted (AVE) of each construct (Fornell and Larker 1981). In contrast, discriminant validity is the extent to which the items representing a latent variable discriminate that construct from other items representing other latent variables (Mentzer and Flint, 1997). It can be assessed by comparing the AVE to the squared correlation between constructs (Fornell and Larker, 1981).

5.2.6.5.3.1 Convergent Validity: Composite Reliability (CR)

To lend further support to the measures of reliability and validity, the composite (construct) reliability (CR) for each scale was calculated (see Table 5.7). CR estimates the internal consistency of a latent construct (Clark *et al.,* 2001). This was calculated using standardized loadings and measurement error obtained from the CFA program output (see Figure 5.2). CR was calculated using the procedures outlined by Fornell and Larker (1981).

Equation 5.1 Composite Reliability

$$CR_\eta = \frac{(\Sigma\lambda\gamma_i)^2}{(\Sigma\lambda\gamma_i)^2 + \Sigma\epsilon_i}$$

Where $CR\eta$ is the composite reliability for scale η, $\lambda\gamma_i$ is the standardized loading for scale item γ_i, and ϵ_i is the measurement error for scale item γ_i. Fornell and Larker (1981) recommended that CR estimates exceed .70 for latent constructs. In this study, $CR\eta$ values ranged from 0.752 to 0.888 (see Table 5.7). Therefore, the scale composite reliability for each construct was quite satisfactory.

5.2.6.5.3.2 Convergent Validity: Average Variance Extracted (AVE)

Item convergence was also assessed through calculation of average variance extracted (AVE) scores. AVE measures the amount of variance explained by a construct as compared to the variance due to random measurement error (Clark *et al.*, 2001). The formula is similar to that of construct reliability. AVE was calculated using the procedures outlined by Fornell and Larker (1981).

Equation 5.2 Average Variance Extracted

$$AVE\eta = \frac{(\Sigma\lambda\gamma_i^2)}{(\Sigma\lambda\gamma_i^2) + \Sigma\epsilon_i}$$

Where $AVE\eta$ is the average variance extracted for scale η, $\lambda\gamma_i$ is the standardized loading for scale item γ_i, and ϵ_i is the measurement error for scale item γ_i. If AVE is less than 0.50, the variance due to measurement error is larger than the variance captured by the construct, and the validity of the individual indicators as well as the construct is questionable (Fornell and Larker, 1981). Generally, score greater than 0.50 supports a case for convergent validity. The results provide support for the independence of the dimensions (see Table 5.7). That is, the AVE for each construct ranged from 0.540 to

0.727, exceeding the acceptable level of 0.50. Based on standardized coefficient loadings, *t*-values, CR estimates and AVE measures, the results indicated acceptable evidence of convergent validity. These satisfactory indices show that the measurement model has an excellent fit and that it can be used as the baseline model to investigate further invariance.

5.2.6.5.3.3 Discriminant Validity

As mentioned earlier, discriminant validity refers to the degree to which a construct differs from other constructs. This study assessed it by determining if the shared variance between two constructs (i.e., squared correlation) is lower than each construct's AVE (Fornell and Larker, 1981). In Table 5.9, the highest squared correlation was observed between technical proficiency and technology synergy (i.e., 0.58), technology synergy and marketing proficiency (i.e., 0.58), technical proficiency and marketing proficiency (i.e., 0.57), the HQ-subsidiary/agent relationship and marketing proficiency (i.e., 0.57), technology synergy and marketing synergy (i.e., 0.55), and standardization and marketing synergy (i.e., 0.54). These were however lower than the respective AVE for the latent variables which stood at 0.70, 0.71, 0.70, 0.73, 0.71and 0.68. Consequently, they are suggestive of discriminant validity.

5.2.6.5.4 Common Method Bias

Tests were conducted to assess if common method bias would be problematic for the interpretation of the results. Harmon's single factor test[67] was used to test for this bias (Podsakoff *et al.*, 2003). That is, the assessment of the severity of method variance is to conduct CFA on competing models that increase in complexity (Korsgaard and Roberson, 1995). If common method variance[68] is a significant problem, a single factor model should fit the data as well as a more complex model. Therefore, this study examined the fit of a model in which all indicators loaded on one factor and then the single factor model resulted in $\chi^2(495) = 2372.33$. The measurement model ($\chi^2(429) = 706.30$) was found to fit the data significantly better than one factor model (i.e., the difference in the chi-square statistic between the single factor model and the measurement model was significant; the change in $\chi^2 = 1666.03$, the change in $df = 66$, $p < 0.05$) (Brockman and Morgan, 2006). This result demonstrates that the probability of common method variance occurring is minimized and common method bias was not a serious threat in this study. This is also affirmed by the better fit of the competing models as they increased in complexity (Korsgaard and Roberson, 1995).

[67] This is based on the assumption that if the risk of common method bias is substantial, a single latent factor will explain the majority of the covariance among the measures.

[68] Method variance refers to variance that is attributable to the measurement method rather than to the construct of interest (Podsakoff *et al.*, 2003).

5.3 Hypotheses Tests

5.3.1 Overall Structural Model and Hypotheses Tests

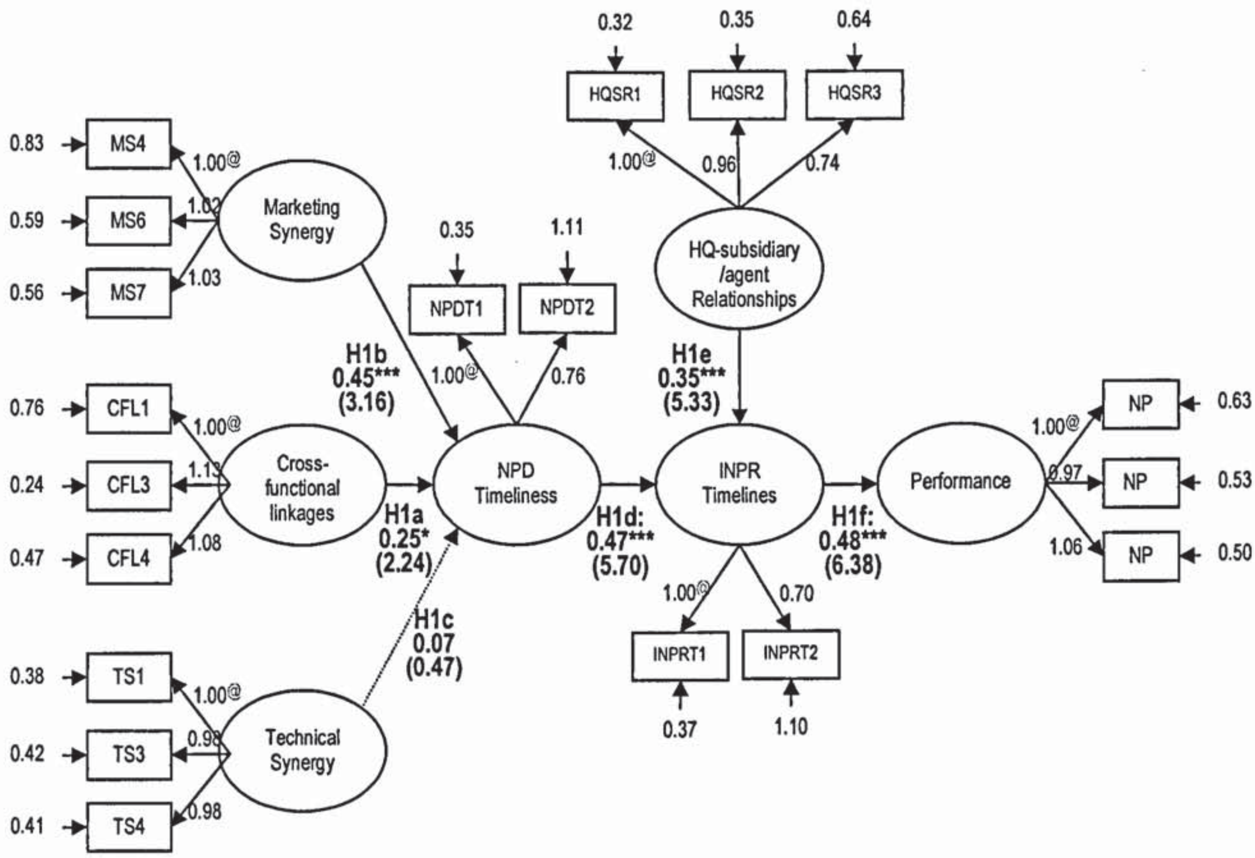
5.3.1.1 Introduction

Once the measurement model is validated, the second step, estimating the structural relationships (regression or path analysis) between latent variables, should be conducted (Garver and Mentzer, 1999). It is in the second step where the theoretical model can be tested (Anderson and Gerbing, 1988). Consequently, the conceptual framework and hypotheses based on the literature review was tested using structural equation modeling (SEM). That is, to test hypotheses, a structural model was evaluated. If a model fits the data adequately, the *t*-values of the structural coefficients (i.e., γ and β) can be used to test the research hypotheses (Koufteros *et al.*, 2005). To determine whether the mediator mediates the effects of the predictor on the outcome, four conditions must hold: (1) The predictor variables must affect the mediator in the predicted direction, (2) the mediator must affect the dependent variable in the predicted direction, (3) the predictor variables must affect the dependent variable in the predicted direction, and (4) the impact of the predictors on the dependent variable must be not significant (full mediation) or reduced (partial mediation) after controlling for the mediator (Baron and Kenny 1986; Holmbeck 1997). At this point, if there is a mediational effect, the fit of the A→ B→ C (A→ C: 0) (i.e., the constrained) model is not significantly better than the fit of the A→ B, B→ C, A→ C (i.e., the non-constrained) model. That is, if there is a mediational effect, the addition of the A → C path to the constrained model should not improve the fit. Improvement in fit was assessed with a significance test on the basis of the difference between the two model chi-squares. To conduct a chi-square difference test, the difference in chi-square values and the difference in degrees of freedom for the two models should be calculated (Garver and Mentzer, 1999). The critical value of chi-square statistical difference with one d.f. at the $\alpha = .05$ level is 3.84.

To test for the presence of moderation, researchers assess the overall fit of the model under two conditions (Holmbeck, 1997): (a) when there are no constraints on the solution (i.e., when the relationship between the predictor and criterion variables can vary as a function of a moderator) and (b) when the association between the predictor and criterion variables is constrained to be equal (i.e., an equality constraint) for the two groups (e.g., high and low competition). The effect of this constraint is to test a model where no Predictor × Moderator interaction is present. Researchers can then calculate and test the significance of the difference between the goodness-of-fit chi-square values for the two models (Holmbeck, 1997). If there is a significant deterioration in model fit when evaluating the model under the constraint of the second condition (an assumption of no interaction), this would indicate that a significant interaction is present. To assess the role of external environments such as competitive intensity and technology change and standardization, the method used amounted to testing for moderator effects. For each of the three moderators, two groups were formed such as high and low groups. The high and low groups were formed based on the median score on the respective moderator scale. Firms scoring below the median score were classified as belonging to the low group and firms scoring above the median score were classified as belonging to the high group.

5.3.1.2 Hypotheses Tests of The Direct Effects Model

Figure 5.3 Path Diagram Results for the Hypothesized Structural Model: The Direct Effects



χ^2 = 463.34 (d.f = 254, p = 0.000), NNFI=0.925, CFI=0.936, RMSEA=0.060

Notes; "dotted" arrow line means a nonsignificant path at the 5% significant level.

@: reference variable (indicator)

* p<0.05

** p<0.01

*** p<0.005

Table 5.10 Summary Table of Structural Model for testing Direct Effects

Hypothesis	Path	γ and β Estimates	t-value
H1a	Cross-functional linkages → NPDt	0.45	3.16***
H1b	Marketing synergy → NPDt	0.25	2.24*
H1c	Technical synergy → NPDt	0.07	0.47
H1d	NPDt → INPRt	0.47	5.70***
H1e	HQ-Subsidiary Relationship → INPRt	0.35	5.33***
H1f	INPRt → New Product Performance	0.48	6.38***

The general structural equation model permits directional predictions among a set of independent or a set of dependent variables (Hoyle and Smith, 1994). The overall structural model fit appeared to be reasonable (e.g., chi-square = 463.34, 254 df, chi-square/df = 1.82, NNFI = 0.925, CFI = 0.936, and RMSEA = 0.060). Hence one proceeded with testing hypotheses H1a-H1f. Hypotheses H1a, H1b and H1c stated that the level of cross-functional linkages, marketing synergy and technical synergy will have a positive effect on NPD timeliness.

H1a: The level of cross-functional linkages is associated positively with the level of timeliness in NPD

H1b: The level of marketing synergy is associated positively with the level of timeliness in NPD

H1c: The level of technology synergy is associated positively with the level of timeliness in NPD

Except H1c, the results support H1a and H1b (Table 5.10, Figure 5.3). That is, cross-functional linkages did exhibit a statistical effect on NPD timeliness. The coefficient was positive ($t = 2.24$, $P < 0.05$). Higher level of marketing synergy was associated with higher level of NPD timeliness ($t = 3.16$, $P < 0.005$). Based on the literature review, technology synergy was also expected to have a positive influence on NPD timeliness. However, the study found a no statistically significant link ($t = 0.47$, $P > 0.05$).

Hypotheses H1d and H1e suggested that NPD timeliness and the HQ-subsidiary/agent relationship have an impact on INPT timeliness.

H1d: The level of NPD timeliness is associated positively with the level of INPR timeliness

H1e: The level of HQ-subsidiary/agent relationship is associated positively with the level of INPR timeliness

The data support this assertion and indicate that a higher level of NPD timeliness is related to a higher level of INPR timeliness (t = 5.70, P < 0.005). The results also indicate that the HQ-subsidiary/agent relationship had a statistically significant and positive connection with INPR timeliness (t = 5.33, P < 0.005).

Hypothesis H1f argued for a positive relationship between INPR timeliness and performance.

H1f: The level of INPR timeliness is associated positively with new product performance

This hypothesis was strongly supported. A higher level of INPR timeliness was associated with a higher level of performance (t = 6.38, P < 0.005). This suggests that INPR timeliness may be indispensable in the quest for improvements in performance in target-country markets.

5.3.1.3 Hypotheses Tests of Mediational Models

After testing causal (direct) effects across latent variables, the mediational hypothesis is a secondary one that follows demonstration of an effect. To use an SEM approach to testing mediated effects, the current study took steps as follows (Holmbeck, 1997); assuming that there is a latent predictor variable (A), and hypothesized latent mediator variable (B), and a latent outcome variable (C), the fit of the direct effect (A→ C) model was first assessed (see Figure 5.3 and Table 5.10). In this model, no third-variable (B) complications such as marketing and technical proficiency and INPR timeliness was assumed. In the second step, the fit of the overall A→ B→ C (A→ C: 0) (i.e., the constrained) model was tested to examine the A→ B and B→ C path coefficients (see Table 5.11). At this point, the A→ B and B→ C paths should all be significant in the directions predicted. In the third step, the fit of the overall A→ B, B→ C, A→ C (i.e., the non-constrained) model was tested to examine the A→ B, B→ C and A→ C path coefficients (see Table 5.11). If there is a mediational effect, the previously significant A→ C path is reduced to nonsignificance (i.e., full mediation). In the non-constrained model, the A→ B and B→ C paths should all be significant in the directions predicted as well. In the final step, the current researcher also examined whether the non-constrained model provides an insignificant improvement in fit over the constrained model based on the chi-square difference.

Table 5.11 Summary Table of Structural Model: Mediating Effects

	A (a latent predictor)	B (a latent mediator)	C (a latent outcome)	A→C (The Direct Effect Model)	A→B→C (A→C:0) (The Constrained Model)		A→B, B→C, A→C (Non-constrained Model)			Δχ²
					A→B	B→C	A→B	B→C	A→C	
H2a	Cross functional linkages	Marketing proficiency	NPD Timeliness	0.25* (2.24)	0.55*** (7.68)	0.74*** (5.82)	0.55*** (7.60)	0.70*** (4.56)	0.09 (0.58)	χ^2 = 2.24 (d.f. = 1)
	Model fit	Chi-square		463.34 (p = .00)	593.93 (p = .00)		591.69 (p = .00)			
		Degree of freedom		254	258		257			
		NNFI		0.925	0.884		0.884			
		CFI		0.936	0.900		0.900			
		RMSEA		0.060	0.075		0.075			
H2b	Marketing synergy	Marketing proficiency	NPD Timeliness	0.45*** (3.16)	0.81*** (8.82)	0.94*** (5.17)	0.79*** (8.73)	0.69** (2.48)	0.35 (1.00)	χ^2 = 3.81 (d.f. = 1)
	Model fit	Chi-square		463.34 (p = .00)	543.10 (p = .00)		539.29 (p = .00)			
		Degree of freedom		254	258		257			
		NNFI		0.925	0.904		0.904			
		CFI		0.936	0.917		0.918			
		NNFI		0.060	0.069		0.069			
H2c	HQ-sub. relationship	Marketing proficiency	INPR Timeliness	0.35*** (5.33)	0.59*** (10.28)	0.69*** (7.35)	0.59*** (10.16)	0.65*** (4.04)	0.04 (0.32)	χ^2 = 0.57 (d.f. = 1)
	Model fit	Chi-square		463.34 (p = .00)	551.34 (p = .00)		550.77 (p = .00)			
		Degree of freedom		254	258		257			
		NNFI		0.925	0.899		0.898			
		CFI		0.936	0.913		0.913			
		RMSEA		0.060	0.070		0.070			
H3a	Cross 'functional linkages	Technical proficiency	NPD Timeliness	0.25* (2.24)	0.58*** (8.18)	0.04 (0.42)	0.58*** (8.13)	-0.02 (-0.18)	0.26* (1.80)	χ^2 = 4.85@ (d.f. = 1)
	Model fit	Chi-square		463.34 (p = .00)	565.85 (p = .00)		561.00 (p = .00)			
		Degree of freedom		254	258		257			
		NNFI		0.925	0.895		0.895			
		CFI		0.936	0.909		0.910			
		RMSEA		0.060	0.072		0.072			
H3b	Technology synergy	Technical proficiency	NPD Timeliness	0.07 (0.47)	0.77*** (11.23)	0.02 (0.19)	0.77*** (11.24)	-0.04 (-0.25)	0.12 (0.57)	χ^2 = 0.68 (d.f. = 1)
	Model fit	Chi-square		463.34 (p = .00)	478.82 (p = .00)		479.50 (p = .00)			
		Degree of freedom		254	258		257			
		NNFI		0.925	0.921		0.921			
		CFI		0.936	0.932		0.932			
		RMSEA		0.060	0.061		0.061			
H3c	HQ-sub. relationship	Technical proficiency	INPR Timeliness	0.35*** (5.33)	0.53*** (9.57)	0.40*** (5.03)	0.53*** (9.44)	0.19* (1.93)	0.28*** (3.23)	χ^2 = 1.58 (d.f. = 1)
	Model fit	Chi-square		463.34 (p = .00)	540.66 (p = .00)		539.08 (p = .00)			
		Degree of freedom		254	258		257			
		NNFI		0.925	0.900		0.903			
		CFI		0.936	0.914		0.917			
		RMSEA		0.060	0.069		0.069			
H4	NPD Timeliness	INPR Timeliness	Performance	0.48*** (5.93)	0.47*** (5.70)	0.48*** (6.38)	0.47*** (5.66)	0.43*** (3.95)	0.05 (0.49)	χ^2 = 0.18 (d.f. = 1)
	Model fit	Chi-square		482.17 (p = .00)	463.34 (p = .00)		463.16 (P = .00)			
		Degree of freedom		254	254		253			
		NNFI		0.920	0.925		0.924			
		CFI		0.932	0.936		0.936			
		RMSEA		0.062	0.060		0.060			

Note; ( ) : t-value, @ The critical value of chi-square statistical difference with one d.f. at the α = .05 level is 3.84.
* $p<0.05$
** $p<0.01$
*** $p<0.005$

5.3.1.3.1 The Mediating Effect of Marketing Proficiency on the Relationship between Cross-functional Linkages and NPD Timeliness

With respect to the mediating effect of marketing proficiency on the relationships between cross-functional linkages and NPD timeliness, hypothesis H2a states that the effect of cross-functional linkages on NPD timeliness may be attributed to marketing proficiency.

H2a: The level of proficiency in marketing activities mediates the association between cross-functional linkages and NPD timeliness.

As noted above, if full mediation exists, the fit of the non-constrained model should not be significantly better than the fit of the constrained model, and the path estimates of the non-constrained model for the predictor variables to the dependent variable should not be significant (Holmbeck 1997).

In table 5.11, the fit indices of model for the constrained model were χ^2 = 593.93 (d.f. = 258), NNFI = 0.884, CFI = 0.900, and RMSEA = 0.075. As for the non-constrained model, the fit indices of model were χ^2 = 591.69 (d.f. = 257), NNFI = 0.884, CFI = 0.900, and RMSEA = 0.075. The chi-square difference between them was 2.24 (d.f. = 1). The non-constrained model did not provide a significant improvement in fit over the constrained model (i.e., the critical value of chi-square statistical difference with one d.f. at the $p = 0.05$ level is 3.84). In the non-constrained model, the impact of cross-functional linkages on NPD timeliness was not significant ($t = 0.58$, $p > 0.05$; full mediation) while the potential mediator variable (i.e., marketing proficiency) significantly affects the dependent variable (i.e., NPD timeliness) (i.e., $t = 4.56$, $p < 0.005$) as well as the predictor variable (i.e., cross-functional linkages) significantly affects the potential mediator variable (i.e., marketing proficiency) (i.e., $t = 7.60$, $p < 0.005$). Therefore, H2a was supported.

5.3.1.3.2 The Mediating Effect of Marketing Proficiency on the Relationship between Marketing Synergy and NPD Timeliness

Hypothesis H2b states that the effect of marketing synergy on NPD timeliness may be attributed to marketing proficiency.

H2b: The level of proficiency in marketing activities mediates the association between marketing synergy and NPD timeliness.

The fit indices of model for the constrained model were χ^2 = 543.10 (d.f. = 258), NNFI = 0.904, CFI = 0.917, and RMSEA = 0.069. As for the non-constrained model, the fit indexes of model were χ^2 = 539.29 (d.f. = 257), NNFI = 0.904, CFI = 0.918, and RMSEA = 0.069. The chi-square difference between them was 3.81 (d.f. = 1). In the non-constrained model, the impact of marketing synergy on NPD timeliness was not significant (t = 1.00, $p > 0.05$; full mediation). Therefore, H2b was supported.

5.3.1.3.3 The Mediating Effect of Marketing Proficiency on the Link between the HQ-subsidiary/agent Relationship and INPR Timeliness

Hypothesis H2c predicted that the effect of the HQ-subsidiary/agent relationship on INPR timeliness may be attributed to marketing proficiency.

H2c: The level of proficiency in marketing activities mediates the association between HQ-subsidiary/agent relationship and INPR timeliness

Above all, four conditions are largely satisfied by the direct model, the constrained model, and the non-constrained model. That is, (1) The predictor variable (the HQ-subsidiary/agent relationship) affects the mediator (marketing proficiency) in the predicted direction (t = 10.16, $p < 0.005$), (2) the mediator (marketing proficiency) affects the dependent variable (INPR timeliness) in the predicted direction (t = 4.04, $p < 0.005$), (3) the predictor variable (the HQ-subsidiary/agent relationship) affects the dependent variable (INPR timeliness) in the predicted direction (t = 5.33, $p < 0.005$), and (4) the impact of the predictors (the HQ-subsidiary/agent relationship) on the dependent variable (INPR timeliness) must be not significant (t = 0.32, $p > 0.05$) after controlling for the mediator (marketing proficiency). Also, the chi-square difference between the constrained model and the non-constrained model was 0.57. Consequently, H2c was supported.

5.3.1.3.4 The Mediating Effect of Technical Proficiency on the Relationship between Cross-functional Linkages and NPD Timeliness

In the conceptual framework, hypothesis H3a stated that the effect of cross-functional linkages on NPD timeliness may be attributed to technical proficiency.

H3a: The level of proficiency in technical activities mediates the association between cross-functional linkages and NPD timeliness.

The fit indices of model for the constrained model were χ^2 = 565.85 (d.f. = 258), NNFI = 0.895, CFI = 0.909, and RMSEA = 0.072. As for the non-constrained model, the fit indices of model were χ^2 = 561.00 (d.f. = 257), NNFI = 0.895, CFI = 0.910, and RMSEA = 0.072. Thus, the chi-square difference between them was 4.85 (d.f. = 1). The fit of the constrained model is significantly better than the fit of the non-constrained model. Moreover, in the non-constrained model ($A \rightarrow B$, $B \rightarrow C$, $A \rightarrow C$), the predictor variable (i.e., cross-functional linkages) significantly affects the dependent variable (i.e., NPD timeliness) (t = 1.80, $p < 0.05$). Thus, H3a was not supported.

5.3.1.3.5 The Mediating Effect of Technical Proficiency on the Relationship between Technology Synergy and NPD Timeliness

Hypothesis H3b states that the effect of technology synergy on NPD timeliness may be attributed to technical proficiency.

H3b: The level of proficiency in technical activities mediates the association between technical synergy and NPD timeliness.

The fit indices of model for the constrained model were χ^2 = 478.82 (d.f. = 258), NNFI = 0.921, CFI = 0.932, and RMSEA = 0.061. As for the non-constrained model, the fit indices of model were χ^2 = 479.50 (d.f. = 257), NNFI = 0.921, CFI = 0.932, and RMSEA = 0.061. The chi-square difference between them was 0.68 (d.f. = 1). However, the effect of the mediator (i.e., technical proficiency) on the dependent variable (i.e., NPD timeliness) is nonsignificant (t = -0.25, $p > 0.05$) even though the effect of the predictor variable (i.e., technology synergy) on the dependent variable (i.e., NPD timeliness) becomes nonsignificant (t = 0.57, $p > 0.05$). Therefore, H3b was not supported.

5.3.1.3.6 The Mediating Effect of Technical Proficiency on the Link between the HQ-subsidiary/agent Relationship and INPR Timeliness

Hypothesis H3c predicted that the effect of the HQ-subsidiary/agent relationship on INPR timeliness may be attributed to technical proficiency.

H3c: The level of proficiency in technical activities mediates the association between HQ-subsidiary/agent relationship and INPR timeliness.

In Table 5.11, the results indicated that (1) The predictor variable (the HQ-subsidiary/agent relationship) affects the mediator (technical proficiency) in the predicted direction ($t = 9.44$, $p < 0.005$), (2) the mediator (marketing proficiency) affects the dependent variable (INPR timeliness) in the predicted direction ($t = 1.93$, $p < 0.05$), (3) the predictor variable (the HQ-subsidiary/agent relationship) directly affects the dependent variable (INPR timeliness) in the predicted direction ($t = 5.33$, $p < 0.005$), and (4) the impact of the predictors (the HQ-subsidiary/agent relationship) on the dependent variable (INPR timeliness) is reduced ($t = 3.23$, $p < 0.005$) after controlling for the mediator (technical proficiency) (i.e., partial mediation). Also, the chi-square difference between the constrained model and the non-constrained model was 1.58. Consequently, H3c was supported.

5.3.1.3.7 The Mediating Effect of INPR Timeliness on the Relationship between NPD Timeliness and New Product Performance

Final result of the mediational model in this study showed that INPR timeliness mediates the relationship between NPD timeliness and performance (see Table 5.11). H4 states that the significant effect of NPD timeliness on performance may be attributed to INPR timeliness.

H4: The level of timeliness in INPR mediates the association between NPD timeliness and performance

The fit indices of model for the constrained model were $\chi^2 = 463.34$ (d.f. = 254), NNFI = 0.925, CFI = 0.936, and RMSEA = 0.060. As for the non-constrained model, the fit indices of model were $\chi^2 = 463.16$ (d.f. = 253), NNFI = 0.924, CFI = 0.936, and RMSEA = 0.060. Thus, the chi-square difference between them was 0.18 (d.f. = 1). Furthermore, the impact of the predictors (NPD timeliness) on the dependent variable

(New Product Performance) becomes insignificant ($t = 0.49$, $p > 0.05$) after controlling for the mediator (INPR timeliness). Consequently, H4 was supported.

5.3.1.4 Hypotheses Tests of Moderating Effects

The mechanics of this procedure are as follows: First, the sample was divided into two groups depending on the moderator variables (i.e., competitive intensity, technology change, and standardization). For each subsample, a covariance matrix was calculated, and the parameters were estimated for each subsample by SIMPLIS LISREL. Of particular interest was the γ and β estimate between paths. The pairwise comparison of the γs and βs of two groups (i.e., high and low groups) in accordance with the three moderator variables was conducted. More specifically, the pairwise comparison was based on the chi-square difference between the two models, in which one model constrained the γs or βs to be equal (i.e., First, an equality constraint model that tests the moderating effect of competitive intensity, in which the influence of marketing synergy and cross-functional linkages on new product development timeliness, the influence of HQ-subsidiary/agent relationship on international new product rollout timeliness, the influence of new product development timeliness on performance, and the influence of international new product rollout timeliness on performance is constrained to be equal across two groups. Second, an equality constraint model that tests the moderating effect of technology change, in which the influence of technology synergy and cross-functional linkages on new product development timeliness, the influence of HQ-subsidiary/agent relationship on international new product rollout timeliness, the influence of new product development timeliness on performance, and the influence of international new product rollout timeliness on performance is constrained to be equal across two groups. Third, an equality constraint model that tests the moderating effect of standardization, in which the influence of new product development timeliness on international new product rollout timeliness is constrained to be equal across two groups) and the other model left the γs or βs free to covary (i.e., the first moderating test of competitive intensity, a free model in which the influence of marketing synergy and cross-functional linkages on new product development timeliness, the influence of HQ-subsidiary/agent relationship on international new product rollout timeliness, the influence of new product development on performance, and the influence of international new product rollout timeliness on performance is allowed to be different. Second, a free model that tests the moderating effect of technology change, in which the influence of technology synergy and cross-functional linkages on new product development timeliness, the influence of HQ-subsidiary/agent relationship on international new product rollout timeliness, the influence of new product development timeliness on performance, and the influence of international new product rollout timeliness on performance is allowed to be different. Third, a free model that tests the moderating effect of standardization, in which the influence of NPD timeliness on INPR timeliness, is allowed to be different).

The difference in the two models' statistical significance was used as a test for the equal γs or βs, that is, whether the equality constraint model (γs and βs are equal) produced a better fit than the free model (γs or βs are not equal). The chi-square statistics for every pair of moderator models are provided in Table 5.12. H5a to H7 examine the moderating role of external environments (i.e., competitive intensity and technology change) and standardization on the interconnections between antecedents and consequence of NPD and INPR timeliness as well as between NPD timeliness and INPR timeliness.

Table 5.12 Summary Table of Structural Model: Moderating Effects

	Moderator variable	Path	Free Model	Equality Constraint Model	Chi-Square Difference	γ and β Estimates of Free Model (t-Value)	
						γ Estimates	β Estimates
H5a	Competitive Intensity	Cross-functional linkages →NPDt	$\chi^2 = 962.37$ (d.f. = 557)	$\chi^2 = 963.15$ (d.f. = 558)	$\chi^2 = 0.78$ (d.f. = 1)	High: 0.30* (2.12) Low: 0.22 (1.52)	-
H5b		Marketing synergy →NPDt		$\chi^2 = 962.13$ (d.f. = 558)	$\chi^2 = 0.24$ (d.f. = 1)	High: 0.55*** (3.74) Low: 0.45*** (3.00)	-
H5c		HQ-Subsidiary Relationship →INPRt		$\chi^2 = 962.43$ (d.f. = 558)	$\chi^2 = 0.06$ (d.f. = 1)	High: 0.35*** (3.69) Low: 0.31*** (3.50)	-
H5d		NPDt →Performance		$\chi^2 = 968.38$ (d.f. = 558)	$\chi^2 = 6.01$@ (d.f. = 1)	-	High: 0.25* (1.92) Low: -0.12 (-0.91)
H5e		INPRt →Performance		$\chi^2 = 962.76$ (d.f. = 558)	$\chi^2 = 0.39$ (d.f. = 1)	-	High: 0.34** (2.54) Low: 0.43*** (2.96)
H6a	Technology Change	Cross-functional linkages →NPDt	$\chi^2 = 850.52$ (d.f. = 557)	$\chi^2 = 850.35$ (d.f. = 558)	$\chi^2 = 0.17$ (d.f. = 1)	High: 0.29* (1.82) Low: 0.31* (1.92)	-
H6b		Technical synergy →NPDt		$\chi^2 = 850.02$ (d.f. = 558)	$\chi^2 = 0.50$ (d.f. = 1)	High: 0.44*** (2.77) Low: 0.40** (2.48)	-
H6c		HQ-Subsidiary Relationship →INPRt		$\chi^2 = 849.92$ (d.f. = 558)	$\chi^2 = 0.60$ (d.f. = 1)	High: 0.26*** (3.08) Low: 0.42*** (4.72)	-
H6d		NPDt →Performance		$\chi^2 = 849.82$ (d.f. = 558)	$\chi^2 = 0.70$ (d.f. = 1)	-	High: 0.15 (1.41) Low: -0.03 (-0.24)
H6e		INPRt →Performance		$\chi^2 = 849.91$ (d.f. = 558)	$\chi^2 = 0.61$ (d.f. = 1)	-	High: 0.33** (2.49) Low: 0.46*** (3.55)
H7	Standardization	NPDt→INPRt	$\chi^2 = 986.56$ (d.f. = 557)	$\chi^2 = 993.97$ (d.f. = 558)	$\chi^2 = 7.41$@ (d.f. = 1)	-	High: 0.55*** (5.66) Low: 0.25*** (2.91)

Note; ( ) : t-value

@; The critical value of chi-square statistical difference with one d.f. at the $\alpha = .05$ level is 3.84.

* $p<0.05$

** $p<0.01$

*** $p<0.005$

5.3.1.4.1 The Moderating Effect of Competitive Intensity on the Relationship between Cross-functional Linkages and NPD Timeliness

H5a predicts that, for NPD timeliness, the γ parameter of cross-functional linkages would be greater for high competitive intensity than for low competitive intensity.

H5a: The positive interconnection between cross-functional linkages and timeliness in NPD is stronger when competitive intensity is high than when it is low.

In Table 5.12, the results indicated that the γ estimates for the free-γ model were 0.22 (t = 1.52, P > 0.05) for low competitive intensity and 0.30 (t = 2.12, P < 0.05) for high competitive intensity. The γ estimate of the high competitive intensity group was significant while that of low competitive intensity group was not significant. The chi-square was χ^2 = 963.15 (d.f. = 558) for the equal-γ model and χ^2 = 962.37 (d.f. = 557) for the free-γ model. The chi-square difference was not significant (i.e. 0.78 (d.f. = 1)). The critical value of chi-square statistical difference with one d.f. at the p = 0.05 level is 3.84. Therefore, H5a was not supported.

5.3.1.4.2 The Moderating Effect of Competitive Intensity on the Relationship between Marketing Synergy and NPD Timeliness

H5b predicts that, for NPD timeliness, the γ parameter of marketing synergy would be greater for high competitive intensity than for low competitive intensity.

H5b: The positive interconnection between marketing synergy and timeliness in NPD is stronger when competitive intensity is high than when it is low

The γ estimate of marketing synergy across two groups for the free-γ model were 0.55 (t = 3.74, $P < 0.005$) for high competitive intensity and 0.45 (t = 3.00, $P < 0.005$) for low competitive intensity. However, the chi-square difference was not significant at the p = 0.05 level (i.e., the chi-square difference was 0.24 (d.f. = 1)). Therefore, H5b was not supported.

5.3.1.4.3 The Moderating Effect of Competitive Intensity on the Link between the HQ-subsidiary/agent Relationship and INPR Timeliness

H5c predicts that, for INPR timeliness, the γ parameter of HQ-subsidiary/agent relationship synergy would be greater for high competitive intensity than for low competitive intensity.

H5c: The positive interconnection between HQ-subsidiary/agent relationship and timeliness in INPR is stronger when competitive intensity is high than when it is low

The γ estimate of HQ-subsidiary/agent relationship across two groups for the free-γ model were 0.35 (t = 3.69, $P < 0.005$) for high competitive intensity and 0.31 (t = 3.50, $P < 0.005$) for low competitive intensity. The chi-square was $\chi^2 = 962.43$ (d.f. = 558) for the equal-γ model and $\chi^2 = 962.37$ (d.f. = 557) for the free-γ model. Accordingly, the chi-square difference was not significant at the p = 0.05 level because the chi-square difference was 0.06 (d.f. = 1). That is, there is no difference between the two groups (i.e., high competitive intensity group and low competitive intensity group) because the chi-square difference is less than 3.84. Therefore, H5c was not supported.

5.3.1.4.4 The Moderating Effect of Competitive Intensity on the Relationship between NPD Timeliness and New Product Performance

H5d predicts that, for performance, the β parameter of NPD timeliness would be greater for high competitive intensity than for low competitive intensity.

H5d: The positive interconnection between timeliness in NPD and performance is stronger when competitive intensity is high than when it is low.

The chi-square was $\chi^2 = 968.38$ (d.f. = 558) for the equal-β model and $\chi^2 = 962.37$ (d.f. = 557) for the free-β model. The chi-square difference was 6.01 (d.f. = 1). There is a difference in the relationship between NPD timeliness and performance across two groups (i.e., high competitive intensity group and low competitive intensity group) because the chi-square difference is over than 3.84 at the $p = .05$ level. Also, the β estimates for the free-β model were 0.25 ($t = 1.92$, $p < 0.05$) for high competitive intensity and -0.12 ($t = -0.91$, $p > 0.05$) for low competitive intensity. Therefore, H5d was supported.

5.3.1.4.5 The Moderating Effect of Competitive Intensity on the Relationship between INPR Timeliness and New Product Performance

H5e predicts that, for performance, the β parameter of INPR timeliness would be greater for high competitive intensity than for low competitive intensity.

H5e: The positive interconnection between timeliness in INPR and performance is stronger when competitive intensity is high than when it is low.

The β estimates for the free-β model were 0.34 ($t = 2.54$, $p < 0.01$) for high competitive intensity and 0.43 ($t = 2.96$, $p < 0.005$) for low competitive intensity. The β estimates for the two groups were significant. The chi-square was $\chi^2 = 962.76$ (d.f. = 558) for the equal-β model and $\chi^2 = 962.37$ (d.f. = 557) for the free-β model. The chi-square difference was not significant (i.e. 0.39 (d.f. = 1)). There is no difference in the relationship between INPR timeliness and performance across two groups (i.e., high competitive intensity group and low competitive intensity group) because the chi-square difference is over than 3.84 at the $\alpha = .05$ level. Therefore, H5e was not supported.

5.3.1.4.6 The Moderating Effect of Technology Change on the Relationship between Cross-functional Linkages and NPD Timeliness

H6a predicts that, for NPD timeliness, the γ parameter of cross-functional linkages would be greater for low technological change than for high technological change.

H6a: The positive interconnection between cross-functional linkages and timeliness in NPD is stronger when technological change is low than when it is high.

The chi-square was $\chi^2 = 850.35$ (d.f. = 558) for the equal-γ model and $\chi^2 = 850.52$ (d.f. = 557) for the free-γ model. The chi-square difference was 0.17 (d.f. = 1). The γ estimates for the free-γ model were 0.29 ($t = 1.82$, $p < 0.05$) for high technological change and 0.31 ($t = 1.92$, $p < 0.05$) for low technological change. Although, the γ estimates of two groups were significant, the chi-square difference was less than 3.84. Therefore, H6a was not supported.

5.3.1.4.7 The Moderating Effect of Technology Change on the Relationship between Technology Synergy and NPD Timeliness

H6b predicts that, for NPD timeliness, the γ parameter of technical synergy would be greater for low technological change than for high technological change.

H6b: The positive interconnection between technology synergy and timeliness in NPD is stronger when technological change is low than when it is high.

The γ estimate of technical synergy across the two groups for the free-γ model were 0.44 ($t = 2.77$, $p < 0.005$) for high technological change and 0.40 ($t = 2.48$, $p < 0.01$) for low technological change. However, the chi-square difference was not significant at the p = .05 level (i.e., the chi-square difference with one d.f. is 0.50). Therefore, H6b was not supported.

5.3.1.4.8 The Moderating Effect of Technology Change on the Link between the HQ-subsidiary/agent Relationship and INPR Timeliness

H6c predicts that, for INPR timeliness, the γ parameter of HQ-subsidiary/agent relationship synergy would be greater for high technological change than for low technological change.

H6c: The positive interconnection between HQ-subsidiary/agent relationship and timeliness in INPR is stronger when technological change is high than when it is low

The γ estimate of HQ-subsidiary/agent relationship across the two groups for the free-γ model were 0.26 ($t = 3.08$, $p < 0.005$) for high technological change and 0.42 ($t = 4.72$, p

< 0.005) for low technological change. The chi-square was $\chi^2 = 849.92$ (d.f. = 558) for the equal-γ model and $\chi^2 = 850.52$ (d.f. = 557) for the free-γ model. The chi-square difference was 0.60 (d.f. = 1). Accordingly, there is no difference between the two groups (i.e., high technological change group and low technological group) because the chi-square difference is less than 3.84. H6c was not supported.

5.3.1.4.9 The Moderating Effect of Technology Change on the Relationship between NPD Timeliness and New Product Performance

H6d predicts that, for performance, the β parameter of NPD timeliness would be greater for low technological change than for high technological change.

H6d: The positive interconnection between timeliness in NPD and performance is stronger when technological change is low than when it is high.

The chi-square was $\chi^2 = 849.82$ (d.f. = 558) for the equal-β model and $\chi^2 = 850.52$ (d.f. = 557) for the free-β model. The chi-square difference was 0.70 (d.f. = 1). There is no difference in the relationship between NPD timeliness and performance across two groups (i.e., high technological change group and low technological change group). Moreover, the significant β estimates for the two groups were not found. Therefore, H6d was not supported.

5.3.1.4.10 The Moderating Effect of Technology Change on the Relationship between INPR Timeliness and New Product Performance

H6e predicts that, for performance, the β parameter of INPR timeliness would be greater for low technological change than for high technological change.

H6e: The positive interconnection between timeliness in INPR and performance is stronger when technological change is low than when it is high.

The β estimates for the free-β model were 0.33 (t = 2.49, $p < 0.01$) for high technological change and 0.46 (t = 3.55, $p < 0.005$) for low technological change. The β estimates for the two groups were significant. The chi-square was χ^2 = 849.91 (d.f. = 558) for the equal-β model and χ^2 = 850.52 (d.f. = 557) for the free-β model. The chi-square difference was 0.61 (d.f. = 1). Therefore, there is no difference in the relationship between INPR timeliness and performance across two groups (i.e., high technological change group and low technological change group). Consequently, H6e was not supported.

5.3.1.4.11 The Moderating Effect of Standardization on the Relationship between NPD Timeliness and INPR Timeliness

H7 predicts that, for INPR timeliness, the β parameter of NPD timeliness would be greater for high standardization than for low standardization.

H7: The positive interconnection between timeliness in NPD and timeliness in INPR is stronger when standardization is high than when it is low

The chi-square was $\chi^2 = 993.97$ (d.f. = 558) for the equal-β model and $\chi^2 = 986.56$ (d.f. = 557) for the free-β model. The chi-square difference was 7.41 (d.f. = 1). There is a difference in the relationship between NPD timeliness and INPR timeliness across the two groups (i.e., high standardization group and low standardization group). Also, the β estimates for the free-β model were 0.55 ($t = 5.66$, $p < 0.005$) for high standardization and 0.25 ($t = 2.91$, $p < 0.005$) for low standardization. Therefore, H7 was supported.

5.3.2 Regression Results and Hypotheses Tests

5.3.2.1 Introduction

The conceptual framework was also tested by applying a regression analysis on the basis of the measurement model. Specifying the measurement model is similar to specifying a regression equation (Garver and Mentzer, 1999). That is, in the measurement model, the latent variable is specified as the independent variable and the indicators as the dependent variables.

In the regression model, the mediation analysis is to add the mediator to the original analysis and to examine the change in the original parameters. According to Baron and Kenny (1986) several steps are recommended to test for mediation. First, the independent variable has an effect on the dependent variable. Second, it has an effect on the mediator. Third, the latter has an effect on the dependent variable controlling for the independent variable. Finally, to establish complete (or partial) mediation, the entry of the mediator (or mediators) into the model must eliminate the impact of the independent variable on the dependent variable. Also, to confirm the mediating effect, the entry of the mediator (or mediators) into the model must significantly show ΔR^2 and F Change compared to the original model. Like the results by SEM, the regression model shows that mediation exists if the effect of the independent variable is less than it was without the mediating variable.

With respect to testing moderating effects, Holmbeck (1997) stated "Although SEM is often considered the preferred method because of the information that it provides on the degree of fit for the entire model after controlling for measurement error, proper use of regression techniques can also provide meaningful tests of hypotheses." Therefore, the regression approach was also adopted to test moderated effects. In order for moderation to exist in a relationship, only the interaction term has to be significant in the regression equation (Aiken and West, 1991). The predictor and moderator main effects (and any covariates, if applicable) are entered into the regression equation first, followed by the interaction of the predictor and the moderator (Holmbeck, 1997). Aiken and West (1991) have recommended that the independent variable and the moderator be "centered" before testing the significance of the interaction term. To center a variable, scores are put into deviation score form by simply subtracting the sample mean from all individuals' scores on the variable, thus producing a revised sample mean of zero. In the presence of interaction effects, the beta coefficients of the simple effects are not interpretable (Aiken and West, 1991). In the regression model, the results also show a significant change in R^2 and F. When the interaction terms were added to the regression model, the increase in R^2 was examined. If the increase in R^2 was significant, it indicated the presence of the moderating effect.

Table 5.13 Regression Results: Mediating Effects

Independent variables	Dependent variable = NPDT			
	Model 1		Model2	
	β	t-value	β	t-value
Cross-functional linkages (CFL)	0.129	1.831†	0.027	0.374
Marketing synergy (MS)	0.363	5.175***	0.205	2.664**
Mediator				
Marketing proficiency (MP)			0.342	4.340***
R^2	0.194		0.260	
Adjusted R^2	0.187		0.249	
F-value	25.935***		25.004***	
ΔR^2			0.065	
F Change			18.838***	

Independent variables	Dependent variable = NPDT			
	Model 1		Model2	
	β	t-value	β	t-value
Cross-functional linkages (CFL)	0.131	1.688†	0.118	1.493
Technology synergy (TS)	0.302	3.874***	0.253	2.718**
Mediator				
Technical proficiency (TP)			0.082	0.947
R^2	0.156		0.159	
Adjusted R^2	0.148		0.147	
F-value	19.915***		13.569***	
ΔR^2			0.004	
F Change			0.897	

Independent variables	Dependent variable = INPRT			
	Model 1		Model2	
	β	t-value	β	t-value
HQ-Subsidiary Relationship (HQSR)	0.391	6.162***	0.131	1.707†
Mediator				
Marketing proficiency (MP)			0.414	5.397***
R^2	0.153		0.257	
Adjusted R^2	0.149		0.250	
F-value	37.972***		36.094***	
ΔR^2			0.104	
F Change			29.129***	

Independent variables	Dependent variable = INPRT			
	Model 1		Model2	
	β	t-value	β	t-value
HQ-Subsidiary Relationship (HQSR)	0.398	6.278***	0.258	3.460**
Mediator				
Technical proficiency (TP)			0.250	3.357**
R^2	0.158		0.201	
Adjusted R^2	0.154		0.193	
F-value	39.419***		26.308***	
ΔR^2			0.043	
F Change			11.270**	

Independent variables	Dependent variable = New Product Performance			
	Model 1		Model2	
	β	t-value	β	t-value
New Product Development Timeliness (NPDT)	0.284	4.266***	0.127	1.768†
Mediator				
International New Product Rollout Timeliness (INPRT)			0.332	4.612***
R^2	0.080		0.166	
Adjusted R^2	0.076		0.158	
F-value	18.202***		20.622***	
ΔR^2			0.086	
F Change			21.269***	

†: Significant at $p < .10$, *: Significant at $p < .05$, **: Significant at $p < .01$, ***: Significant at $p < .001$

5.3.2.2 Hypotheses Tests of Mediational Models

The results of regression Model 1 in Table 5.13 indicate the effects of the independent variables (e.g., cross-functional linkages) on the dependent variable (e.g., NPD timeliness). The mediator variable was added in the second model, thus providing a test of the mediation hypotheses, H2a, b, c, H3a, b, c and H4. Model 2 in Table 5.13 indicates the effects of the independent variables on the dependent variable with the addition of the mediator including ΔR^2 and F Change.

5.3.2.2.1 The Mediating Effect of Marketing Proficiency on the Relationship between Cross-functional Linkages and NPD Timeliness

Hypothesis H2a states that the effect of cross-functional linkages on NPD timeliness may be attributed to marketing proficiency.

H2a: The level of proficiency in marketing activities mediates the association between cross-functional linkages and NPD timeliness.

Cross-functional linkages must be significantly related to NPD timeliness, and this effect must diminish (partial mediation) or become non-significant (full mediation) for mediation to be supported. In an analysis not displayed in Table 5.13, cross-functional linkages against marketing proficiency as well as marketing proficiency against NPD timeliness were regressed. Cross-functional linkages had a significant effect on marketing proficiency ($\beta = 0.198$, $p < 0.01$) and marketing proficiency had a significant effect on NPD timeliness ($\beta = 0.468$, $p < 0.001$).

To test Hypothesis H2a, the procedure required the estimation of two regression equations. In the first, the dependent variable (i.e., NPD timeliness) was regressed on the independent variable (i.e., cross-functional linkages). In the second, the dependent variable was regressed simultaneously on both the independent variable and the mediator (i.e., marketing proficiency). Therefore, the first step in assessing mediation was to examine the association between cross-functional linkages and NPD timeliness. Next, the current researcher examined whether the entry of the mediator (i.e., marketing proficiency) into the model eliminates the impact of the independent variable (i.e., cross-functional linkages) on the dependent variable (i.e., NPD timeliness). NPD timeliness on cross-functional linkages and marketing proficiency was regressed (Models 1 and 2 of Table 5.13). Cross-functional linkages were entered in Model 1, and cross-functional linkages and marketing proficiency were simultaneously added in Model 2. Model 1 showed that when entered alone, cross-functional linkages had a significant effect on NPD timeliness ($\beta = 0.129$, $p < 0.10$). In evaluation of both the change in R and in beta coefficients between two Models, the addition of marketing proficiency in Model 2 was significant ($P < 0.001$) and resulted in a statistically significant gain in R^2 (F change = 18.838; $p < 0.001$) from Model 1. It also showed that cross-functional linkages became insignificant ($\beta = 0.027$, $p = 0.709$), whereas marketing proficiency remained significant ($\beta = 0.342$, $p < 0.001$). Taken together, these results supported Hypothesis H2a about the mediation effect of marketing proficiency on the relationship between cross-functional linkages and NPD timeliness. This represents a complete mediation model (i.e., full mediation) rather than a partial mediation model.

5.3.2.2.2 The Mediating Effect of Marketing Proficiency on the Relationship between Marketing Synergy and NPD Timeliness

Hypotheses H2b states that the effect of marketing synergy on NPD timeliness may be attributed to marketing proficiency.

H2b: The level of proficiency in marketing activities mediates the association between marketing synergy and NPD timeliness.

Marketing synergy had a significant effect on marketing proficiency (β = 0.305, $p < 0.001$) in an analysis not displayed in Table 5.13. Model 1 showed that when entered alone, marketing synergy had a significant effect on NPD timeliness ($\beta = 0.363$, $p < 0.001$). However, when entered marketing synergy and marketing proficiency simultaneously in Model 2, the beta coefficient of marketing synergy was reduced from 0.363 ($t = 5.175$, $p < 0.001$) to 0.205 ($t = 2.664$, $p < 0.01$), which shows partial mediation of marketing proficiency on the relationship between marketing synergy and NPD timeliness. In evaluation of both the change in R and in beta coefficients between two Models, the addition of marketing proficiency in Model 2 was significant ($P < 0.001$) and resulted in a statistically significant gain in R^2 (F change = 18.838; $p < 0.001$) from Model 1. Thus, marketing proficiency appeared to partially mediate the relationship between marketing synergy and NPD timeliness, supporting Hypothesis H2b.

5.3.2.2.3 The Mediating Effect of Marketing Proficiency on the Link between the HQ-subsidiary/agent Relationship and INPR Timeliness

Hypotheses H2c predicted that the effect of the HQ-subsidiary/agent relationship on INPR timeliness may be attributed to marketing proficiency.

H2c: The level of proficiency in marketing activities mediates the association between HQ-subsidiary/agent relationship and INPR timeliness

The direct impacts of the HQ-subsidiary/agent relationship on INPR timeliness and marketing proficiency were found to have significant effects in both cases ($\beta = 0.391$, $p < 0.001$); ($\beta = 0.359$, $p < 0.001$). When marketing proficiency was added to the model, its parameter was significant ($\beta = 0.414$, $p < 0.001$). Furthermore, the estimate of the HQ-subsidiary/agent relationship dropped from its original value of 0.391 ($t = 6.162$, p

< 0.001) to one of 0.131 (t = 1.707, $p < 0.10$). In evaluation of both the change in R and in beta coefficients between the two Models, the addition of marketing proficiency in Model 2 was significant ($P < 0.001$) and resulted in a statistically significant gain in R^2 (F change = 29.129; $p < 0.001$) from Model 1. Accordingly, the result indicates a partial mediation, supporting Hypothesis H2c.

5.3.2.2.4 The Mediating Effect of Technical Proficiency on the Relationship between Cross-functional Linkages and NPD Timeliness

In the conceptual framework, hypotheses H3a stated that the effect of cross-functional linkages on NPD timeliness may be attributed to technical proficiency.

H3a: The level of proficiency in technical activities mediates the association between cross-functional linkages and NPD timeliness.

Cross-functional linkages had a significant effect on technical proficiency ($\beta = 0.107$, $p < 0.10$) whereas the latter had an insignificant effect on NPD timeliness ($\beta = 0.021$, $p = 0.782$). When technical proficiency was added to the model, its parameter was also insignificant ($\beta = 0.082$, $p = 0.345$) even though the estimate of cross-functional linkages dropped from its original value of 0.131 (t = 1.688, $p < 0.10$) to one of 0.118 (t = 1.493, $p = 0.137$). Therefore, H3a was not supported.

5.3.2.2.5 The Mediating Effect of Technical Proficiency on the Relationship between Technology Synergy and NPD Timeliness

Hypothesis H3b states that the effect of technology synergy on NPD timeliness may be attributed to technical proficiency.

H3b: The level of proficiency in technical activities mediates the association between technical synergy and NPD timeliness.

Technology synergy had a significant effect on technical proficiency (β = 0.482, $p < 0.001$) in an analysis not shown in Table 5.13. When technical proficiency was added to the model, its parameter was insignificant (β = 0.082, p = 0.345) even though the estimate of technology synergy dropped from its original value of 0.302 (t = 3.874, $p < 0.001$) to one of 0.253 (t = 2.718, $p < 0.01$). Consequently, H3b was not supported.

5.3.2.2.6 The Mediating Effect of Technical Proficiency on the Link between the HQ-subsidiary/agent Relationship and INPR Timeliness

Hypothesis H3c predicted that the effect of the HQ-subsidiary/agent relationship on INPR timeliness may be attributed to technical proficiency.

H3c: The level of proficiency in technical activities mediates the association between HQ-subsidiary/agent relationship and INPR timeliness.

In an analysis not displayed in Table 5.13, the HQ-subsidiary/agent relationship had a significant effect on technical proficiency (β = 0.251, $p < 0.001$) and the latter had a significant effect on INPR timeliness (β = 0.148, $p < 0.05$). Subsequently, its mediating effect was tested (Model 1 and 2). Furthermore, in an evaluation of both the change in R and in beta coefficients between two Models, the addition of technical proficiency in Model 2 was significant ($p < 0.01$). That is, the estimate of the HQ-subsidiary/agent relationship fell from its original value of 0.398 (t = 6.278, $p < 0.001$) to one of 0.258 (t = 3.460, $p < 0.01$) while the estimate of technical proficiency was significant ($\beta = 0.250$, $p < 0.01$). The addition of technical proficiency to the original model resulted in a statistically significant gain in R^2 (F change = 11.270; $p < 0.01$) from Model 1. This represented a partial mediation model rather than a complete one. Therefore, H3c was supported.

5.3.2.2.7 The Mediating Effect of INPR Timeliness on the Relationship between NPD Timeliness and New Product Performance

H4 stated that the significant effect of NPD timeliness on performance may be attributed to INPR timeliness.

H4: The level of timeliness in INPR mediates the association between NPD timeliness and performance

The impact of NPD timeliness on INPR timeliness was found to have a significant effect (β = 0.388, $p < 0.001$) in an analysis not displayed in Table 5.13. When INPR timeliness was added to the model (Model 2), its estimate was significant ($\beta = 0.332$, $p < 0.001$). The results also indicated the estimate of NPD timeliness dropped from its original value of 0.284 ($p < 0.001$) to one of 0.127 ($p < 0.10$). Furthermore, the change in R^2 between the two Models was significant (F change = 21.269; $p < 0.001$). This represents a partial mediation model rather than a complete one. Thus, H4 was supported.

5.3.2.3 Hypotheses Tests of Moderating Effects

The moderating hypotheses were tested with an hierarchical moderated regression analysis (Aiken and West, 1991). The current researcher ran an initial regression with the predictor and the moderator to determine their main effects. The hypothesized interactions were added to the second model, thus providing a test of the moderation hypotheses, H5a, b, c, d, e H6a, b, c, d, e and H7.

5.3.2.3.1 The Moderating Effect of Competitive Intensity on the Relationship between Cross-functional Linkages and NPD Timeliness

H5a: The positive interconnection between cross-functional linkages and timeliness in NPD is stronger when competitive intensity is high than when it is low.

As shown in Box A of Table 5.14, the results indicated that competitive intensity did not in fact moderate the cross-functional linkages – NPD timeliness relationship. When the interaction term between cross-functional linkages and competition intensity was introduced, this variable proved insignificant (β = - 0.085, p = 0.226). The addition of the interaction term with the independent variable to the regression equation yielded an insignificant increase in R^2 (F change = 0.860, p = 0.425). Therefore, H5a was not supported.

Table 5.14 Regression Results: Moderating Effects

Independent variables	Dependent variable = NPDT			
	Model 1		Model 2	
	β	t-value	β	t-value
A.				
Main effects				
Cross-functional linkages (CFL)	0.128	1.828†	0.130	1.854†
Marketing synergy (MS)	0.366	5.233***	0.366	5.108***
Moderator				
Competitive Intensity (COM)	- 0.062	- 1.017	- 0.047	- 0.763
Interaction terms				
CFL × COM			- 0.085	- 1.213
MS × COM			0.009	0.125
R^2	0.201		0.207	
Adjusted R^2	0.190		0.189	
F-value	18.090***		11.184***	
ΔR^2			0.006	
F Change			0.860	

Independent variables	Dependent variable = NPDT			
	Model 1		Model 2	
	β	t-value	β	t-value
B.				
Main effects				
Cross-functional linkages (CFL)	0.128	1.638	0.143	1.832†
Technical synergy (TS)	0.310	3.935***	0.294	3.752***
Moderator				
Technology Change (TECH)	- 0.061	- 0.967	- 0.025	- 0.380
Interaction terms				
CFL × TECH			- 0.194	- 2.407*
TS × TECH			0.105	1.342
R^2	0.159		0.181	
Adjusted R^2	0.147		0.162	
F-value	13.474***		9.391***	
ΔR^2			0.022	
F Change			2.906†	

Independent variables	Dependent variable = INPRT			
	Model 1		Model 2	
	β	t-value	β	t-value
C.				
Main effects				
HQ-Subsidiary Relationship (HQSR)	0.262	4.179***	0.256	4.012***
New Product Development Timeliness (NPDT)	0.400	6.366***	0.405	6.380***
Moderator				
Competitive Intensity (COM)	0.108	1.812†	0.111	1.855†
Interaction terms				
HQSR × COM			- 0.037	- 0.620
R^2	0.305		0.307	
Adjusted R^2	0.295		0.293	
F-value	29.168***		21.905***	
ΔR^2			0.001	
F Change			0.385	

Independent variables	Dependent variable = INPRT			
	Model 1		Model2	
	β	t-value	β	t-value
D.				
Main effects				
HQ-Subsidiary Relationship (HQSR)	0.273	4.327***	0.276	4.347***
New Product Development Timeliness (NPDT)	0.388	6.147***	0.388	6.133***
Moderator				
Technology Change (TECH)	- 0.023	- 0.381	- 0.030	- 0.483
Interaction terms				
HQSR × TECH			0.032	0.518
R^2	0.295		0.296	
Adjusted R^2	0.284		0.282	
F-value	27.603***		20.693***	
ΔR^2			0.001	
F Change			0.268	

Independent variables	Dependent variable = New Product Performance			
	Model 1		Model2	
	β	t-value	β	t-value
E.				
Main effects				
New Product Development Timeliness (NPDT)	0.126	1.722†	0.111	1.510
International New Product Rollout Timeliness (INPRT)	0.334	4.575***	0.320	4.387***
Moderators				
Competitive Intensity (COM)	- 0.010	- 0.161	- 0.019	- 0.290
Interaction terms				
NPDT × COM			0.149	2.274*
INPRT × COM			- 0.032	- 0.489
R^2	0.166		0.187	
Adjusted R^2	0.154		0.167	
F-value	13.692***		9.376***	
ΔR^2			0.021	
F Change			2.585†	

Independent variables	Dependent variable = New Product Performance			
	Model 1		Model2	
	β	t-value	β	t-value
F.				
Main effects				
New Product Development Timeliness (NPDT)	0.125	1.733†	0.098	1.353
International New Product Rollout Timeliness (INPRT)	0.335	4.636***	0.359	4.947***
Moderators				
Technology Change (TECH)	0.040	0.634	0.027	0.427
Interaction terms				
NPDT × TECH			0.168	2.103*
INPRT × TECH			- 0.150	- 1.877†
R^2	0.168		0.188	
Adjusted R^2	0.156		0.168	
F-value	13.782***		9.389***	
ΔR^2			0.020	
F Change			2.499†	

Independent variables	Dependent variable = INPRT			
	Model 1		Model2	
	β	t-value	β	t-value
G.				
Main effects				
HQ-Subsidiary Relationship (HQSR)	0.130	1.864†	0.110	1.587
New Product Development Timeliness (NPDT)	0.358	5.836***	0.355	5.861***
Moderators				
Standardization (STAN)	0.285	4.160***	0.304	4.471***
Interaction terms				
NPDT × STAN			0.140	2.459*
R^2	0.355		0.374	
Adjusted R^2	0.345		0.361	
F-value	36.119***		29.295***	
ΔR^2			0.019	
F Change			6.047*	

†: Significant at $p < .10$, *: Significant at $p < .05$, **: Significant at $p < .01$, ***: Significant at $p < .001$

5.3.2.3.2 The Moderating Effect of Competitive Intensity on the Relationship between Marketing Synergy and NPD Timeliness

H5b: The positive interconnection between marketing synergy and timeliness in NPD is stronger when competitive intensity is high than when it is low

The results for Hypothesis 5b are presented in Box A of Table 5.14. Contrary to my expectation, competitive intensity did not moderate the relationship between marketing synergy and NPD timeliness, failing to provide support for Hypothesis 5b. In Model 2, the insignificance of the interaction term (i.e., MS × COM) variable is shown by its t-statistic (0.125; $p = 0.900$).

5.3.2.3.3 The Moderating Effect of Competitive Intensity on the Link between the HQ-subsidiary/agent Relationship and INPR Timeliness

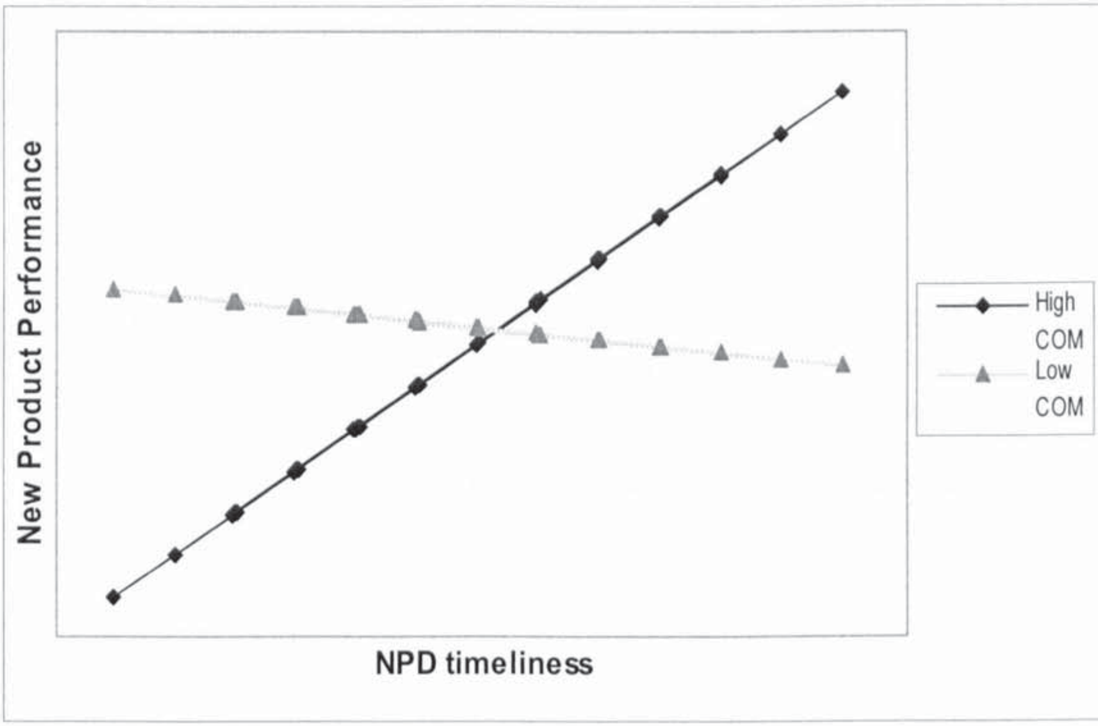
H5c: The positive interconnection between HQ-subsidiary/agent relationship and timeliness in INPR is stronger when competitive intensity is high than when it is low

As shown in Box C of Table 5.14, in Model 2, competitive intensity did not moderate the relationship between the HQ-subsidiary/agent relationship and INPR timeliness. The interaction term between them was not significant ($\beta = -0.037$, $p = 0.536$). Thus, H5c was not supported.

5.3.2.3.4 The Moderating Effect of Competitive Intensity on the Relationship between NPD Timeliness and New Product Performance

H5d: The positive interconnection between timeliness in NPD and performance is stronger when competitive intensity is high than when it is low.

Figure 5.4 NPDT × COM Interaction Effect on New Product Performance



The results for Hypothesis 5d are presented in Box E of Table 5.14. In Model 2, I introduced an interaction term (i.e., NPDT × COM) was positive and significant (β = 0.149, $p < 0.05$). The results did support the interaction between NPD timeliness and competitive intensity on new product performance. The addition of the interaction variable also created a significant change in R^2 (from 0.166 to 0.187), the adjusted R^2 (from 0.154 to 0.167) and F Change ($p < 0.10$). Following the suggestions of Aiken and West (1991), the variables of interest, NPD timeliness and competitive intensity were mean-centered in order to avoid scaling problems and potential issues of multicollinearity. The collinearity statistics revealed that variance inflation factors (VIF) was less than 4.0 (i.e., 1.083) and tolerance was more than 0.1 (i.e., 0.923). Therefore, multicollinearity did not appear to be a problem. The interaction in a chart (Figure 5.4) illustrates the moderating effect of competitive intensity on the relationship between NPD timeliness and new product performance. The regression slope was positive for NPD timeliness with high competitive intensity whereas for that with low competitive intensity it was negative. That is, there is a strong positive relationship between NPD timeliness and new product performance under high competitive intensity condition. These results supported Hypothesis 5d.

5.3.2.3.5 The Moderating Effect of Competitive Intensity on the Relationship between INPR Timeliness and New Product Performance

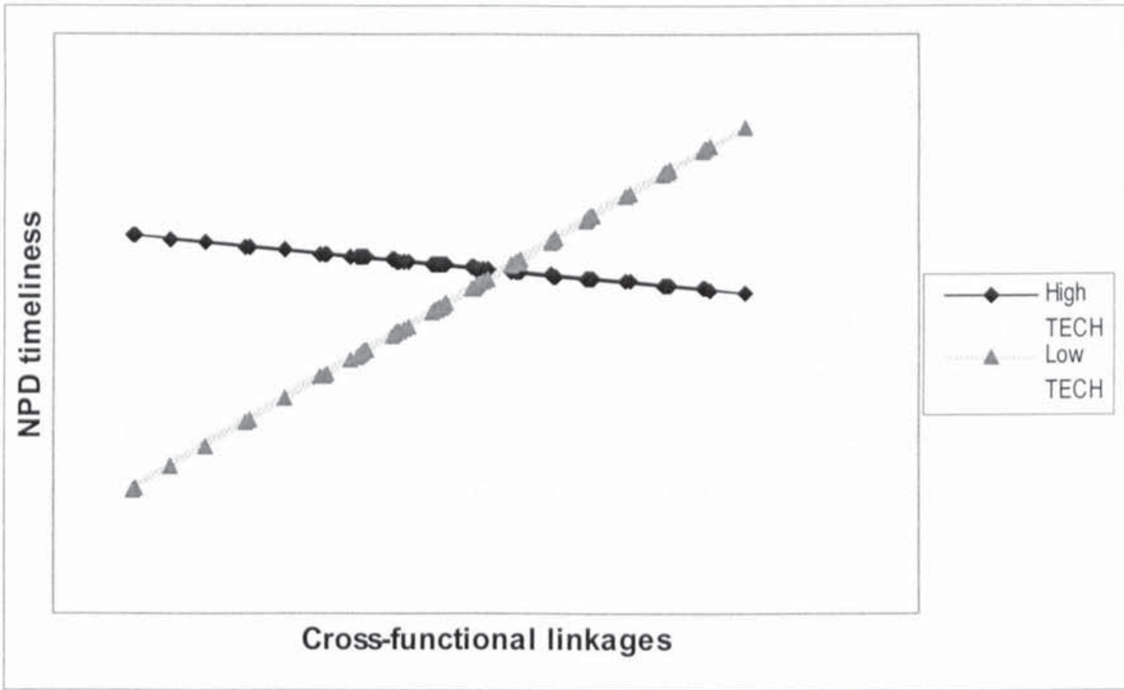
H5e: The positive interconnection between timeliness in INPR and performance is stronger when competitive intensity is high than when it is low.

As shown in Box E of Table 5.14, competitive intensity did not in fact moderate the INPR timeliness – new product performance relationship. That is, the interaction term (i.e., INPRT × COM) which was introduced was insignificant (β = -0.032, p = 0.625). Therefore, H5e was not supported.

5.3.2.3.6 The Moderating Effect of Technology Change on the Relationship between Cross-functional Linkages and NPD Timeliness

H6a: The positive interconnection between cross-functional linkages and timeliness in NPD is stronger when technological change is low than when it is high.

Figure 5.5 CFL × TECH Interaction Effect on NPD timeliness



The results for Hypothesis 6a are presented in Box B of Table 5.14. The model 2 also included the interaction term (CFL × TECH) to test for the conditions of technology change on cross-functional linkages. The significance of the interaction term (i.e., CFL × TECH) variable is shown both by its t-statistic (-2.407; $P < 0.05$) and by the significance of the F Change ($p < 0.10$). As well, R^2 and the adjusted R^2 increased to 0.181 and 0.162 respectively. The collinearity statistics revealed that VIF was less than commonly used thresholds of 4.0 (i.e., 1.677) and tolerance was 0.596. The results indicated that multicollinearity was not an issue. Figure 5.5 shows the simple slopes of the relationship between cross-functional linkages and NPD timeliness in high and low technology change conditions. Accordingly, the effect of cross-functional linkages on NPD timeliness was stronger in low than in high technology change. These results supported Hypothesis 6a.

5.3.2.3.7 The Moderating Effect of Technology Change on the Relationship between Technology Synergy and NPD Timeliness

H6b: The positive interconnection between technology synergy and timeliness in NPD is stronger when technological change is low than when it is high.

As shown in Box B of Table 5.14, the results indicated that technology change did not moderate on the relationship between technology synergy and NPD timeliness. In Model 2, the interaction term between technology synergy and technology change was insignificant ($\beta = 0.105$, $p = 0.181$). Thus, H6b was not supported.

5.3.2.3.8 The Moderating Effect of Technology Change on the Link between the HQ-subsidiary/agent Relationship and INPR Timeliness

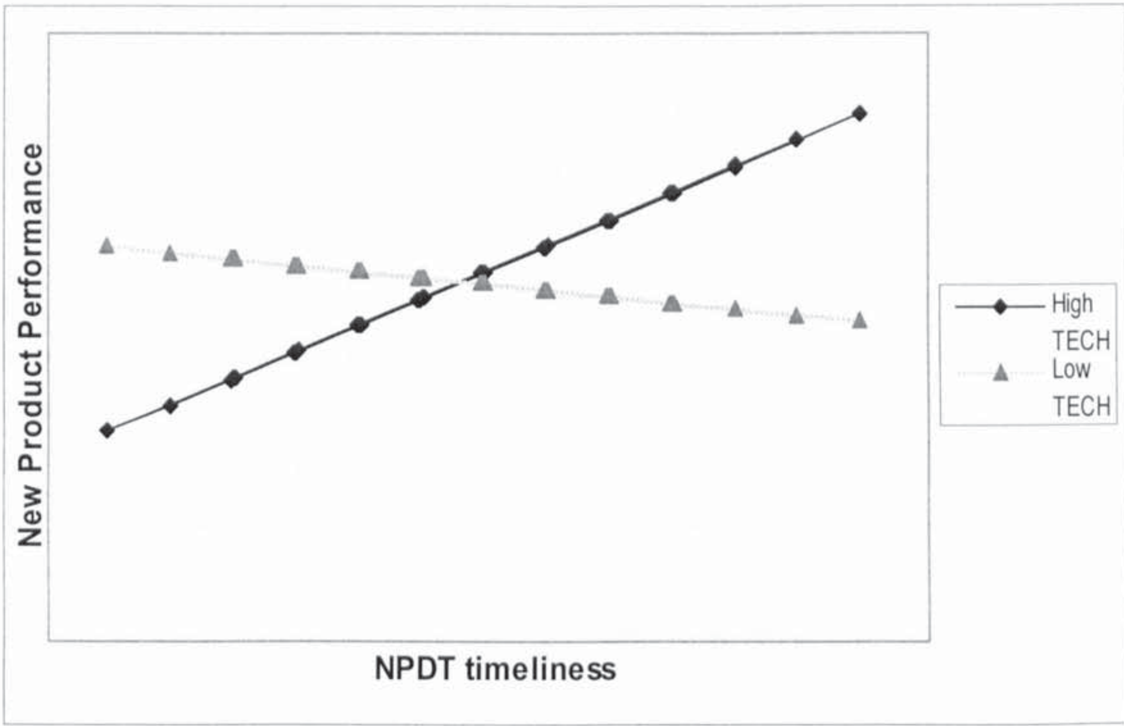
H6c: The positive interconnection between HQ-subsidiary/agent relationship and timeliness in INPR is stronger when technological change is high than when it is low

The results for Hypothesis 6c are presented in Box D of Table 5.14. In Model 2, when the interaction term between the HQ-subsidiary/agent relationship and technology change was introduced, this variable proved insignificant (β = 0.032, p = 0.605). Therefore, H6c was not supported.

5.3.2.3.9 The Moderating Effect of Technology Change on the Relationship between NPD Timeliness and New Product Performance

H6d: The positive interconnection between timeliness in NPD and performance is stronger when technological change is low than when it is high.

Figure 5.6 NPDT × TECH Interaction Effect on New Product Performance



The results for Hypothesis 6d are presented in Box F of Table 5.14. In Model 2, an interaction term (i.e., NPDT × TECH) was positive and significant ($\beta = 0.168$, $p < 0.05$).

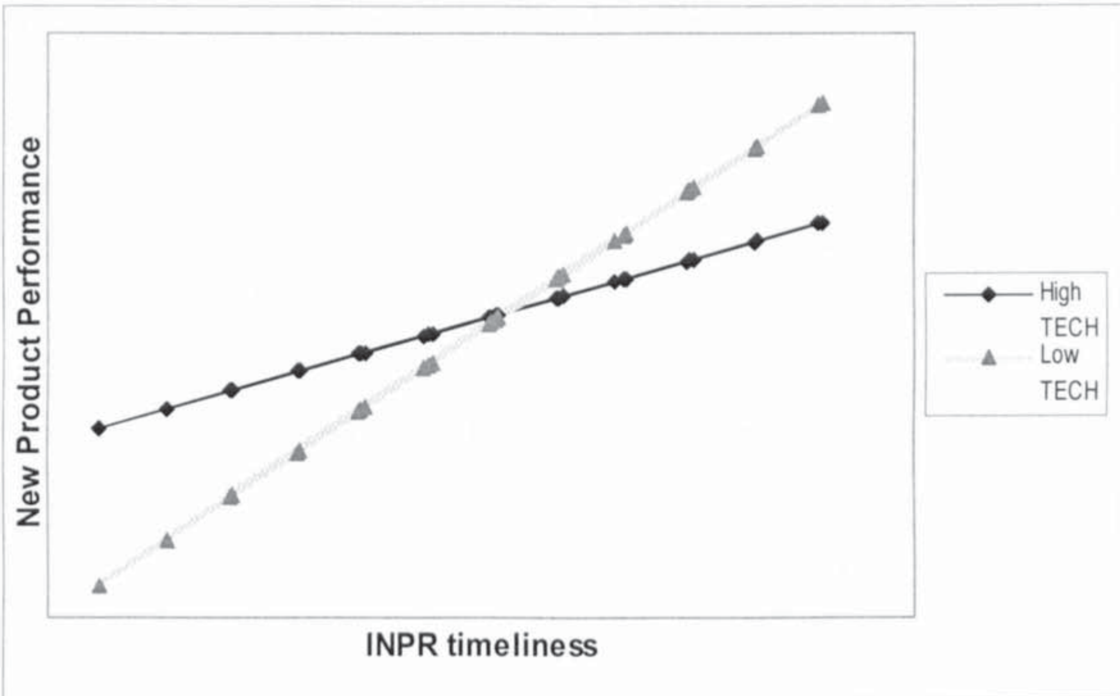
The results did support the interaction between NPD timeliness and technology change on new product performance. The addition of the interaction variable also created a significant change in R^2 (from 0.168 to 0.188), the adjusted R^2 (from 0.156 to 0.168) and F Change ($p < 0.10$). The collinearity statistics revealed that VIF was 1.599 and tolerance was 0.625. Therefore, multicollinearity did not appear to be a problem. Figure 5.6 shows the simple slopes of the relationship between NPD timeliness and new product performance in high and low technology change conditions. Accordingly, the effect of NPD timeliness on new product performance was stronger in high than in low technology change. These results supported Hypothesis 6d.

5.3.2.3.10 The Moderating Effect of Technology Change on the Relationship between INPR Timeliness and New Product Performance

H6e: The positive interconnection between timeliness in INPR and performance is stronger when technological change is low than when it is high.

As shown in Box F of Table 5.14, the interaction between INPR timeliness and technology change was statistically significant ($\beta = -0.150$, $p < 0.10$). The addition of the interaction term (i.e., INPRT × TECH) to the main effects model yielded a significant increase in R^2 (F change = 2.499; $p < 0.10$). The collinearity statistics revealed that VIF was 1.590 and tolerance was 0.629. Consequently, multicollinearity was not an issue. To better understand the interaction effects, the results have been plotted in Figure 5.7. The line representing low technology change has the steeper slope indicating that the relationship between INPR timeliness and new product performance is stronger for lower technology change conditions than for higher. These results supported Hypothesis 6e.

Figure 5.7 INPRT × TECH Interaction Effect on New Product Performance



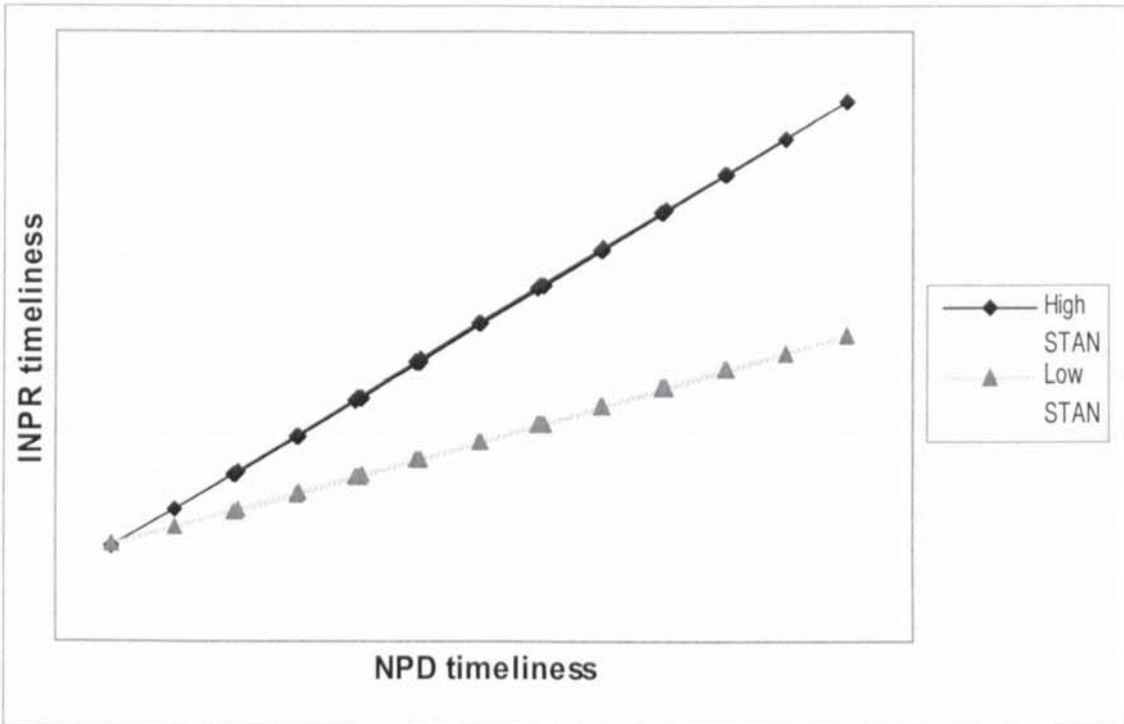
5.3.2.3.11 The Moderating Effect of Standardization on the Relationship between NPD Timeliness and INPR Timeliness

H7: The positive interconnection between timeliness in NPD and timeliness in INPR is stronger when standardization is high than when it is low

The results for Hypothesis 7 are presented in Box G of Table 5.14. In Model 2, the interaction term (i.e., NPDT × STAN) which was positive and significant ($\beta = 0.140$, $p < 0.05$). The results did support the interaction between NPD timeliness and standardization on INPR timeliness. The addition of the interaction variable also created a significant change in R^2 (from 0.355 to 0.374), the adjusted R^2 (from 0.345 to 0.361) and F Change ($p < 0.05$). The collinearity statistics revealed that VIF was 1.019

and tolerance was close to 1 (i.e., 0.981). For this reason multicollinearity did not appear to be a problem. The interactions in a chart (Figure 5.8) illustrate the moderating effect of standardization on the relationship between NPD timeliness and INPR timeliness. The regression slope was steeper for NPD timeliness with high standardization conditions than for low. That is, there is a strong positive relationship between NPD timeliness and INPR timeliness under high standardization conditions. These results supported Hypothesis 7.

Figure 5.8 NDPT × STAN Interaction Effect on INPR timeliness



5.4. Summary

The main purpose of this chapter has been to analyse the data obtained in order to examine the hypothesized relationships that were developed in chapter 3. Overall, the research findings from the proposed conceptual model show the direct, mediated and moderated relationships. Table 5.15 shows a summary of the findings of the hypotheses tested in terms of SEM and regression analyses.

Fifteen of the twenty-four hypotheses were supported by regression analyses. That is, in the six direct hypothesized relationships, five (i.e., the impacts of marketing synergy and cross-functional linkages on NPD timeliness, the impacts of the HQ-subsidiary/agent relationship and NPD timeliness on INPR timeliness, and the impact of INPR timeliness on new product performance) were supported.

In the seven mediated hypothesised relationships, five (i.e., the mediating effect of marketing proficiency on the marketing synergy-NPD timeliness association, the cross-functional linkages-NPD timeliness association, and the HQ-subsidiary/agent relationship-INPR timeliness association, the mediating effect of technical proficiency on the HQ-subsidiary/agent relationship-INPR timeliness association, and the mediating effect of INPR timeliness on the NPD timeliness-new product performance association) were also confirmed.

In the eleven moderated hypothesized relationships, five (i.e., the moderating effect of competitive intensity on the NPD timeliness-new product performance association, the moderating effect of technology change on the cross-functional linkages-NPD timeliness association, the NPD timeliness-new product performance association and the INPR timeliness-new product performance association, and the moderating effect of standardization on the NPD timeliness-INPR timeliness association) were again supported. The empirical findings imply that the combinations of the direct, mediated and moderated variables influence new product performance in target markets as well as timeliness in NPD and INPR.

Table 5.15 Summary of the Tests of Hypothesised Relationships

Hypothesised Relationships		Findings: SEM	Findings: Regression Analyses
Direct Effects	H1a: The level of cross-functional linkages is associated positively with the level of timeliness in NPD	**Supported**	**Supported**
	H1b: The level of marketing synergy is associated positively with the level of timeliness in NPD	**Supported**	**Supported**
	H1c: The level of technology synergy is associated positively with the level of timeliness in NPD	Not supported	Not supported
	H1d: The level of NPD timeliness is associated positively with the level of INPR timeliness	**Supported**	**Supported**
	H1e: The level of HQ-subsidiary/agent relationship is associated positively with the level of INPR timeliness	**Supported**	**Supported**
	H1f: The level of INPR timeliness is associated positively with new product performance	**Supported**	**Supported**
Mediated Effects	H2a: The level of proficiency in marketing activities mediates the association between cross-functional linkages and NPD timeliness	**Supported**	**Supported**
	H2b: The level of proficiency in marketing activities mediates the association between marketing synergy and NPD timeliness	**Supported**	**Supported**
	H2c: The level of proficiency in marketing activities mediates the association between HQ-subsidiary/agent relationship and INPR timeliness	**Supported**	**Supported**
	H3a: The level of proficiency in technical activities mediates the association between cross-functional linkages and NPD timeliness	Not supported	Not supported
	H3b: The level of proficiency in technical activities mediates the association between technical synergy and NPD timeliness	Not supported	Not supported
	H3c: The level of proficiency in technical activities mediates the association between HQ-subsidiary/agent relationship and INPR timeliness	**Supported**	**Supported**
	H4: The level of timeliness in INPR mediates the association between NPD timeliness and performance	**Supported**	**Supported**
Moderated Effects	H5a: The positive interconnection between cross-functional linkages and timeliness in NPD is stronger when competitive intensity is high than when it is low	Not supported	Not supported
	H5b: The positive interconnection between marketing synergy and timeliness in NPD is stronger when competitive intensity is high than when it is low	Not supported	Not supported
	H5c: The positive interconnection between HQ-subsidiary/agent relationship and timeliness in INPR is stronger when competitive intensity is high than when it is low	Not supported	Not supported
	H5d: The positive interconnection between timeliness in NPD and performance is stronger when competitive intensity is high than when it is low	**Supported**	**Supported**
	H5e: The positive interconnection between timeliness in INPR and performance is stronger when competitive intensity is high than when it is low	Not supported	Not supported
	H6a: The positive interconnection between cross-functional linkages and timeliness in NPD is stronger when technological change is low than when it is high	Not supported	**Supported**
	H6b: The positive interconnection between technology synergy and timeliness in NPD is stronger when technological change is low than when it is high	Not supported	Not supported
	H6c: The positive interconnection between HQ-subsidiary/agent relationship and timeliness in INPR is stronger when technological change is high than when it is low	Not supported	Not supported
	H6d: The positive interconnection between timeliness in NPD and performance is stronger when technological change is low than when it is high	Not supported	**Supported**
	H6e: The positive interconnection between timeliness in INPR and performance is stronger when technological change is low than when it is high	Not supported	**Supported**
	H7: The positive interconnection between timeliness in NPD and timeliness in INPR is stronger when standardization is high than when it is low	**Supported**	**Supported**

Chapter Six: Discussion

6.1 Introduction

This chapter will interpret and discuss the results of the analysis conducted in the previous chapter. It mainly discusses the relationship of this study with the literature presented in chapter two. Based on the empirical evidence and the findings from my study conducted on a Korean sample, the present study helps to better understand the antecedents and the consequences of timeliness in NPD and INPR by dividing them into direct influences, mediators and moderators in a research model. The results are also interpreted and discussed on the basis of the research questions, conceptual framework and hypotheses of this study. Alternative explanations will be given for both significant and insignificant results.

The chapter is structured in the following way. The first section of this chapter interprets the significant role of timeliness in NPD and INPR based on the empirical evidence as well as the proposed model. Secondly, the results of testing the direct influences on new product performance as well as timeliness in NPD and INPR are discussed. Next, it then discusses the results of the testing of my hypotheses to examine the effects of three mediators (i.e., marketing proficiency, technical proficiency and INPR timeliness). In the last section of this chapter I discuss the moderating effects of external environments (i.e., competitive intensity and technology change) and standardization in the INPR process.

6.2 Interpretation of the Role of Timeliness in NPD and INPR

The significant role of timeliness in NPD and INPR is explained here. The finding that timeliness in NPD and INPR enhances new product performance emphasizes the strategic significance of timeliness in international new product rollout as well as new product development projects. This thesis focuses on selected antecedents and consequences of timeliness in NPD and INPR that are germane to the domain of marketing. Despite the general acceptance of the importance of timeliness in NPD and INPR to an organization's new product success, to date little has been offered that aids businesses as they undertake such an endeavour. The investigation is motivated by the growing recognition that effective management of timeliness in NPD and INPR is an issue of marketing significance (e.g., Chryssochoidis and Wong, 1998; Cooper and Kleinschmidt, 1994). However, previous research has been carried out using Western samples (see Table 6.1). Therefore, the justification for its inclusion in the proposed model is to test whether the findings from previous studies conducted with USA and European samples (e.g., Chryssochoidis and Wong, 1998; Cooper and Kleinschmidt, 1994) similarly hold true in a different contextual sample, namely Korean companies.

The findings of the present study confirm the significant role of timeliness in NPD and INPR between key marketing and technological factors and new product performance according to mediator and moderator variables. Previous research used to employ the construct of time dimension (e.g., speed-to-market, cycle time and timeliness) as the outcome variable (see Table 6.1). Specifically, a previous attempt to consolidate research findings in the timeliness in NPD and INPR literature includes the investigation of the relationships between timeliness in NPD and INPR and its antecedents (e.g., Chryssochoidis and Wong, 1998). Unlike previous research regarding timeliness construct, the current study aims to test how and when key determinants such as marketing and technology factors affect timeliness in NPD and INPR and then when it influences new product performance.

Table 6.1 Examples of Research on Time Dimensions

Time Dimensions	Variable	Sample	Author(s)
Timeliness	Outcome variable	30 new products which were rolled out across European markets	Chryssochoidis and Wong (1998)
Time-to-market	Outcome variable	354 US manufacturing firms	Akgün and Lynn (2002)
Time-to-market	Outcome variable	220 new products from US manufacturing firms	Datar *et a,* (1997a)
NPD cycle time	Outcome variable	343 total projects from 21 divisions of US 11 firms	Griffin (1997)
NPD cycle time	Outcome variable	188 US small manufacturing firms	LaBahn *et al.* (1996)
NPD on-time	Outcome variable	131 US manufacturing firms	Swink (2003)

This study also operationalizes the framework of the causal effects among antecedents, NPD and INPR timeliness, and consequences to investigate the different role of timeliness in NPD and INPR from previous research. The findings from the current research highlight that timeliness in NPD and INPR show differing results in new product performance depending on particular conditions. The most important finding from this study is that timeliness in NPD and INRP has a central influence on the relationships between marketing synergy, cross-functional linkages, technology synergy, the HQ-subsidiary/agent relationship, and new product success. Based on the present study, timeliness in NPD and INPR is a central component of companies' competitive strategy. Therefore, the effective management of timeliness in NPD and INPR is an issue of marketing significance. An important managerial aspect of a speed-based strategy is the ability to manage the speed with which new products can be developed and introduced to a market. It is empirically clear evidence for there being a significant direct relationship between timeliness in NDP and INPR and new product performance.

6.3 Interpretation of the Antecedents and the Consequences of Timeliness in NPD and INPR

As the first investigation on the relationships between NPD timeliness and its antecedents (i.e., marketing synergy, cross-functional linkages and technology synergy), the results support both the hypothesized relationships (H1a and H1b) between cross-functional linkages and marketing synergy and NPD timeliness except for a hypothesis (H1c) that the level of technology synergy is associated positively with the level of timeliness in NPD. Cross-functional linkages and marketing synergy were found to be positively related to NPD timeliness. R^2 is the proportion of variance in the dependent variable which can be predicted from the independent variables. These predictor variables significantly explained 19.7% of the variance in NPD timeliness.

Regarding the relationships between INPR timeliness and its antecedents (i.e., NPD timeliness and the HQ-subsidiary/agent relationship), the findings support both the hypothesized relationships (H1d and H1e) between NPD timeliness and the HQ-subsidiary/agent relationship and INPR timeliness. NPD timeliness and the HQ-subsidiary/agent relationship positively influence INPR timeliness. Both of these predictor variables significantly explained 29.4% of the variance in INPR timeliness.

The third direct relationship concerns the outcomes of timeliness in INPR. The results support the hypothesized relationships (H1f) between INPR timeliness and new product performance. Two predictor variables had a statistically significant and positive connection with new product performance. Both of these predictor variables significantly explained 16.6% of the variance in new product performance.

6.3.1 The Relationship between Cross-functional Linkages and NPD Timeliness

Consistent with previous research (e.g., Chryssochoidis and Wong, 1998; Cooper and Kleinschmidt, 1994), this study similarly reflects the positive effect of cross-functional linkages on NPD timeliness in the both results by an SEM and a regression analysis on the hypothesis (H1a): *the level of cross-functional linkages is associated positively with the level of timeliness in NPD.* This is reflected in the fact that organizations need to build cross-functional linkages among their marketing, R&D and manufacturing groups in order to support NPD timeliness (Dyer *et al.*, 1999). For the rapid development of new products, evidence is mounting in favour of cross-functional linkages that facilitate both the quick dissemination and utilization of information. This leads to a case of less information dissemination and utilization among functions and, consequently, to a more cumbersome product development process. Thus, the results indicate that mere possession of accurate knowledge about technology, customers and competition does not lead to enhanced time efficiency in new product development. Instead, exchange and sharing of knowledge across functions in line with cooperation, interaction and integration become key roles in timely developing new products. Every function (e.g., marketing and R&D) of organizations must interact to ensure an orderly and reliable resource flow to produce effective outcomes because marketing, R&D and manufacturing are seldom internally self-sufficient with regard to the critical resources required to perform their NPD role effectively (Ruekert and Walker 1987).

The finding from this study is also consistent with several previous studies regarding time efficiency (e.g., Griffin, 1997; Sherman *et al.*, 2000). However, this research does not offer evidence of the effects of process and project characteristics on NPD timeliness. The first issue that I would like to raise concerns the effects of the different types of process (i.e., cross-functional linkages) on time efficiency. Sherman *et al.* (2000) suggest that one of the challenges facing cross-functional linkages is to find out which types of cross-functional linkages have the greatest impact on time efficiency in new product development. Among the five forms of cross-functional linkages including R&D/marketing integration, R&D/customer integration, R&D/manufacturing integration, R&D/supplier integration, and strategic partnership, achieving R&D integration of information or knowledge from past projects is the single most important integration factor in reducing development time. It is important to note that cumulative experience can strongly provide organizations with NPD timeliness. Outcome feedback can serve as a principle motivator for organizations to actively improve their learning ability (Menon and Lukas, 2004). Therefore, organizational learning is also a function of improvement in NPD speed. This occurs through enhancing and expanding information sharing across functions so that more organizational areas can reap feedback benefits (Menon and Lukas, 2004).

The next issue is the effect of product characteristics on the cross-functional linkages-NPD timeliness relationship. Unlike incremental products which are incremental redesigns of existing products, greater product newness requires more design and development tasks to be completed (Swink, 2003). Cross-functional teams have a larger impact on reducing cycle time for newer products than for more incremental products (Griffin, 1997). The time-reducing effect of using cross-functional linkages counteracts the time-increasing effects associated with product newness. That is, cross-functional linkages can mitigate the negative effects of time-consuming activities on NPD project schedule in line with increasing amounts of novelty in process (e.g., technological novelty). Moreover, cross-functional linkages help project workers to accelerate a development schedule even though the growing uncertainty of the tasks on NPD projects when organizations develop more complicated products requires increasing lead-time in development length. Rich communication among functions to accelerate NPD activities is thought to convey greater importance and challenge to organization members. Therefore, cross-functional linkages can encourage and facilitate organizational members to think in new ways about an NPD project, perhaps even to innovate or adopt new technologies and previously undetected opportunities for optimizing workflow and development processes might be realized.

The results from the present study could not indicate the effect of the different types of cross-functional linkages on NPD timeliness. Neither did this study test whether any difference exists between the effects of cross-functional linkages on NPD timeliness in newer products and those in the case of more incremental products. This is because the present research only examines the roles of mediators (i.e., marketing proficiency and technical proficiency) and moderators (i.e., competitive intensity and technology change) on the cross-functional linkages-NPD timeliness relationship. In 6.4, 6.5 and the following parts, the mediating effect of marketing proficiency as well as the moderating effect of technology change on the relationship between cross-functional linkages and NPD timeliness will be discussed and interpreted.

6.3.2 The Relationship between Marketing Synergy and NPD Timeliness

In addressing the antecedents of timeliness in NPD and INPR, it is explicit objective to focus on factors specific to marketing. The result of this study is supportive of the second hypothesized relationship (H1b): *the level of marketing synergy is associated positively with the level of timeliness in NPD.* Specifically, NPD timeliness is found to be determined, to a large extent, by marketing synergy. These findings suggest that marketing synergy plays a key role in enhancing NPD timeliness in South Korean manufacturing companies. The results also support finding in prior research that marketing synergy is a key determinant of NPD timeliness (e.g., Chryssochoidis and Wong, 1998) and that the allocation and use of resources are likely to have greater impact on accelerated project schedules (Hauptman and Hirji, 1999).

There are several possible explanations for this significant relationship. I can explain Song and Parry's argument (1997a) on the basis of my findings. They emphasized that *"superior skills and resources are not automatically converted into positional advantages, nor is there a certain performance payoff from superior cost or differentiation positions. Both conversions are mediated jointly by entry timing and the quality of tactics and implementation."*

Successful new products emerge from a combination of the firm's existing skills, and resources (Day and Wensley, 1988). With respect to the relationships marketing resources, marketing skills and competitive advantage, marketing resources lead to marketing skills and they result in product competitive advantage (Song *et al.*, 1997b; Song and Montoya-Weiss, 2001). Both marketing resources and marketing skills are positively associated with new product performance (Cooper, 1979) because identification of the key success factor for business performance must lead to investment in the assets (i.e., resources) and skills which are necessary and sufficient for achieving a successful position. Product advantage has consistently been shown to be a key differentiator between success and failure in the development of new products and services alike (Craig and Hart, 1992). This present study tested neither the relationship between marketing synergy and other key factors (e.g., competitive advantage or product advantage) for new product performance nor that but between NPD timeliness and product competitive advantage. However, the significant role of NPD timeliness on the basis of findings from the present study suggests that NPD timeliness is likely to mediate the relationship between marketing synergy and product competitive advantage. This is because marketing synergy leads to proficiency in NPD activities (Song *et al.*, 1997b) and then the latter results in competitive advantage (Song and Parry, 1997) as well as timeliness in NPD and INPR (Chryssochoidis and Wong, 1998). Thus, marketing synergy results in new product performance through competitive advantage. Competitive advantage also occurs when marketing synergy yields NPD timeliness. Hultink and Hart (1998) found that swift new product development is associated with the degree of new product advantage. That is, marketing synergy is another key contributor to new product performance, product competitive advantage and NPD timeliness. Consequently, NPD timeliness becomes a tool through which marketing synergy acquires competitive advantage for new product success. Regarding how marketing synergy influence NPD timeliness, I will discuss and interpret in 6.4.2.

6.3.3 The Relationship between Technology Synergy and NPD Timeliness

Although the study was designed to test the third hypothesized relationship (H1c): *technology synergy significantly predicts timeliness in NPD,* the actual result uncovers the nonsignificant effect of technology synergy on NPD timeliness. However, the lack of a strong association between technology synergy and NPD timeliness in the data is interesting, but not surprising. This implies that Korean manufacturers' managers do not recognise technology to be a major driving force, unlike Western manufacturers' managers[69].

This nonsignificant relationship between technology synergy and NPD timeliness demonstrates that technology synergy does seem to be related weakly to new product success as well as product advantage in Korean manufacturing companies. Korean manufacturers' new products do not seem to rely heavily on R&D, production and manufacturing competence. This result may be attributed to the shortage of technologically skilled manpower in Korean manufacturing companies. It is also assumed that this is due to the acknowledgement that in general terms technology is, or can be, available to each company operating in a particular industry (Sohal, 1998). Korean manufacturers respectively concentrate companies' resources on buying or developing to make their products better than the competition's rather than allocating their resources - people, equipment, money - in ways that produce the greatest competitive impact. This is possibly because Korean industries have actually pursued the acquisition of core technology from advanced countries and most of them are still dependent on them, especially the automotive and the machine tool industries (Shin and Ho, 1997; Sohal and Ferme, 1996). Furthermore, Korean firms realize the importance of product differentiation and quality improvement rather than R&D capacity for new product success (Shin and Ho, 1997). Thus, Korean manufacturers' managers may think that their companies' new products do not have product competitive advantages in terms of technology skills and resources, compared to competitors' new products in advanced countries.

Another explanation with respect to the nonsignificant impact of technology synergy on NPD timeliness is that the major weaknesses of South Korean companies have been identified as bureaucracy and a lack of creativity (Sohal and Ritter, 1995). One of the characteristics of Korean companies is centralization, which refers to the hierarchy of authority and degree of participation in decision making (Aiken and Hage

[69] Technology synergy is a direct determinant of new product performance in line with previous research (e.g., Song *et al.*, 1997b; Song and Parry, 1997b). Moreover it leads to NPD timeliness and product competitive advantage (e.g., Cooper and Kleinschmidt, 1994, Song and Parry, 1996; Song and Montoya-Weiss, 2001). Li and Calantone (1998) empirically found that R&D strength leads to product advantage because firms with greater technology development resources can create products with more innovative features.

1968). A hierarchy of authority encourages people to adhere to the established norm but discourages them from taking creative actions involving risks. Moreover, the representative characteristic of Korean companies is one of family-ownership, where the founder and/or the founder's descendants influence the decision-making process, which for the most part is top down (Song, 1992). Limitation of participation in decision making is also adverse to the innovation process. Sohal and Ritter (1995) proposed that these are the likely areas of development in the future, and progress will probably depend on reducing the influence of chaebols, increasing competition and developing small business and increasing the domestic R&D base. The Korean government also supports the development of core industrial technology and research on science in order to improve national competitiveness over the long term (Shin and Ho, 1997). In the future, such endeavours facilitate Korean manufacturing companies in the acquisition of technology synergy as a key contributor not only to NPD timeliness but also to product competitive advantage.

6.3.4 The Relationship between the HQ-subsidiary/agent Relationship and INPR Timeliness

The results in the present study support the positive effect of the HQ-subsidiary/agent relationship on INPR timeliness in the both results by an SEM and a regression analysis on the hypothesis (H1e): *the level of HQ-subsidiary/agent relationship is associated positively with the level of INPR timeliness*. This finding provides support to the argument that the HQ-subsidiary/agent relationship is an antecedent to INPR timeliness. A previous study merely uncovered a positive correlation between the HQ-subsidiary/agent relationship and INPR timeliness without investigating the causal effect (Chryssochoidis and Wong, 1998).

Although this study did not test either the link between the HQ-subsidiary/agent relationship and product competitive advantage or that between the latter and INPR timeliness, more comprehensive and varied information flows between

HQ and subsidiary are likely to achieve product competitive advantage and then the latter may lead to new product launch timeliness. This is because new product advantage (or superiority) increases the adoption rate in the commercialization stage (Rogers 1995). The quality of communication between HQ and subsidiary was emphasized as being particularly important in the innovation process (Ghoshal and Barlett, 1988). Market knowledge competence and a customer knowledge process enhance new product advantage because they enable a firm to explore innovation opportunities created by emerging market demand and reduce potential risks of misfitting buyer needs (Li and Calantone 1998). Moreover, the significance of cooperation between HQ and subsidiaries in successfully developing a new product reveals a balance between standardization and adaptation in the product design for target-country markets (Subramaniam and Hewett, 2004). The finding in this study indicates that organizations with rich cooperation and communication between HQ and subsidiary/agent can clearly make and implement decisions regarding rollout of their new products across target-country markets on the basis of local market information and product competitive advantage. Thus, the findings from this study validate that organizations acquire market, customer and competitor knowledge in line with the effective and intensive HQ-subsidiary relationship and then they tend to accelerate new product launch into target markets.

6.3.5 The Relationships between NPD Timeliness, INPR Timeliness and New Product Performance

This study also hypothesizes that *NPD timeliness leads to INPR timeliness* (H1d). The results provide evidence in support of this hypothesis as well. NPD timeliness is found to have a positive effect on INPR timeliness. This is consistent with previous research (Chryssochoidis and Wong, 1998). The finding in the present research confirms an underlying assumption about the relationship between the two constructs. That is, more successful new product development in terms of planned time schedule is strongly associated with a much faster introduction to overseas markets.

Although this research did not investigate the relationships between timeliness in NPD and INPR and new product advantage, their relationships can be interpreted by previous research (e.g., Chryssochoidis and Wong, 1998; Li and Calantone 1998; Oakley, 1996; 1997; Rogers 1995). Product advantage is positively associated with new product performance (Henard and Szymanski, 2001; Li and Calantone 1998) because superior products are more likely to succeed (Cooper, 1990). As mentioned earlier, the timing decision of new product launch is also related to the degree of product advantage. High advantage new products tend to be among the first to market and those with low advantage tend to be followers (Hultink and Hart, 1998; Yoon and Lilien, 1985). More successful launches are strongly associated with a much faster introduction to overseas markets because product competitive advantage encourages a firm to quickly launch its new product into target markets (Oakley, 1996; 1997). Therefore, when a firm develops its new product on time in terms of the planned time schedule, it may acquire product competitive advantage and then the latter seems to influence INPR timeliness.

In addressing the outcomes of timeliness in NPD and INPR, the hypothesis (H1f) that *there is positive effect of timeliness in NPD and INPR on new product performance* is tested. The results support the hypothesis. Thus, new product performance in a local country market is found to be determined by INPR timeliness as well as NPD timeliness. Based on the results of testing two hypotheses (H1d and H1f), it is important note that successful achievements of product competitive advantage and new product success are likely to rely on not only NPD timeliness and INPR timeliness but also on the time lapse between new product development and overseas launch. That is, companies that achieve product competitive advantage through NPD timeliness can quickly launch their new products into target markets. NPD timeliness, product competitive advantage and INPR timeliness result in new product performance

6.4 The Mediating Effects of Proficiency in NPD activities and INPR timeliness

6.4.1 The Mediating Effect of Marketing Proficiency on the Cross-functional Linkages-NPD Timeliness Relationship

A conceptual framework for an examination of mediating effects on the antecedents-timeliness in NPD and INPR relationships is also developed here. The main objective of this study was to increase our understanding of how antecedents influence NPD (INPR) timeliness. The finding of the present study is supportive of the mediation hypothesis of marketing proficiency on the cross-functional linkages-NPD timeliness relationship (H2a): *the level of proficiency in marketing activities mediates the association between cross-functional linkages and NPD timeliness.* Previous empirical research supports the direct effect of cross-functional linkages on proficiency in NPD activities (e.g., Song and Parry, 1997a) and the direct effect of the latter on NPD timeliness (e.g., Chryssochoidis and Wong, 1998) as well as new product performance (Song and Parry, 1996; 1997a; b; Song and Montoya-Weiss, 2001). However, the present study, which is the investigation of timeliness in NPD and INPR process, showed that the effect of cross-functional linkages on NPD timeliness is fully mediated by marketing proficiency.

The findings from the test of mediation in the SEM support this hypothesized mediation model with the condition for testing the role of marking proficiency being met for NPD timeliness. The chi-square differences test between non-constrained model and the constrained model indicated that the addition of the cross-functional linkages → NPD timeliness path to the constrained model did not significantly improve the fit (i.e., $\chi^2 = 2.24$ / d.f. = 1). Also, previously significant cross-functional linkages → NPD timeliness path (i.e., γ estimates = 0.25, t = 2.24) was reduced to nonsignificance (i.e., γ estimates = 0.09, t = 0.58) when marketing proficiency was taken into account. It is a useful SEM approach to distinguish an important distinction between indirect and mediated effects. For example, if I found that the direct effect of cross-functional linkages on NPD timeliness is not significant in the first place (despite the fact that the cross-functional linkages → marketing proficiency and marketing proficiency → NPD timeliness paths are significant), there is evidence for an indirect effect between cross-functional linkages and NPD timeliness. That is, marketing proficiency cannot significantly *"account"* for the cross-functional linkages-NPD timeliness relationship in line with a suggestion by Holmbeck (1997).

In addition, the use of regression techniques also provides a similar result for testing the mediating effect of marketing proficiency on the cross-functional linkages-NPD timeliness relationship. The entry of marketing proficiency into the model results in the nonsignificant impact of cross-functional linkages on NPD timeliness. The proposed model explained 26.0% of the variance in NPD timeliness. Based on the results by an SEM and a regression model, both conclude that there exists a positive effect of cross-functional linkages on NPD timeliness through marketing proficiency. That is, the effect of cross-functional linkages on NPD timeliness is attributed to marketing proficiency.

Consideration of the importance of the mediation effect of timeliness in NPD and INPR construct on the marketing proficiency → new product performance path could be argued. That is, timeliness in NPD and INPR may mediate the proficiency in NPD activities-new product performance relationship. This is because the findings in this study support that marketing proficiency leads to NPD timeliness and the latter results in new product performance. Previous research also found the significant relationship between proficiency in NPD activities and new product performance (Song and Parry, 1996; 1997a; b; Song and Montoya-Weiss, 2001). Therefore, it is arguable whether the impact of timeliness in NPD and INPR on the relationship between marketing proficiency and new product performance is indirect effect or mediated effect.

Table 6.2 Regression Results: the Mediating Effect of Timeliness in NPD and INPR on the Marketing Proficiency-New Product Performance Relationship

	Dep. Var. = New product performance			
	Model 1		Model2	
	β	t-value	β	t-value
Marketing proficiency (MP)	0.530	9.123***	0.492	7.861***
Mediator				
New Product Development Timeliness (NPDT)			0.100	1.598
R^2	0.281		0.290	
Adjusted R^2	0.278		0.283	
F-value	83.237***		43.199***	
ΔR^2			0.009	
F Change			2.554	
Marketing proficiency (MP)	0.522	8.996***	0.445	6.895***
Mediator				
International New Product Rollout Timeliness (INPRT)			0.169	2.615*
R^2	0.273		0.295	
Adjusted R^2	0.269		0.288	
F-value	80.924***		44.974***	
ΔR^2			0.022	
F Change			6.838*	

†: Significant at $p < .10$, *: Significant at $p < .05$, **: Significant at $p < .01$, ***: Significant at $p < .001$

The current researcher tested this argument and found that INPR timeliness partially mediates the marketing proficiency-new product performance relationship in the Korean sample (see Table 6.2). In Table 6.2, Model 1 shows that when entered alone, marketing proficiency has a significant effect on new product performance (β = 0.522, p < 0.001). When marketing proficiency and INPR timeliness were entered simultaneously in Model 2, the beta coefficient of marketing proficiency was reduced from 0.522 (t = 8.996, p < 0.001) to 0.445 (t = 6.895, p < 0.001), which shows partial mediation of INPR timeliness on the relationship between marketing proficiency and new product performance. In an evaluation of both the change in R^2 and in beta coefficients between the two Models, the addition of INPR timeliness in Model 2 was significant and resulted in a statistically significant gain in R^2 from Model 1. However, the result of this additional analysis did not support NPD timeliness as a mediator of marketing proficiency-new product performance relationship in the Korean sample (see Table 6.2).

6.4.2 The Mediating Effect of Marketing Proficiency on the Marketing Synergy-NPD Timeliness Relationship

Regarding the role of the marketing factor in Korean companies, Song *et al.* (1997b) argued that "*Korean mangers may not perceive the existing marketing skill base as directly impacting the proficient execution of marketing activities because pecuniary rewards are not always clearly and directly linked to performance in Korean firms-instead a patriarchal, seniority based system dominates.*" Their result showed that the proficiency of marketing activities does not mediate the relationships between marketing resources and new product performance as well as the relationships between marketing skills and new product performance. That is, marketing proficiency cannot account for both the marketing resources-new product performance relationship and the marketing skills- new product performance relationship in Korean companies.

However, this study found the mediating effect of marketing proficiency on the marketing synergy-NPD timeliness relationship (H2b): *the level of proficiency in marketing activities mediates the association between marketing synergy and NPD timeliness.* As mentioned in 6.3.2, this hypothesis is to test how marketing synergy influences NPD timeliness. The findings suggest that the effect of marketing synergy on NPD timeliness is explained by marketing proficiency. The finding from the SEM supports that the chi-square differences test between non-constrained model and the constrained model show that the addition of the marketing synergy → NPD timeliness path to the constrained model did not significantly improve the fit (i.e., $\chi^2 = 3.81$ / d.f. = 1). Also, previously significant marketing synergy → NPD timeliness path (i.e., γ estimates = 0.45, t = 3.16) was reduced to nonsignificance (i.e., γ estimates = 0.35, t = 1.00) when marketing proficiency was taken into account. In a regression analysis, the entry of marketing proficiency into the model resulted in the beta coefficient of marketing synergy being reduced from 0.363 (t = 5.175, $p < 0.001$) to 0.205 (t = 2.664, $p < 0.01$), which shows partial mediation. The proposed model explained 26.0% of the variance in NPD timeliness.

Although the criterion variable is different (i.e., new product performance vs. NPD timeliness), the results in the present study are not similar to those in the study by

Song *et al.*, (1997b). There are two possible explanations for the differences between the two studies. Firstly, it could be a matter of time difference in the conducting of the surveys in the two studies. When this survey was carried out, most Korean companies might have become more flexible in hiring/firing the requisite marketing talent and expertise necessary for conducting the marketing activities Song *et al.*, (1997b) pointed out. I assume that the weaker link between the marketing knowledge and expertise of the employees and the marketing tasks in current Korean companies had disappeared on the basis of my findings. Thus, the flexible availabilities of marketing resources have become significant predictors of proficiency in marketing activities in this study. In addition, the lack of a neutral, unbiased incentive system in South Korean firms Song *et al.*, (1997b) pointed out might have been corrected. This may not act as a counterproductive force against the Korean project manager's attempts to mobilize marketing skills in current Korean companies. Based on the findings in the present study, it is possible that Korean companies have removed the limitations of the significant interlinks between marketing synergy and marketing proficiency by complementing human resource management systems regarding the flexibility in hiring/firing employees and the reward system.

Another reason for there being different results may be attributed to the difference of the model examined in the two studies. In that by Song *et al.*, (1997b), marketing skills not marketing resources directly impact new product performance. This present study found that marketing synergy is a significant contributor to NPD timeliness. Both results similarly showed that marketing proficiency significantly impact new product performance or NPD timeliness. The research by Song *et al.*, (1997b) examined the effects of marketing resources and marketing skill on new product performance through marketing proficiency, while the present research investigated the effect of marketing synergy on NPD timeliness through marketing proficiency. To examine this issue and clearly explain these different results, it can be argued that there is justification for the simultaneous inclusion of both NPD timeliness and new product performance as outcome variables in one model.

Table 6.3 Regression Results: the Mediating Effect of Marketing Proficiency on the Marketing Synergy-New Product Performance Relationship

	Dep. Var. = New product performance			
	Model 1		Model2	
	β	t-value	β	t-value
Marketing synergy (MS)	0.474	8.080***	0.239	3.566***
Mediator				
Marketing proficiency (MP)			0.406	6.072***
R^2	0.225		0.334	
Adjusted R^2	0.221		0.328	
F-value	65.280***		56.278***	
ΔR^2			0.110	
F Change			36.869***	

†: Significant at $p < .10$, *: Significant at $p <.05$, **: Significant at $p < .01$, ***: Significant at $p < .001$

The current researcher tested this argument and found that marketing proficiency also partially mediates the marketing synergy-new product performance relationship in the Korean sample (see Table 6.3). In Table 6.3, Model 1 showed that when entered alone, marketing synergy had a significant effect on new product performance (β = 0.474, p < 0.001). When entered marketing synergy and marketing proficiency simultaneously in Model 2, the beta coefficient of marketing synergy was reduced from 0.474 (t = 8.080, p < 0.001) to 0.239 (t = 3.566, p < 0.001), which shows partial mediateon of marketing proficiency on the relationship between marketing synergy and new product performance. In evaluation of both the change in R^2 and in beta coefficients between two Models, the addition of marketing proficiency in Model 2 was significant and resulted in a statistically significant gain in R^2 from Model 1. Thus, this additional analysis result supports for my first explanation of the different results between the two studies.

6.4.3 The Mediating Effect of Marketing Proficiency on the HQ-subsidiary/agent Relationship-INPR Timeliness Link

This result offers an answer to the question of how the HQ-subsidiary/agent relationship influences INPR timeliness (H2c): *the level of proficiency in marketing activities mediates the association between HQ-subsidiary/agent relationship and INPR timeliness.* Results of this study suggest that the positive influence of the HQ-subsidiary/agent relationship on INPR timeliness is attributed to marketing proficiency. In the results by an SEM, the chi-square differences test between the non-constrained model and the constrained model show that the addition of the HQ-subsidiary/agent relationship → INPR timeliness path to the constrained model did not significantly improve the fit (i.e., $\chi^2 = 0.57$ / d.f. = 1). Also, the previously significant the HQ-subsidiary/agent relationship → INPR timeliness path (i.e., γ estimates = 0.35, t = 5.33) was reduced to nonsignificance (i.e., γ estimates = 0.04, t = 0.32) when marketing proficiency was taken into account. In a regression analysis, the entry of marketing proficiency into the model resulted in the beta coefficient of the HQ-subsidiary/agent relationship dropping from its original value of 0.391 ($t = 6.162$, $p < 0.001$) to one of 0.131 ($t = 1.707$, $p < 0.10$). The proposed model explained 25.7% of the variance in INPR timeliness.

This proposed partial mediation effect of marketing proficiency on the HQ-subsidiary/agent relationship-INPR timeliness path supports the improvement of marketing activities (e.g., determining target market characteristics and trends, appraising competitors and their products, identifying characteristics that would differentiate and sell the product, executing test marketing programs, and conducting market research) through the effective coordination of HQ-subsidiary/agents' activities to achieve on-time international market launch. High cooperation, which is reflected in the openness of communication and similarity in goals among headquarters and subsidiary managers, influences the motivation among them to share their knowledge and further facilitate their knowledge exchange (Bartmess and Cerny, 1993). Their effective information flows lead to proficiency in marketing activities in order to secure effective sales forecasting, product modifications and product support services and then the latter confers speed in reaching managerial consensus on timely introduction of new products into target markets. The answer to the question of how the HQ-subsidiary/agent relationship is associated with INPR timeliness can be found from the results of this study in the mediating role of marketing proficiency on the relationship. Thus, marketing proficiency can account for the HQ-subsidiary/agent relationship-INPR timeliness link in INPR process.

6.4.4 The Mediating Effect of Technical Proficiency on the Cross-functional Linkages-NPD Timeliness Relationship

Another issue on the effect of mediation on the key determinants-timeliness in NPD and INPR timeliness relationships is technical proficiency construct. It is related to my explicit objective to focus on factors specific to technology. The result of this study is not supportive of the hypothesized relationship (H3a): *the level of proficiency in technical activities mediates the association between cross-functional linkages and NPD timeliness.* That is, technical proficiency cannot significantly account for the cross-functional linkages-NPD timeliness relationship. This finding is not consistent with previous research which has been carried out using Western samples. Moreover, this result cannot explain the indirect effect of technical proficiency on the cross-functional linkages-NPD timeliness relationship because the technical proficiency → NPD timeliness path is not significant (i.e., β estimates = - 0.02, t = - 0.18) in a SEM (Holmbeck, 1997).

According to my findings, technical proficiency does not lead to NPD timeliness in the Korean sample even though cooperation, interaction and integration among functions result in technical proficiency. Unlike advanced countries companies such as American and Japanese companies, Korean companies are likely to have a weak role for technical proficiency in such activities as conducting engineering and manufacturing evaluations, product testing, determining product specifications, prototyping, and building the final product on timely new product development. It may be that technical proficiency is not a stronger driver of product competitive advantage in Korean firms even though this study did not test the relationship between both constructs.

Although cross-functional linkages significantly influence NPD timeliness in the present study, centralization may adversely affect them in Korean manufacturers. As mentioned earlier, centralization is one of the characteristics of Korean companies (Aiken and Hage 1968). New product development is considered to be an organizational learning process (Day, 1994; Leonard-Barton, 1992; Moorman, 1995). Therefore, it is important to focus on information acquisition and shared interpretation as sub-processes through cooperation and communication among functions. However, South Korean workers have to compete with their co-workers in order to keep their jobs and this suggests that South Korean people can be highly competitive (Lee, 2004). This is related to a study by Bae and Chung (1997) which showed that 54.2% of South Korean workers were classified as committed to their company (workers turned down another job with higher pay) and this compare favourably with Japanese workers (20.4%) and American workers (26.3%). Furthermore, a structural hierarchy makes cross-functional linkages less efficient (Li, 1999). A hierarchy of authority in Korean firms may discourage communication among personnel from marketing, R&D and manufacturing units because a hierarchy stresses top-down communication and treats cross-functional communication as abnormal. Such hierarchies in Korean firms tend to force a form of localized communication on the organization by requiring that sub-units handle pieces of the organization's problems in relative independence. As Korean companies are more centralized compared to competitors (i.e., advanced countries' companies), cross-functional linkages are less likely to intensify their communication and cooperation and as a result they cannot affect NPD timeliness through technical proficiency. If a new product is to become an accepted project in an organization, people within functions have to interact and be trained by working closely together regarding a new technology. Thus, cross-functional linkages of more centralized Korean companies may decrease proficiency as well as efficiency because people among functions cannot decrease procedure time more rapidly when an organization is centralized. Such a lack of technical proficiency and efficiency is likely to hinder achieving feasible and desirable technical solutions for Korean NPD projects. Therefore, this study showed that technical proficiency cannot account for the cross-functional linkages-NPD timeliness relationship.

6.4.5 The Mediating Effect of Technical Proficiency on the Technology Synergy-NPD Timeliness Relationship

Inconsistent with previous research regarding the mediating effect of technical proficiency on the technology synergy-new product success relationship, the actual result from the present study does not support a significant mediating effect of technical proficiency on the technology synergy-NPD timeliness relationship even though the study was designed to test the hypothesized relationship (H3b): *the level of proficiency in technical activities mediates the association between technical synergy and NPD timeliness*. Furthermore, this result also cannot explain the indirect effect of technical proficiency on the technology synergy-NPD timeliness relationship because the technical proficiency → NPD timeliness path is not significant (i.e., β estimates = - 0.04, t = - 0.25) in a SEM (Holmbeck, 1997).

The reason why technical proficiency does not mediate the impacts of technology synergy on NPD timeliness in the Korean sample is that a new product manager may view technical proficiency really to be a hindrance to NPD timeliness. The negative relationship found between technical proficiency and NPD timeliness supports this viewpoint. This result also implies that the most prominent characteristic of Korean manufacturing industries is the shortage of technologically skilled manpower. A company's proficiency in developing new products or technologies depends just as heavily on management's skill in applying resources as it on raw engineering talent (Hume, 1992). Such proficiency leads to product competitive advantage and then confers speed in new product development as a stronger contributor of it for new product project. However, this study showed the nonsignificant impact of technology synergy on NPD timeliness. That is, the availability of adequate technological resources and skills is not influential in Korean firms in order to acquire feasible and desirable technical solutions for NPD projects. Therefore, this study empirically proved that technical proficiency cannot account for the technology synergy-NPD timeliness relationship in the Korean sample.

6.4.6 The Mediating Effect of Technical Proficiency on the HQ-subsidiary/agent Relationship-INPR Timeliness Link

This result also offers an answer to the question of how the HQ-subsidiary/agent relationship influences INPR timeliness (H3c): *the level of proficiency in technical activities mediates the association between HQ-subsidiary/agent relationship and INPR timeliness.* In the results by an SEM, the chi-square differences test between non-constrained model and the constrained model show that the addition of the HQ-subsidiary/agent relationship → INPR timeliness path to the constrained model did not significantly improve the fit (i.e., $\chi^2 = 1.58$ / d.f. = 1). Also, when technical proficiency was taken into account, the significance of the HQ-subsidiary/agent relationship → INPR timeliness path was reduced from 0.35 ($t = 5.33$) to 0.28 ($t = 3.23$) which shows partial mediation. A regression analysis similarly showed that the beta coefficient of the HQ-subsidiary/agent relationship dropped from its original value of 0.398 ($t = 6.278$, $p < 0.001$) to one of 0.258 ($t = 3.460$, $p < 0.01$). The proposed model explained 20.1% of the variance in INPR timeliness.

This result empirically showed that the availability of Korean company resources and capabilities drawn from disparate locations or sites in different countries can contribute directly to NPD operational proficiency. Unlike the nonsignificant mediating effect of technical proficiency on the technology synergy-NPD timeliness relationship as well as the cross-functional linkages-NPD timeliness, this result can be interpreted as being in line with a study by Wong (2002). That is, adequacy of technology resources through the intensive HQ-subsidiary relationship is likely to positively impact on the proficiency of Korean NPD activities (i.e., proficiency in technical activities), which subsequently raises the chances of timeliness in INPR. Therefore, this proposed partial mediation effect of technical proficiency on the HQ-subsidiary/agent relationship-INPR timeliness path explain how Korean firms achieve proficiency in technical activities (e.g., conducting preliminary engineering, technical and manufacturing assessments, building of the product to designated or revised specifications, evaluating laboratory tests to determine basic performance against specifications and determining the final product design and specifications). In addition, this result showed that Korean firms still rely on core technology from advanced countries for their NPD projects. Consequently, based on the effective cooperation and coordination among HQ and subsidiaries, Korean companies achieve productive competitive advantage as well as feasible and desirable technical solutions for NPD projects and then make the availability of the new product in their target markets on time. Thus, technical proficiency can account for the HQ-subsidiary/agent relationship-INPR timeliness link in INPR process.

6.4.7 The Mediating Effect of INPR Timeliness on the NPD Timeliness-New Product Performance Relationship

The results in the present study found that both NPD timeliness and INPR timeliness constructs play key roles in enhancing new product performance in target-country markets. With respect to how NPD timeliness influences new product performance, this study hypothesizes that *the level of timeliness in INPR mediates the association between NPD timeliness and performance* (H4). The results provide evidence in support of this hypothesis as well. In the results by an SEM, the chi-square differences test between non-constrained model and the constrained model show that the addition of the NPD timeliness → new product performance path to the constrained model did not significantly improve the fit (i.e., $\chi^2 = 0.18$ / d.f. = 1). When INPR timeliness was taken into account, the significance of the NPD timeliness → new product performance path was reduced from 0.48 (t = 5.93) to 0.05 (t = 0.49). A regression analysis similarly showed that the beta coefficient of NPD timeliness dropped from its original value of 0.284 ($t = 4.266$, $p < 0.001$) to one of 0.127 ($t = 1.768$, $p < 0.10$). The proposed model explained 16.6% of the variance in new product performance.

The effect of mediation on the NPD timeliness-new product performance is INPR timeliness. The results indicate that INPR timeliness is the means by which NPD timeliness impacts new product performance in target markets. It is important to mention that the present study provides empirical evidence concerning the substantial mediating effect of INPR timeliness on the contribution of NPD timeliness to new product performance in target markets. This finding also empirically supports the argument of Wong (2002) who emphasized that *"timely introduction of new products has a positive impact on new product success. However, a reduction in the time it takes a company to develop a new product does not automatically mean on-time availability of the new product in the firm's target markets."* That is, this empirical result reveals that companies cannot achieve new product success in their target markets without the presence of INPR timeliness even though they efficiently develop new products on time in terms of the planned time schedule. Therefore, the positive effect of NPD timeliness on new product performance in target markets is attributed to INPR timeliness which can account for the NPD timeliness-new product performance relationship.

6.5 The Moderating Effects of External Environments and Standardization

6.5.1 The Moderating Effect of Competitive Intensity on the Relationships between Cross-functional Linkages, Marketing Synergy and NPD Timeliness

This study hypothesised that there is a competitive intensity construct that systematically strengthens or weakens the relationship between cross-functional linkages, marketing synergy and NPD timeliness. Arguably, the higher the competitive intensity, the stronger the effects of cross-functional linkages and marketing synergy on NPD timeliness (H5a): *the positive interconnection between cross-functional linkages and timeliness in NPD is stronger when competitive intensity is high than when it is low*; (H5b): *the positive interconnection between marketing synergy and timeliness in NPD is stronger when competitive intensity is high than when it is low.* The present study, however, does not find any evidence of a moderating effect of competitive intensity either on the cross-functional linkages-NPD timeliness relationship or on the marketing synergy-NPD timeliness relationship.

The direct effect of competitive intensity on NPD timeliness, marketing proficiency, cross-functional linkages and marketing synergy was tested in order to confirm the role of this construct in the NPD process (see Table 6.4). Consistent with past studies (Li, 1999; Song and Parry, 1997b; Song *et al.,* 1997a), the additional results in this research show that competitive intensity does not have a significant effect on cross-functional linkages. Also, the results show that there is no direct effect of competitive intensity on marketing synergy. On the direct effect of competitive intensity on marketing proficiency, the additional result is similar to previous research (Song and Parry, 1997b). This implies that competitors' aggressive responses force companies to effectively achieve proficiency in NPD activities (e.g., competitive and market intelligence acquired during new product development process).

Table 6.4 Regression Results: the Direct effect of Competitive Intensity on NPD Timeliness, Marketing Proficiency, Cross-functional Linkages, Marketing Synergy and HQ-subsidiary Relationship

	Dep. Var. = NPD timeliness	
	β	t-value
Cross-functional linkages (CFL)	0.127	1.826†
Marketing synergy (MS)	0.360	5.167***
Competitive Intensity (COM)	- 0.107	- 1.771†
R^2	0.208	
Adjusted R^2	0.197	
F-value	18.964***	
	Dep. Var. = Marketing proficiency	
	β	t-value
Cross-functional linkages (CFL)	0.317	5.526***
Marketing synergy (MS)	0.429	7.495***
Competitive Intensity (COM)	0.122	2.413*
R^2	0.428	
Adjusted R^2	0.420	
F-value	56.089***	
	Dep. Var. = Cross-functional linkages	
	β	t-value
Competitive Intensity (COM)	- 0.009	- 0.130
R^2	0.000	
Adjusted R^2	- 0.004	
F-value	0.017	
	Dep. Var. = Marketing synergy	
	β	t-value
Competitive Intensity (COM)	- 0.002	- 0.024
R^2	0.000	
Adjusted R^2	- 0.004	
F-value	0.001	
	Dep. Var. = HQ-subsidiary Relationship	
	β	t-value
Competitive Intensity (COM)	0.108	1.618
R^2	0.012	
Adjusted R^2	0.007	
F-value	2.617	

†: Significant at $p < .10$, *: Significant at $p < .05$, **: Significant at $p < .01$, ***: Significant at $p < .001$

Further, the additional result shows the marginally significant and negative effect of competitive intensity on NPD timeliness (β = - 0.107, t = -1.771, p < 0.10) (see Table 6.4). This result is interesting because the findings from this study are different from those of previous research (Chryssochoidis and Wong, 1998; Cooper and Kleinschmidt, 1994) that competitive intensity does not directly influence NPD timeliness. In addition, competitive intensity plays the role of a moderator on the relationship between marketing synergy and marketing proficiency (see Table 6.5). Table 6.5 shows that the higher the competitive intensity, the weaker the effect of marketing synergy on marketing proficiency.

Table 6.5 Regression Results: the Moderating Effect of Competitive Intensity on the Marketing Synergy-Marketing Proficiency Relationship

Independent variables	Dep. Var. = Marketing proficiency			
	Model 1		Model 2	
	β	t-value	β	t-value
Main effects				
Cross-functional linkages (CFL)	0.317	5.526***	0.309	5.411***
Marketing synergy (MS)	0.429	7.495***	0.452	7.784***
Moderator				
Competitive Intensity (COM)	0.122	2.413*	0.121	2.403*
Interaction terms				
CFL × COM			- 0.028	- 0.485
MS × COM			- 0.098	- 1.691†
R^2	0.428		0.440	
Adjusted R^2	0.420		0.428	
F-value	56.089***		35.085***	
ΔR^2			0.012	
F Change			2.475†	

†: Significant at $p < .10$, *: Significant at $p <.05$, **: Significant at $p < .01$, ***: Significant at $p < .001$

The additional investigations with respect to the role of competitive intensity on the relationships between key determinants of NPD timeliness (i.e., cross-functional linkages, marketing synergy and marketing proficiency) and NPD timeliness can explain why there is no evidence of the moderating effect of competitive intensity on the cross-functional linkages-NPD timeliness relationship and the marketing synergy-NPD timeliness relationship. The construct of competitive intensity has different directional impacts on each consequence (i.e., marketing proficiency and NPD timeliness) of marketing synergy and cross-functional linkages even though it does not significantly influence cross-functional linkages and marketing synergy. That is, competitive intensity negatively influences NPD timeliness whereas it positively influences marketing proficiency. These relationships are likely to nullify the moderating effect of competitive intensity on the marketing synergy-NPD timeliness relationship as well as the cross-functional linkages-NPD timeliness relationship. That is, the positive and direct effect of competitive intensity on marketing proficiency acts as a countervailing force against the negative and direct effect of competitive intensity on NPD timeliness. The direct and indirect impact of competitive intensity on each construct gives the lack of a moderating effect of competitive intensity on the marketing synergy-NPD timeliness relationship and the cross-functional linkages-NPD timeliness relationship.

6.5.2 The Moderating Effect of Competitive Intensity on the HQ-subsidiary/agent Relationship-INPR Timeliness Link

On the premise that competitive intensity may have different implications for the effect of the HQ-subsidiary/agent relationship on INPR timeliness, its differential moderating effect was examined. The present study also hypothesized the moderating effect of competitive intensity on the link between the HQ-subsidiary/agent relationship and INPR timeliness (H5c): *the positive interconnection between HQ-subsidiary/agent relationship and timeliness in INPR is stronger when competitive intensity is high than when it is low*. The actual result from the present study, however, does not support a significant moderating effect of competitive intensity on the relationship.

To investigate the role of competitive intensity on the link between the HQ-subsidiary/agent relationship and INPR timeliness, the mediated effect of NPD timeliness on the link between the HQ-subsidiary/agent relationship and INPR timeliness was additionally tested. In this regression analysis, the effect of the HQ-subsidiary/agent relationship on INPR timeliness through NPD timeliness was found (see Table 6.6). That is, NPD timeliness partially mediates the link between the HQ-subsidiary/agent relationship and INPR timeliness. Therefore, it may be arguable that the negative and direct effect of competitive intensity on NPD timeliness has a tendency to indirectly influence the effect of the HQ-subsidiary/agent relationship on INPR timeliness.

Table 6.6 Regression Results: the Mediating Effect of NPD Timeliness on the HQ-subsidiary/agent Relationship-INPR Timeliness Link

	Dep. Var. = INPR timeliness			
	Model 1		Model2	
	β	t-value	β	t-value
HQ-Subsidiary Relationship (HQSR)	0.399	6.172***	0.273	4.341***
Mediator				
NPD Timeliness (NPDT)			0.388	6.176***
R^2	0.159		0.294	
Adjusted R^2	0.155		0.287	
F-value	38.094***		41.637***	
ΔR^2			0.135	
F Change			38.140***	

†: Significant at $p < .10$, *: Significant at $p <.05$, **: Significant at $p < .01$, ***: Significant at $p < .001$

Following Wong's argument (2002) that *"a study of the direct and indirect effect of competitive intensity on timeliness of new product rollouts in international markets will be necessary as an area for future research"*, I speculate that this construct may have a direct impact on INPR timeliness. This additional result shows that there is a positive and significant direct effect of competitive intensity on INPR timeliness (see Table 6.7). This additional result is also different from that in the previous study (Chryssochoidis and Wong, 1998) that competitive intensity does not directly influence INPR timeliness. The direct effect of competitive intensity on INPR timeliness supports the idea that a firm is forced to compete in the introduction of new products in a competitive market (Li, 1999) in order to persuade local customers to adopt its new product over its competitors' (Li *et al.*, 1999).

Table 6.7 Regression Results: the Direct Effect of Competitive Intensity on INPR Timeliness

	Dep. Var. = INPR timeliness	
	β	t-value
New Product Development Timeliness (NPDT)	0.400	6.366***
HQ-Subsidiary Relationship (HQSR)	0.262	4.179***
Competitive Intensity (COM)	0.108	1.812†
R^2	0.305	
Adjusted R^2	0.295	
F-value	29.168***	

†: Significant at $p < .10$, *: Significant at $p <.05$, **: Significant at $p < .01$, ***: Significant at $p < .001$

Based on the additional results in Table 6.6 and 6.7, the interpretations propose that the lack of support for the moderated effect of competitive intensity on the HQ-subsidiary/agent relationship-INPR timeliness link is attributed to the direct and indirect effect relationships between competitive intensity, mediators (e.g., NPD timeliness) and the criterion variable (i.e., INPR timeliness). That is, the negative effect of competitive intensity on NPD timeliness (see Table 6.4), which is a mediator, mitigates the positive effect of competitive intensity on INPR timeliness. Therefore, this result shows that there is no moderating effect of competitive intensity on the HQ-subsidiary/agent relationship-INPR timeliness link.

6.5.3 The Moderating Effect of Competitive Intensity on the Relationships between Timeliness in NPD and INPR and New Product Performance

Based on previous research regarding the relationship between new product performance and timeliness in NPD and INPR, the important question arises: *"Will timeliness in NPD and INPR be uniformly successful in improving market performance in every external environment situation (e.g., competitive intensity)?"* This study proposed the hypothesized relationship (H5d): *the positive interconnection between timeliness in NPD and performance is stronger when competitive intensity is high than when it is low.* The results of this study show that there is a stronger relationship between NPD timeliness and new product performance when competition intensity is greater. In a regression analysis on the hypothesis (H5d), an interaction term (i.e., NPDT × COM) was positive and significant ($\beta = 0.149$, $p < 0.05$). The proposed model explained 18.7% of the variance in new product performance.

On the basis of this result, the question is how does competitive intensity moderate the relationship between NPD timeliness and new product performance? Although the competitive intensity construct does not directly influence new product performance (see Table 6.8), it has an indirect impact (i.e., a moderator) on the NPD timeliness-performance relationship. This result indicates that if a new product gains competitive advantage through its timely development it can largely improve performance in markets characterized by high intensive competition. Also, NPD timeliness is a more important determinant of new product performance under conditions of high competitive intensity. According to a study by Cohen *et al.*, (1996), speeding up the product development process is an important way to gain competitive advantage in the marketplace because companies increasingly rely on development time for competitive advantage. Time dimensions (e.g., time-to-market, cycle time and timeliness) are recognized as key sources of competitive advantage (Cooper and Kleinschmidt, 1994; Datar *et al.*, 1997a; b; Griffin, 1997; Wong, 2002). A superior product leads to new product success (Cooper, 1990). A firm can acquire product competitive advantage through NPD timeliness. Moreover, product competitive advantage is likely to decrease the negative direct effect of competitive intensity on NPD timeliness. Specifically, if a product is developed on time it is more likely to be competitive with other competitors' products when it is distinctive from them, rather than being similar to them. The findings in the present study support the idea that NPD timeliness strongly enables companies to achieve sustainable product competitive advantage resulting in better performance under high competition. A firm achieving NPD timeliness can mitigate or decrease the influences of competitors' reactions (e.g., aggressive pricing, high levels of advertising and the adding of services) on consumers because it has a product competitive advantage (superiority) over opponents' products. That is, manufacturers more effectively implementing NPD timeliness meet customer demands and significantly raise the product's adoption rate in the commercialization stage under conditions of high competitive intensity. Thus, when there are high competitive intensity markets, the level of NPD timeliness strongly increases the level of market performance. However, when there are low competitive intensity markets, the level of NPD timeliness only slightly increases the level of market performance because the product competitive advantage acquired by NPD timeliness only marginally influences its adoption rate among consumers. This implies that the growth rate of a market is another key factor which influences the adoption rate of new products in target markets.

Regarding the moderating effect of competitive intensity on the INPR timeliness-new product performance relationship, the result of this study is not supportive of the hypothesized relationship (H5e): *the positive interconnection between timeliness in INPR and performance is stronger when competitive intensity is high than when it is low.* This result implies that competitive intensity does not moderate the INPR timeliness-performance relationship because there exist three differential effects; (1) the negative and direct effect of competitive intensity on performance (nonsignificant relationship in Table 6.8), (2) the positive and direct effect of competitive intensity on INPR timeliness (significant relationship in Table 6.7) and (3) the negative and indirect effect of competitive intensity on INPR timeliness through NPD timeliness (see Table 6.4). That is, competitive intensity has a tendency to simultaneously provide different directions (i.e., positive and negative) to both NPD timeliness and the commercialization stage (e.g., INPR timeliness and performance). The interactions between three differential effects give a lack of support to the moderating effect of competitive intensity on the INPR timeliness-performance relationship.

Table 6.8 Regression Results: the Direct Effect of Competitive Intensity on Performance

	Dep. Var. = Performance	
	β	t-value
International New Product Rollout Timeliness (INPRT)	0.393	6.265***
Competitive Intensity (COM)	- 0.022	- 0.355
R^2	0.153	
Adjusted R^2	0.146	
F-value	19.656***	

†: Significant at $p < .10$, *: Significant at $p < .05$, **: Significant at $p < .01$, ***: Significant at $p < .001$

Although this study did not find a significant direct effect of competitive intensity on performance (see Table 6.8), the negative association of competitive intensity on performance (e.g., market share) has been generally recognized (Bstieler and Gross, 2003; Jaworski and Kohli, 1993). A situation of high competition, competitors may also be developing similar new products. A newly introduced product also faces aggressive advertising from competitors for their products. Therefore, companies that introduce a new product into target markets on time require more investment for product promotions (Lilien and Yoon, 1990). Competitive intensity has a negative impact on a new product's market share rather than a positive impact on it. Consequently, in markets characterized by high competitive intensity, this construct is likely to strongly and positively influence a product's competitive advantage obtained through NPD timeliness whereas it may negatively influence performance. In low competitive intensity markets, this construct has a tendency to only weakly influence product competitive advantage whereas it may positively influence performance. Therefore, this result supports the idea that the negative effect of competitive intensity on performance mitigates the positive effect of competitive intensity on INPR timeliness as well as the positive and indirect effect of competitive intensity on INPR timeliness through NPD timeliness. Then, such interacting relationships bring a lack of moderating effect of competitive intensity on the INPR timeliness-performance relationship. Thus, this explains why the current study shows that competitive intensity does not moderate the INPR timeliness-new product performance relationship.

6.5.4 The Moderating Effect of Technology Change on the Relationships between Cross-functional Linkages, Technology Synergy and NPD Timeliness

On the role of the construct of technology change on the cross-functional linkages-NPD timeliness relationship, this research hypothesised that there is a technology change construct that systematically strengthens or weakens the relationship between cross-functional linkages, technology synergy and NPD timeliness. The first contention is that the higher the technology change, the weaker the effects of cross-functional linkages and technology synergy on NPD timeliness (H6a): *the positive interconnection between cross-functional linkages and timeliness in NPD is stronger when technological change is low than when it is high.* The present study found evidence of a moderating effect of technology change on the cross-functional linkages-

NPD timeliness relationship. The findings from this study are consistent with previous research (e.g., Bstieler, 2005; Tseng, 2006). Technological uncertainty moderates the relationship between cross-functional project team and time efficiency (Bstieler, 2005). Tseng (2006) found that technological innovation moderates the relationship between the design-manufacturing late stage cooperation and time performance effectiveness (i.e., NPD time performance). As expected, moderated regression analysis performed to assess the interaction effect (CFL × TECH) shows its t-statistic (-2.407) and the significance of the F Change ($p < 0.10$). The proposed model explained 18.1% of the variance in NPD timeliness. These findings suggest that when technology change is low, cross-functional linkages can have more effect on NPD timeliness; however, when technology change is high, organizations experience a weaker effect of cross-functional linkages on NPD timeliness.

The question is how does technology change moderate the relationship between cross-functional linkages and NPD timeliness? To clarify the significantly moderated relationship, the three possible explanations may be used. Firstly, although there is a nonsignificant effect of technology change on the two constructs of cross-functional linkages and NPD timeliness, the additional results support the answer. That is, the moderating effect of technology change on the cross-functional linkages-NPD timeliness relationship originates from two negative directional effects; (1) the effect of technology change on NPD timeliness and (2) the indirect effect of technology change on NPD timeliness through technical proficiency (see Table 6.9). These effects of technology change on each construct support the idea that technology change moderates the cross-functional linkages-NPD timeliness relationship.

Secondly, most manufacturing companies cannot effectively and efficiently promote technology in new products at the expense of customer needs due to the possibility of their potentially limited access to rapidly changing core technology. It is possible that new core technology arises from innovation that does not fit the needs of cross-functional linkages or the project team (e.g., cross-functional team). The technology the project team had to deal with might be too complicated and not compatible with their preferences and requirements. As a result, cross-functional linkages give only weak support to manufacturers in achieving NPD timeliness to meet customer demands under conditions of high technology change. Thus, when there are markets characterisised by high technology change, the level of cross-functional linkages barely increases the level of NPD timeliness.

Table 6.9 Regression Results: the Direct Effect of Technology Change on NPD Timeliness, Technical Proficiency, Cross-functional Linkages, Technology Synergy and HQ-subsidiary Relationship

	Dep. Var. = NPD timeliness	
	β	t-value
Cross-functional linkages (CFL)	0.128	1.638
Technical synergy (TS)	0.310	3.935***
Technology Change (TECH)	- 0.061	- 0.967
R^2	0.159	
Adjusted R^2	0.147	
F-value	13.474***	
	Dep. Var. = Technical proficiency	
	β	t-value
Cross-functional linkages (CFL)	0.187	3.158**
Technical synergy (TS)	0.577	9.697***
Technology Change (TECH)	- 0.043	- 0.893
R^2	0.491	
Adjusted R^2	0.484	
F-value	72.358***	
	Dep. Var. = Cross-functional linkages	
	β	t-value
Technology Change (TECH)	0.034	0.513
R^2	0.001	
Adjusted R^2	- 0.003	
F-value	0.263	
	Dep. Var. = Technical synergy	
	β	t-value
Technology Change (TECH)	0.111	1.682†
R^2	0.012	
Adjusted R^2	0.008	
F-value	2.831†	
	Dep. Var. = HQ-subsidiary Relationship	
	β	t-value
Technology Change (TECH)	0.031	0.458
R^2	0.001	
Adjusted R^2	- 0.004	
F-value	0.210	

†: Significant at $p < .10$, *: Significant at $p <.05$, **: Significant at $p < .01$, ***: Significant at $p < .001$

Another explanation of this result is related to the moderating effect of technology change on the cross-functional linkages-technical proficiency relationship (see Table 6.10). The findings from Table 6.10 explain that the higher the technology change, the weaker the effects of cross-functional linkages on technical proficiency. This additional result is similar to that in a study by Song and Montoya-Weiss (2001). They found that technological uncertainty moderates the relationship between cross-functional linkages and technical proficiency. Although involving functionally diverse people in all development activities may offer opportunities for integrating diverse information and perspectives, high technological change tends to increase the difficulty of reaching consensus and may increase the propensity for conflict and compromise in technical activities because ill-defined technical problems can result in information redundancy and chaos in NPD project teams (Song and Montoya-Weiss, 2001). Conflict may in turn negatively impact proficiency in technical activities under high technology change. Therefore, in an industry characterized by high technology change industry, the weaker effect of cross-functional linkages on technical proficiency has a tendency to extend an influence to the cross-functional linkages-NPD timeliness relationship.

Table 6.10 Regression Results: the Moderating Effect of Technology Change on the CFL-TP Relationship and the TS-TP Relationship

Independent variables	Dep. Var. = Technical proficiency (TP)			
	Model 1		Model 2	
	β	t-value	β	t-value
Main effects				
Cross-functional linkages (CFL)	0.187	3.158**	0.191	3.325**
Technical synergy (TS)	0.577	9.697***	0.561	9.683***
Moderator				
Technology Change (TECH)	- 0.043	- 0.893	0.002	0.044
Interaction terms				
CFL × TECH			- 0.213	- 3.556***
TS × TECH			0.057	0.977
R^2	0.491		0.523	
Adjusted R^2	0.484		0.512	
F-value	72.358***		48.862***	
ΔR^2			0.032	
F Change			7.422**	

†: Significant at $p < .10$, *: Significant at $p <.05$, **: Significant at $p < .01$, ***: Significant at $p < .001$

With respect to the moderating effect of technology change on technology synergy-NPD timeliness relationship, this study also hypothesised that there is a technology change construct that systematically strengthens or weakens the relationship between technology synergy and NPD timeliness (H6b): *the positive interconnection between technology synergy and timeliness in NPD is stronger when technological change is low than when it is high.* However, the result showed that there is no moderating effect of technology change on the technology synergy-NPD timeliness relationship. The possible explanation is that the significant and positive effect of technology change on technology synergy counteracts the negative direction of technology change on technical proficiency and NPD timeliness (see Table 6.9) and, thus, such interactions give a lack of support for a moderating effect of technology change on the technology change-NPD timeliness relationship.

6.5.5 The Moderating Effect of Technology Change on the HQ-subsidiary/agent Relationship-INPR Timeliness Link

On the premise that technology change may have different implications for the effect of the HQ-subsidiary/agent relationship on INPR timeliness, this study hypothesized the moderating effect of technology change on the link between the HQ-subsidiary/agent relationship and INPR timeliness (H6c): *the positive interconnection between HQ-subsidiary/agent relationship and timeliness in INPR is stronger when technological change is high than when it is low.* However, the result in the present study does not support this hypothesis. That is, the construct of technology change does not moderate the link between the HQ-subsidiary/agent relationship and INPR timeliness.

It is possible that the lack of support for the moderating effect of technology change on the HQ-subsidiary/agent relationship-INPR timeliness link is related to three differential effects; (1) the effect of technical proficiency on the HQ-subsidiary/agent relationship-INPR timeliness (i.e., the mediated relationship), (2) the negative and direct effect of technology change on INPR timeliness (a nonsignificant relationship in Table 6.11), and (3) the positive and direct effect of technology change on the HQ-subsidiary/agent relationship (a nonsignificant relationship in Table 6.9). As discussed in 6.4.6, the mediator role of technical proficiency is only found in the HQ-subsidiary/agent relationship-INPR timeliness in this study. This implies that a key source of technical proficiency for the timely rollout of new products in international markets is the HQ-subsidiary/agent relationship. Technical proficiency as well as a desirable technical product solution acquired by the HQ-subsidiary/agent relationship gives a product competitive advantage. For the timely rollout of a new product in international markets, technical proficiency in Korean companies can be achieved on the basis of effective interaction and cooperation between HQ and subsidiaries. Given Korea's relatively weak domestic R&D base, its choice has appeared to be reliance on imported technologies (Byun and Kim, 2000). To capitalize on the imported technologies, strategic use of management and domestic R&D and the allocation of investment are necessary. Such activities are also likely to achieve technical proficiency, resulting in INPR timeliness. Therefore, the positive effect of high technology change on the HQ-subsidiary/agent relationship mitigates the negative effect of high technology.change on INPR timeliness as well as technical proficiency (see Table 6.9 and 6.11) and thus nullifies the moderating effect of technology change on the HQ-subsidiary/agent relationship-INPR timeliness link.

Table 6.11 Regression Results: the Direct Effect of Technology Change on INPR Timeliness

	Dep. Var. = INPR timeliness	
	β	t-value
New Product Development Timeliness (NPDT)	0.388	6.147***
HQ-Subsidiary Relationship (HQSR)	0.273	4.327***
Technology Change (TECH)	- 0.023	- 0.381
R^2	0.295	
Adjusted R^2	0.284	
F-value	27.603***	

†: Significant at $p < .10$, *: Significant at $p < .05$, **: Significant at $p < .01$, ***: Significant at $p < .001$

6.5.6 The Moderating Effect of Technology Change on the Relationships between Timeliness in NPD and INPR and New Product Performance

With respect to the moderating effect of technology change on the NPD timeliness-new product performance relationship, the result of this study is supportive of the hypothesized relationship (H6d): *the positive interconnection between timeliness in NPD and performance is stronger when technological change is low than when it is high*. In a regression analysis, an interaction term (i.e., NPDT × TECH) was statistically significant ($\beta = 0.168$, $p < .05$). The proposed model explained 18.8% of the variance in new product performance. The possible explanation for this result can be drawn from three aspects; (1) the level of technology change positively influences technology synergy which is a strong promoter of product competitive advantage (a significant relationship in Table 6.9), (2) high technology change positively influences cross-functional linkages which are strong contributors to product competitive advantage (a nonsignificant relationships in Table 6.9) and (3) the level of technology change that has an impact on new product performance is positive (a nonsignificant relationship in Table 6.12). Although the nonsignificant and negative effect of technology change on NPD timeliness exists, the positive effect of technology change on technology synergy and cross-functional linkages resulting in NPD timeliness is likely to neutralize the negative effect of technology change on NPD timeliness. On the contrary, technology change positively influences new product performance. In other words, the negative effect of technology change on NPD timeliness may not influence the moderated effect on the relationship between NPD and new product performance. As a result, the support for the moderating effect of technology change on the NPD timeliness-performance relationship is attributed to the fact that the effects of both (1) the positive and indirect influence of technology change through technology synergy and cross-functional linkages on NPD timeliness and (2) the positive effect of technology change on new product performance are integrated. Therefore, in industries characterized by rapidly changing technology, NPD timeliness is a more important contributor to new product performance than it is in technologically stable industries.

In addition, this study proposed the hypothesized relationship (H6e): *the positive interconnection between timeliness in INPR and performance is stronger when technological change is low than when it is high.* The results of this study show that there is a greater relationship between INPR timeliness and new product performance when technology change is lower. In a regression analysis, an interaction term (i.e., INPRT × TECH) was statistically significant (β = -0.150, p < .10). The proposed model explained 18.8% of the variance in new product performance.

The reason for the moderating effect of technology change on the INPR timeliness-new product performance relationship is that a new product with the mitigating effect of the degree of product competitive advantage (e.g., product newness or uniqueness) from rapidly changing technology can have negative effects on success. According to Table 6.9 and 6.11, technology change does seem to be negatively related to criterion variables (i.e., technical proficiency and INPR timeliness) even though this construct has no significant association with them. Various sources (e.g., technical proficiency) of competitive advantage and commercialization stage (i.e., INPR timeliness) are positively associated with new product performance. However, technology change negatively influences technical proficiency and INPR timeliness and then these negative effects have a tendency to have a moderating effect on the relationship between INPR timeliness and new product performance (although technology change is positively related to the latter) (see Table 6.12).

Table 6.12 Regression Results: the Direct Effect of Technology Change on Performance

	Dep. Var. = Performance	
	β	t-value
International New Product Rollout Timeliness (INPRT)	0.394	6.283***
Technology Change (TECH)	0.038	0.603
R^2	0.155	
Adjusted R^2	0.147	
F-value	19.773***	

†: Significant at $p < .10$, *: Significant at $p <.05$, **: Significant at $p < .01$, ***: Significant at $p < .001$

A new product with a lack of competitive advantage, in achieving timely rollout of a new product across target markets, cannot effectively meet customer demands and then will not increase its adoption rate at the commercialization stage under conditions of high technology change. Rogers (1995) suggested that newness in product can have positive or negative effects on performance because its success depends on the demonstrability of the new product's usefulness to customers. In markets for high technology products characterised by uncertainty buyers remain loyal to the pioneer's brand as it is the only one they know (Lee and O'Connor, 2003). The objective superiority of new products often comes from innovations (Zhang and Markman, 1998). Therefore, companies have to rapidly change the product form due to higher technology change. The speed of a potential pioneer's innovation first increases and then decreases as the intensity of rivalry increases (Lilien and Yoon, 1990) because high technology change renders fast current technological obsolescent (Robertson and Gatignon, 1998). High technological change also requires intensive resource investment in order to sustain development practices and the maintenance of technological norms (Kohli and Jaworski, 1990). Although this study did not test the effect of technology change on product competitive advantage, it may be argued that the negative effect of technology change on technical proficiency and NPD timeliness has a tendency to indirectly influence the effect of technology change on product competitive advantage. This result indicates that a new product with a strong competitive advantage (e.g., superior products) is likely to be rewarded by all the benefits of product newness or uniqueness in the markets by rapidly changing technology. In the case of a new product with a weak competitive advantage, a delay in its launching leads to a better new product performance in industries characterized by rapidly changing technology.

6.5.7 The Moderating Effect of Standardization on the NPD Timeliness-INPR Timeliness Relationship

As the last investigation on "*Does standardization affect the strength of the positive relationship of NPD timeliness to INPR timeliness?*" this study examines whether the NPD timeliness-INPR timeliness relationship is moderated by standardization (H7): *the positive interconnection between timeliness in NPD and timeliness in INPR is stronger when standardization is high than when it is low.* The result in the present study supports this hypothesis. In the results by an SEM, the chi-square differences test between the equal-β model and the free-β model significantly improve the fit (i.e., $\chi^2 = 7.41$ / d.f. = 1). Also, the β estimates for the free-β model were 0.55 ($t = 5.66$) for high standardization and 0.25 ($t = 2.91$) for low standardization. In a regression analysis, an interaction term (i.e., NPDT × STAN) was positive and significant ($\beta = 0.304$, $p < 0.001$). The proposed model explained 37.4% of the variance in INPR timeliness. Thus, NPD timeliness has a larger effect on INPR timeliness when standardization is high, but the effect is small when it is low.

Table 6.13 Regression Results: the Direct Effect of Standardization on INPR Timeliness

	Dep. Var. = INPR timeliness	
	β	t-value
HQ-Subsidiary Relationship (HQSR)	0.130	1.864†
New Product Development Timeliness (NPDT)	0.358	5.836***
Standardization (STAN)	0.285	4.160***
R^2	0.355	
Adjusted R^2	0.345	
F-value	36.119***	

†: Significant at $p < .10$, *: Significant at $p < .05$, **: Significant at $p < .01$, ***: Significant at $p < .001$

The findings from this study indicate that it is necessarily standardization that holds the key to INPR timeliness. Standardization also positively influences INPR timeliness (see Table 6.13). It allows companies to save costs because this approach can use a consistent image of the product across national markets. Companies can introduce their new products into target markets on time through standardization strategies. That is, adopting a standardized approach to serving multinational markets is desirable for INPR timeliness because time can be decreased by developing a consistent image of the product across national markets and costs can be lowered by pooling production activities across countries. Thus standardization appears to moderate the NPD-INPR timeliness relationship.

Table 6.14 Regression Results: the Moderating Effect of the HQ-subsidiary/agent Relationship on the Standardization-INPR Timeliness Relationship

Independent variables	Dep. Var. = INPR timeliness			
	Model 1		Model 2	
	β	t-value	β	t-value
Main effects				
Standardization (STAN)	0.333	4.644***	0.342	4.795***
Moderator				
HQ-Subsidiary Relationship (HQSR)	0.219	3.052**	0.249	3.411**
Interaction terms				
STAN × HQSR			0.118	1.867†
R^2	0.236		0.249	
Adjusted R^2	0.229		0.238	
F-value	32.141***		22.846***	
ΔR^2			0.013	
F Change			3.486†	

†: Significant at $p < .10$, *: Significant at $p <.05$, **: Significant at $p < .01$, ***: Significant at $p < .001$

In line with a study by Subramaniam and Hewett (2004), the moderating effect of the HQ-subsidiary/agent relationship on the standardization-INPR timeliness relationship was tested (see 6.14) although such a moderator role was not formally hypothesized in the current study. The additional result indicated that the HQ-subsidiary/agent relationship moderates the relationship between standardization and INPR timeliness. That is, the higher the HQ-subsidiary/agent relationship, the stronger the effect of standardization on INPR timeliness. This result supports the argument of Rau and Preble (1987) that a greater degree of standardization would be possible where the level of interaction between headquarters and subsidiaries is high. Similarly, Jain (1989) proposes that conflict, or a poor relationship, between marketing functions at an

MNC's headquarters and its subsidiaries may discourage the transfer of global marketing programms to foreign markets. Consequently, cooperation between the subsidiary and parent organizations will reduce the uncertainty regarding the decisions being handed down, and will make adoption of practices from headquarters more likely (Kostova and Roth, 2002). That is, under conditions in which the subsidiary and headquarters have a positive relationship, open communications, and regular interactions, the objectives of the planning system will be better understood, and adopted with less resistance by the subsidiary. HQ-subsidiary cooperation further facilitates the assimilation of cross-border inputs, as cooperation among product development team members enhances shared and integrative knowledge and thereby could reduce the number of glitches in the product design. Moreover, cost reductions from standardization of marketing and technical activities mainly originate from economies of scale (Levitt, 1983; Sorenson and Wiechmann, 1975). The major benefits from standardization are economies of scale and consistent brand image because high adaptation is associated with high cost and internal inefficiency (Oktemgil and Greenley, 1997; Vrontis and Papasolomou, 2005; Zou *et al.*, 1997). Therefore, the HQ-subsidiary working relationships enable the firm to ensure that the act of standardizing the new product and marketing implementation achieves economies of scale but not at the expense of customer need satisfaction. This is related to the fact that greater decentralization within subsidiaries with simultaneous close coordination from headquarters promotes the feedback of local knowledge from the subsidiary to headquarters and this knowledge can then be employed in other countries which share common characteristics (Rau and Preble, 1987). Furthermore, Chryssochoidis and Wong (2000) empirically found that customization of product technology increases the likelihood of delays in the completion of new product development projects and multi-country rollout. Thus, when there is high HQ-subsidiary cooperation, the level of standardization markedly increases the level of timeliness in international new product rollout. However, when there is low HQ-subsidiary cooperation, the level of standardization only slightly increases its level. Regarding the role of standardization in the INPR process, the present study supports the idea that it plays a moderating role on the relationship between NPD timeliness and INPR timeliness as well as being a predictor variable of INPR timeliness.

6.6 Summary

This study extends prior attempts to develop the extant analysis of timeliness in NPD and INPR literature by employing a considerably larger number of mediators and moderators and investigating more comprehensive models. The role of timeliness in NPD and INPR, the relationships between the antecedent variables, timeliness in NPD and INPR and its consequences, and the roles of mediators and moderators on the relationships are described. This chapter includes an examination of how the findings accord with or differ from the previous studies as discussed in chapters two, three and four. It also provides useful additions to the literature.

Based on alternative explanations given for both significant and insignificant results, the findings facilitate understanding of the relative importance of each predictor variable on new product performance as well as timeliness in NPD and INPR. Moreover, the findings are intended to draw attention to the need for more comprehensive models of timeliness in NPD and INPR that take mediating and moderating variables into account. The results allow the validity of the proposed model to be assessed by examining the effects of marketing and technology factors on new product performance as well as timeliness in NPD and INPR.

Chapter Seven: Conclusions

7.1 Introduction

This chapter presents the conclusion of this research. It begins with an overview of the study including research objectives, a summary of the research and the main findings. The implications of the findings are then addressed in the context of their contributions to both marketing theory and practice. Some limitations of the research and suggestions for future areas of study will also be discussed. Subsequent studies will be able to overcome some of the limitations of this research.

This chapter consists of five major parts. In the first section, the overview of the research and the major findings arrived at in this investigation are given. In the second section, the contributions of the study to the existing body of marketing literature are outlined in the form of theoretical implications. In the third section, the managerial implications of research findings are addressed. This also includes several practical recommendations relevant to companies which develop and export new products. Next, the study's limitations are outlined. In the last section, some avenues for further research are indicated.

7.2 Overview of the Research

7.2.1 Research Objectives

The main objective of this study was to establish the direct and indirect factors determining timeliness in NPD and INPR. The research was designed specifically to;

- ***Test and demonstrate the direct relationships (1) between marketing synergy and NPD timeliness, (2) between cross-functional linkages and NPD timeliness, (3) between technology synergy and NPD timeliness, (4) between HQ-subsidiary/agent relationship and INPR timeliness, (5) between NPD timeliness and INPR timeliness, and (6) between INPR timeliness and new product performance in Korean companies.***

- ***Examine the mediating effect of proficiency in NPD activities on the direct relationships (1) between marketing synergy and NPD timeliness, (2) between cross-functional linkages and NPD timeliness, (3) between technology synergy and NPD timeliness, and (4) HQ-subsidiary/agent relationship and INPR timeliness.***

- ***Examine the mediating effect of INPR timeliness on the direct relationship between NPD timeliness and new product performance.***

- ***Identify the moderating effects of external environments on the direct relationships (1) between marketing synergy and NPD timeliness, (2) between cross-functional linkages and NPD timeliness, (3) between technology synergy and NPD timeliness, (4) between HQ-subsidiary/agent relationship and INPR timeliness, (5) between NPD timeliness and new product performance, and (6) between INPR timeliness and new product performance.***

- ***Identify the moderating effect of standardization on the direct relationship between NPD timeliness and INPR timeliness.***

7.2.2 Summary of the Research and Major Findings

The study examined the relationships between antecedents, timeliness in NPD and INPR, and consequences. A conceptual framework was tested using 232 new products from South Korean firms. There are several reasons why this study was conducted with a Korean sample. First, it is necessary to investigate whether it is possible to apply similarly the significant role of timeliness in NPD and INPR established in the literature (i.e., empirical findings from Western samples) to a different contextual setting. Second, South Korea has grown at a tremendous rate over the past three decades. Yet few studies have systematically examined the NPD and INPR process regarding new products from this emerging economic juggernaut. The hypothesized relationships among the constructs in the model were evaluated by multiple regression and hierarchal regression analyses using SPSS 12 as well as by structural equation modelling (SEM) using SIMPLIS LISREL. In addition, confirmatory factor analysis (CFA) was carried out using SIMPLIS LISREL.

Figure 7.1 describes the empirical findings of the relationships between antecedents and NPD timeliness. In the direct relationships, cross-functional linkages and marketing synergy exhibited a statistically significant effect on NPD timeliness. However, in the Korean companies study, technology synergy did not appear to be a predictor of NPD timeliness perhaps due to a weak domestic R&D base in this study.

In the mediating effect tests, marketing proficiency significantly accounts for the relationships between cross-functional linkages and NPD timeliness, between marketing synergy and NPD timeliness. When project fit with marketing skills and resources is high, it is more likely that NPD or, more correctly, marketing activities are proficiently undertaken, hence raising the probability that the NPD project would be completed on-time. The likelihood of timely development of a new product is also increased when cross-functional linkages are well established. This is because cross-functional linkages enable a firm to achieve proficiency in NPD activities (e.g., marketing proficiency). In other words, even if cross-functional interaction, cooperation and integration are well implemented in a specific NPD task and even if a new project fits to a firm's existing marketing skills and resources[70], unless NPD activities[71] are well conducted during a particular NPD project, both these constructs of marketing synergy and cross-functional linkages would not significantly influence NPD timeliness. Technical proficiency, however, mediates neither the hypothesised cross-functional linkages-NPD timeliness relationship nor the hypothesised technology synergy-NPD timeliness relationship. It might be the case that in some contexts (e.g., South Korea) NPD timeliness is driven not so much by technical proficiency as by marketing proficiency.

In the moderating effect tests, technology change only has a moderating role on the cross-functional linkages-NPD timeliness relationship. In my Korean sample, cooperation, interaction and integration among marketing, R&D and manufacturing become a more important contributor in the completion of an NPD project on-time in market conditions characterized by lower technology change, compared to those characterized by higher technology change. This implies that high technology change tends to increase the difficulty of reaching consensus among functions as well as the likelihood of conflict and compromise in marketing, technical, and competitive intelligence activities in some developing country's manufacturers (e.g., Korean companies).

In addition, figure 7.2 depicts the empirical findings of the relationships between antecedents, INPR timeliness and consequences. In the direct relationships, the results supported the influences of the HQ-subsidiary/agent relationship and NPD timeliness on INPR timeliness as well as INPR timeliness on performance.

In the mediating effect tests, marketing proficiency significantly accounts for the relationships between the HQ-subsidiary/agent relationship and INPR timeliness. Technical proficiency also mediates the effect of the HQ-subsidiary/agent relationship on INPR timeliness. These findings indicate that the significant and positive effect of the HQ-subsidiary/agent relationship on INPR timeliness does not take place without proficiency in NPD activities. The model suggests that an effective HQ-

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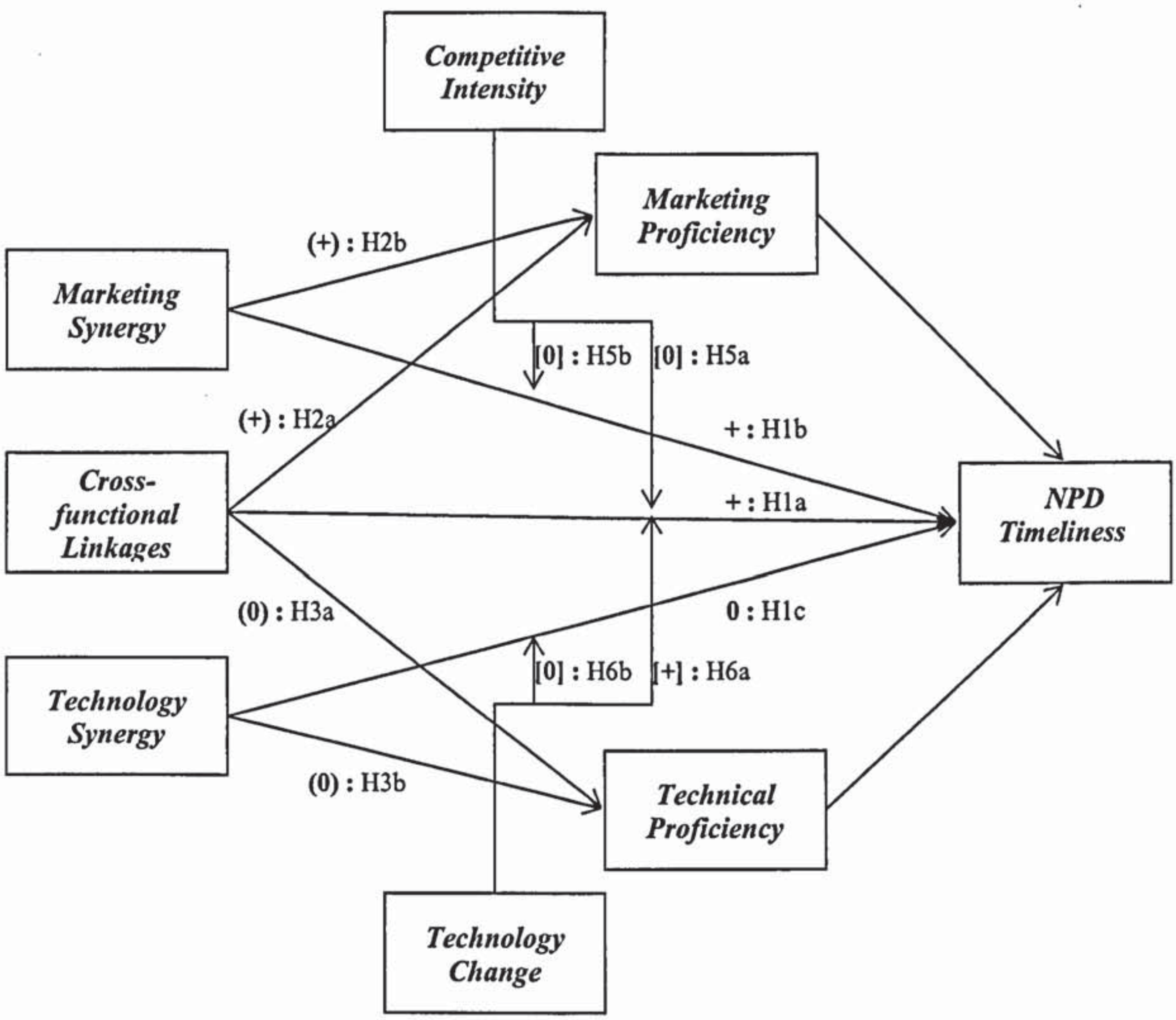
[70] The available market research, sales force, distribution, and advertising and promotion skills and resources.

[71] Proficiency in screening, preliminary market and technical assessments, market research, product development, test marketing, and market launch.

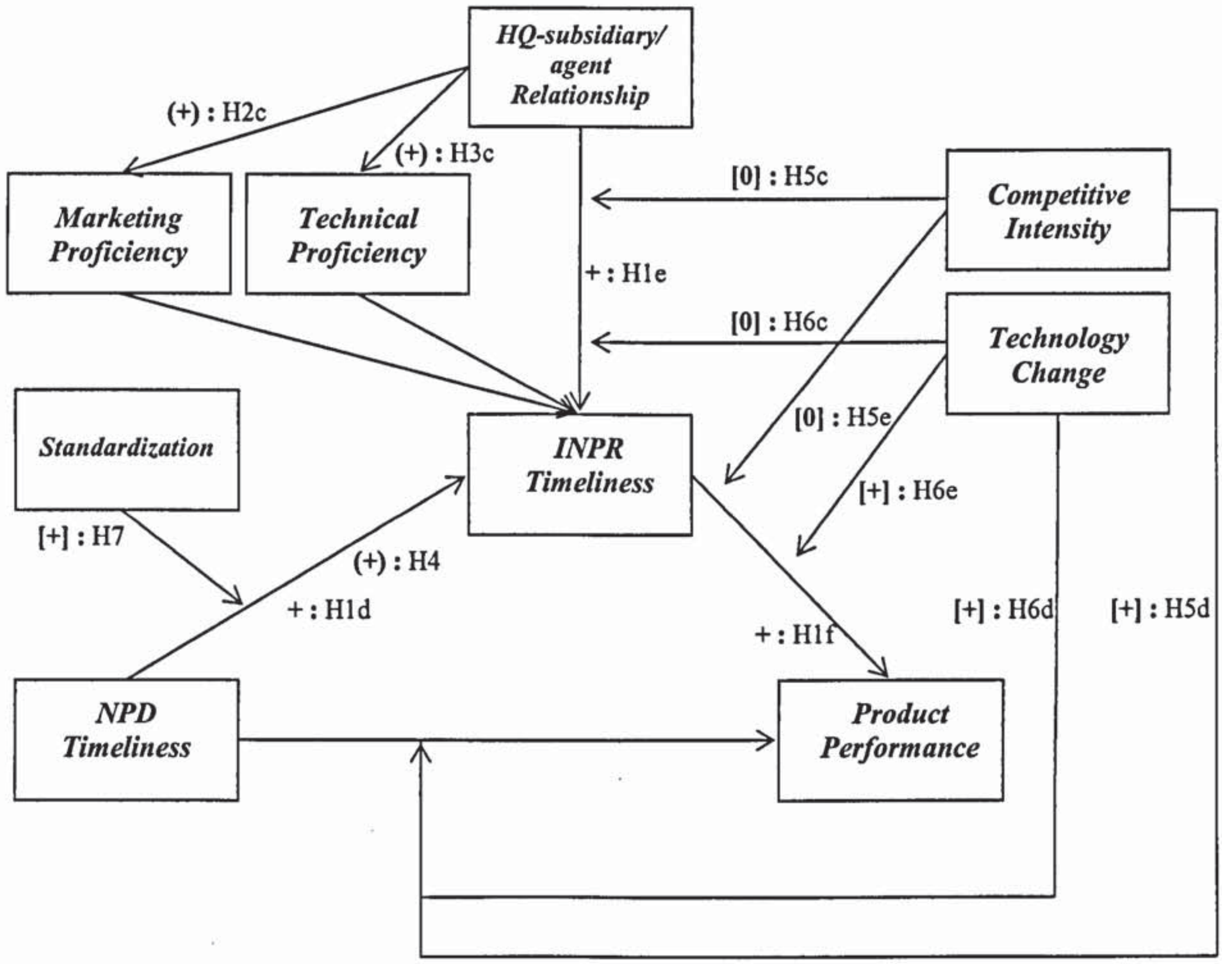
subsidiary/agent relationship leads to increased proficiency in NPD activities, to INPR timeliness, and ultimately to new product success in target markets.

Figure 7.1 Summary of Empirical Direct, Mediated and Moderated Effects on NPD Timeliness



Note. 0 = no empirical support (direct effect); H1c
+ = empirical support (direct effect); H1a and b
(0) = no empirical support (mediating effect); H3a and b
(+) = empirical support (mediating effect); H2a and b
[0] = no empirical support (moderating effect); H5a, b and H6b
[+] = empirical support (moderating effect); H6a

Figure 7.2 Summary of Empirical Direct, Mediated and Moderated Effects on INPR Timeliness and New Product Performance



Note. 0 = no empirical support (direct effect)
+ = empirical support (direct effect); H1d, e and f
(0) = no empirical support (mediating effect)
(+) = empirical support (mediating effect); H2c, 3c and 4
[0] = no empirical support (moderating effect); H5c, e and 6c
[+] = empirical support (moderating effect); H5d, 6d, e and 7

In particular, this study reveals that the HQ-subsidiary/agent relationship provides an important contribution to a firm's technical proficiency in some contexts (e.g., South Korea). Moreover, this finding emphasizes the importance of the HQ-subsidiary/agent relationship on INPR timeliness achieved for Korean manufacturers through technical proficiency in correctly conducting preliminary engineering, technical and manufacturing assessments, building the product to designated or revised specifications, evaluating laboratory tests to determine basic performance against specifications, executing prototype or "in house" sample product testing, determining the final product design and specifications, and working for cost reduction and quality control.

In addition, the influence of NPD timeliness on new product performance in target markets is attributed to INPR timeliness. Specifically, a key finding from this study highlights that INPR timeliness plays two important roles: (1) it contributes directly to new product performance in target markets, and (2) it mediates the influence of NPD timeliness on new product performance in target markets. These results imply that even if an NPD project completes on-time, NPD timeliness would not have a positive impact on NP performance without timely roll-out of a new product into target country-markets within planned time-schedules.

As for the results of the external environments and standardization influences, competitive intensity moderates the relationship between NPD timeliness and new product performance. Even though competitive intensity has a significant and negative direct effect on product competitive advantage (Song and Parry, 1997b) and NPD timeliness in accordance with the additional results in chapter 6 (see Table 6.4), a timely development of a new product tends to increase competitive advantage more when competitive intensity is high than when it is low, and this, in turn, enables a firm to compete effectively in target markets, resulting in satisfaction of customer needs and the provision of better customer service compared to competitors.

Technology change also moderates the relationship between timeliness in NPD and INPR and performance. With respect to the moderating effect of technology change on the NPD timeliness-new product performance relationship, NPD timeliness is also a more important determinant of new product performance under conditions of high technology change. This result implies that product life cycles are likely to be longer in low rates of technological change and thus the importance of time efficiency in NPD may be less critical given technologically stable markets where the PLC in target markets is longer. On the contrary, high rates of technological change tend to increase the importance of competing on the basis of time efficiency in NPD (Sherman *et al.*, 2000). Thus, competitive advantage in terms of time efficiency in NPD offers more important contribution to a firm's new product success when technology change is high than when it is low. In other words, in a more turbulent technological environment, a new product will more likely strengthen its competitive advantage due to timely NPD than in technologically more stable environments.

On the other hand, the finding of a significant interaction between INPR timeliness and technology change and impacts on performance suggests that INPR timeliness is a less important determinant of new product performance under conditions of high technology change whereas it is a more important determinant of new product performance under conditions of low technology change. Rapid technology changes in an industry make product specification more complex and challenging. High technology turbulence results in a firm facing the difficulty of re-use of its existing technologies and stored knowledge for organizational innovation (Hanvanich *et al.*, 2006). Firms that exploit technological competence and capability for a new product often incur high cost. When a firm attempts to rollout a new product across target-country markets on-time, it is more likely that time compression in international product launches will negatively affect the quality of the product. There may be a stronger likelihood that, in rapidly changing technological environments, the project team will confront more technical setbacks such as poor design, product malfunctioning, product liability suits, expensive product recalls, and higher production costs. When technology change is high, time compression for the roll-out of a new product into target markets increases the likelihood that a firm will weakly undertake a number of activities to satisfy customer needs.

Standardization moderates the relationship between NPD timeliness and INPR timeliness. This finding suggests that the greater the degree of standardization of marketing and technical-related activities, the more likely it is that NPD timeliness would result in more timely completion of rollout into target-country markets. That is, the completion of an NPD project on-time becomes a more important contributor in the completion of multicountry roll-out through higher standardization of marketing and technical-related activities. This is because internal efficiency, as well as cost savings owing to standardization in production and marketing, is likely to prevent delays in the completion of new product development projects and multicountry rollout.

7.3 Theoretical Implications

The findings in the present study have some theoretical implications that should lead to further theory development in both marketing and management. This empirical study contributes to the literature on NPD and INPR timeliness in several ways. Studies regarding the subject of timeliness in NPD and INPR have been rare in the literature. Specifically, there is a lack of research yielding empirical support to the validity, in an international setting, to research results obtained in domestic markets. Despite the growing role of globalization and the increasing internationalization of corporations, most studies on new product development have focused on domestic markets. Similarly, most studies on time dimensions (e.g., time-to-market and cycle development) have also focused on domestic contexts. Moreover, previous research employed the construct of time dimension (e.g., speed-to-market, cycle time and timeliness) as the outcome variable without investigating its effects on its consequences (e.g. new product performance). To fill this gap, this research basically investigated the impact of timeliness in NPD and INPR on new product success in target-country markets by proposing new product performance as its consequences. Based on the above, this research suggests that future studies should take into consideration the importance of the effects of time dimensions (e.g., timeliness) on performance in international markets.

The conceptual framework and findings in this study imply that the construct of timeliness in NPD and INPR rather than the constructs of both NPD cycle time and time-to-market might be an appropriate measure for investigating time efficiency in product development and international product launch in a global context. To investigate the effects of time dimensions (e.g., NPD cycle time) on performance in international markets, this study suggests that the concept of NPD cycle time, as in the case of NPD timeliness and INPR timeliness, should perhaps be considered by dividing it into, on the one hand, the completion of product development (i.e. the end of manufacturing start-up) and, on the other, the completion of actual availability of a new product across target markets (i.e. the end of market launch). In consideration of the definitions of NPD cycle time (Griffin, 1993; Ali *et al.*, 1995) as well as time-to-market

(Vesey, 1991), these measures include a period from the beginning of idea generation to the end of manufacturing start-up as well as a period from the end of manufacturing start-up to the end of market launch. However, these studies concentrated solely on a domestic context. An important contribution of this study is an explanation, in an international context, of the link between the pressure on the development of new products on-time to achieve product advantage, the propensity to complete a rollout exercise on-time, and product performance in target markets. Moreover, based on the existence of the mediating effect of INPR timeliness on the relationship between NPD timeliness and performance, INPR timeliness rather than NPD timeliness should be given greater emphasis in studies of time efficiency in NPD and international product launches with respect to understanding how the completion of product development (e.g., the end of manufacturing start-up) influences performance in target-country markets.

The framework in this study identifies the direct, mediated and moderated relationships by establishing three conceptual processes. Firstly, the hypothesized paths (i.e., direct relationships) between key antecedents, timeliness in NPD and INPR and its consequences were tested in Korean sample. Next, I tested how key predictors influence the criterion variables (e.g., timeliness in NPD and INPR and product performance) and, finally, in specific situations such as competitive intensity, technology change and standardization, this study explained how these predictors differently influence the criterion variables with a theoretical base in line with previous studies.

Thus, this research implies the importance of path analysis in providing new insights into the INPR process, while also including moderator and mediator variables. Unlike some models (e.g., NPD process), previous research on NPD timeliness and INPR timeliness appeared to lack an understanding of the relationships between timely development of a new project, timely roll-out of a new product across target-country markets and performance without distinguishing between moderator and mediator roles. The framework and its findings assist in filling a significant gap in the understanding of the effects of internal and external factors (e.g., standardization and external environments) on NPD timeliness, INPR timeliness and new product success, by empirically examining the relationships among constructs considered in this research.

In terms of mediated relationships, the proposed framework incorporates Chryssochoidis and Wong's (1998) conceptual model of INPR timeliness and the Song *et al.*, (1997) conceptual model of the NPD process. It is rare to find research studies on NPD timeliness and INPR timeliness where marketing proficiency and technical proficiency are included in the study as mediator variables. However, prior studies have tested proficiency of NPD activities as a mediator variable in securing product development performance (e.g., Song *et al.,* 1997). Although the current research suggests that key determinants affect NPD timeliness as well as INPR timeliness, the additional indirect effects on the relationships between antecedents, timeliness in NPD and INPR and its consequences investigated lend support to the call for future research to consider the roles of additional mediators and to examine these further.

In addition, the present study supports the view that the technical proficiency of companies in the emerging economies (e.g., South Korea) originates from their subsidiaries/agents located in target markets. A corporation's most important source of advantage is the knowledge possessed by its employees and that built into its structures and systems. The importance of foreign subsidiaries/agents as sources of competence is acknowledged in the literature (e.g., Holm *et al.,* 2005) because flows of knowledge from a foreign-owned subsidiary to HQ are regarded as a potentially important source of competitive advantage for a company. This study implies that the Korean companies in my sample may have assimilated external knowledge to thereby improve their proficiency in NPD activities (i.e. technical proficiency). The current study also points out that the existence of knowledge transfer (e.g., the subsidiary's role as a base for the creation of new R&D knowledge) may lead a company to build, at least partly, on its knowledge development systems and thus to improve its performance (Rugman and Verbeke, 2001). Therefore, international spillovers of R&D are also important for less developed countries. For example, Coe *et al.* (1997) found that less developed countries that hardly invest in research and development themselves benefit from R&D performed in the industrialized countries. The findings from this study have an implication for research (i.e. the impact of knowledge transfer between a knowledge-seeking organisation's separate units on competitive advantage and performance) seeking to explain the commercialization (e.g., INPR timeliness and new product success) impact of the HQ-subsidiary/agent relationship.

In terms of moderating effects, this study includes the effects of the external environments (i.e. competitive intensity and technology change) and standardization on the direct relationships between marketing, technology and organizational context factors, NPD timeliness, INPR timeliness and performance. The current study's conceptual model and findings extend Song and Montoya-Weiss's (2001) work which investigated the role of technological uncertainty in the NPD process. Despite the call by Wong (2002) emphasing the importance of examining the role of external environments in the INPR process, no study has investigated empirically the moderating role of external environments on the relationships between marketing, technology and organizational context factors, timeliness in NPD and INPR, and performance. Accordingly, the present research could be considered as one of the early attempts to investigate the role of moderators (e.g. external environments) on timeliness in NPD and INPR.

Consistent with the findings of the moderating role of technological uncertainty in the NPD process, my findings lend more credence to the contingency fit approach in studies regarding timeliness in NPD and INPR. For instance, the results from this research suggest that perceived uncertainty (e.g., technology change) in the environment interacts with organizational practices (e.g., cross-functional linkages) to influence time dimensions (i.e., NPD timeliness). Specifically, the interaction of NPD timeliness with external environments (as well as the interaction of INPR timeliness with external environments) has a significant effect on new product performance. The findings from this study provide empirical evidence that new product success in target-country markets depends on the match between time efficiency in NPD and international market launches and external environments. This study is one of the few that has examined the moderating role of situational factors (e.g., competitive intensity and technology changes) on the relationship between timeliness in NPD and INPR and performance. The findings of the present study support the idea that the consideration of a contingency perspective (e.g., internal and external factors) should be included so as to understand the relationships between antecedents, timeliness in NPD and INPR and consequences.

In addition, new products are inclined to be developed with not only features that are standardized across target-country markets but also features that adapt to unique country requirements. For example, electrical products should be developed by adaptation to local environments because there are situations where national infrastructure requires unique products (Yakhou and Dorweiler, 2006). Interestingly, the results of the present study show that standardization makes the timely development of new products more likely to lead to the timely rollout of new products. Therefore, the current study implies that, rather than exploring the direct effect of standardization on performance, there is a need to investigate its indirect role in performance in international markets.

7.4 Managerial Implications

The findings in the present research provide management personnel responsible for new product exports with a better understanding of the role of timeliness in NPD and INPR. The theoretical framework and empirical results have several managerial implications.

First, the study draws managers' attention to the importance of achieving timeliness in NPD and INPR as these are prerequisites for attaining a higher level of product success in target-country markets. I consider this an important finding that may explain why firms lacking timeliness in NPD and INPR often find that their new products do not yield the anticipated performance outcomes. NPD timeliness enables companies to meet customers' needs and service those customers better and hence achieve success in target markets because NPD timeliness is a source of product advantage. Based on the present study, the results also provide further evidence of the significant relationship between INPR timeliness and new product performance, and suggest that this should give a strong message to organizations. This underlines the necessity of completing the rollout of new products in international markets within the planned time frame. Thus, the present study suggests that it is crucial for manufacturers to seek to foster NPD and roll-out competencies in order to secure NPD and INPR timeliness.

Second, the findings that marketing synergy enhances NPD timeliness suggest that managers should seek to match marketing resources and skills to the NPD project. Organizations cannot gain the potential benefits of marketing synergy unless the knowledge is effectively shared (Song, 2002). This is because knowledge sharing creates opportunities to maximize a company's ability to meet customers' changing needs and generates solutions and efficiencies that will give a business its competitive advantage (Reid, 2003). Furthermore, it is widely recognized that organizations often repeat mistakes, duplicate projects, and otherwise waste resources because the members of the organization are unable to see each other's work (Robertson, 2002). Managers should set up a formal knowledge-sharing system for the purpose of sharing information and the experiences of individuals across the organization. In addition, unfamiliarity (e.g., newness) to a firm increases the odds of failure in the NPD process and delays in project completion, whereas familiarity to a firm has been found to be highly correlated to success (Cooper and Kleinschmidt, 2000). Therefore, a firm should realize that building on a firm's in-house marketing strengths and resources (rather than seeking new opportunities far from a firm's skill and resource base) is one of the keys to NPD timeliness.

Third, this study also reinforces the need for effective cross-functional linkages. The different types of knowledge and information in organizations is generated and utilized effectively through collaboration, interaction, and relations among functions (Song, 2002). To obtain better knowledge sharing, integration and utilization within an organization, managers should develop and build knowledge competencies and capabilities on the basis of effective cross-functional linkages that ultimately enhance the chance of effective and efficient NPD and international market launches. Moreover, project learning occurs wherever cross-functional project team members acquire, disseminate and use information. That is, the more sources of information that are used the higher the level of cross-functional cooperation, interaction and integration among marketing, manufacturing and R&D.

Managers may need to identify barriers to the information flow among functions stemming from organizational structure and climate. A bureaucratic structure is likely to slow down product development effects. Previous research on the effect of intraorganizational communication and transaction efficiencies suggests that both formalization and centralization impede dissemination and utilization of information (e.g. Kohli and Jaworski, 1990; Menon and Varadarajan, 1992). Specifically, formalization directly hinders idea generation (Troy *et al.,* 2001). Top management may need to consider investment in communications technology that facilitates interaction among functions. In addition, top management would do well to encourage marketing, R&D, and manufacturing to exchange complete and accurate information and emphasise common interests. There are various ways to promote knowledge sharing among functions. One example is explicit rewards or an incentive structure that can help organizations create a knowledge sharing culture. Employees in organizations have little incentive to share their own knowledge and insights with others (Lei *et al.* 1999). Therefore, it is necessary to motivate them to share knowledge.

Fourth, the findings from the present study show that higher levels of the HQ-subsidiary/agent relationship significantly contribute toward enhancing INPR timeliness. Managers should understand that coordination and communication between headquarters and subsidiary/agent provides an effective mechanism for the firm to respond to local market conditions. Specifically, managerial co-ordination of knowledge dispersal between headquarters and subsidiaries is a matter of specific monitoring, learning, and sanctioning rather than controlling through authority or hierarchy (Holm *et al.*, 2005). Therefore, the expected outcome of mutual cooperation between headquarters and subsidiaries must satisfy the condition of reliable relational behaviour between them. Moreover, the results imply that companies need to design the incentive structure of unit managers in order to rollout their new product on time into target markets because knowledge flows into and out of subsidiaries depend crucially on the motivation of the subsidiary to acquire knowledge and to share it (Gupta and Govindarajan, 2000).

Fifth, the findings of this study demonstrate that the significant impacts of key determinants on timeliness in NPD and INPR are attributed to proficiency in NPD activities (i.e., marketing proficiency and technical proficiency). That is, these results point out that the HQ-subsidiary/agent relationship only has a substantial impact on INPR timeliness through technical proficiency, while 3 predictors (i.e., marketing synergy, cross-functional linkages and the HQ-subsidiary/agent relationship) have an impact on timeliness in NPD and INPR through marketing proficiency. In the Korean sample (i.e. a developing country's companies), a higher level of marketing proficiency would allow companies to achieve NPD timelines whereas higher levels of marketing and technical proficiency congruency would allow companies to attain timely rollout of their new product into target markets.

How well a firm engages in marketing (e.g. evaluating consumers and competitors, determining market characteristics and trends, carrying out marketing research, test marketing, and executing product launch) and technical activities (e.g. conducting engineering and manufacturing evaluations, product testing, determining product specifications, prototyping, and building the final product) largely determines timeliness in NPD and INPR. Therefore, managers should pay particular attention to proficiency in market testing and product launch activities during a particular NPD project. Through the processes of effective and efficient gathering, interpreting and using market information, companies can increase the level of proficiency in NPD activities.

Moreover, managers must resist the temptation to pay less attention to knowledge inflow outflows between HQ and subsidiaries because the level of proficiency in market testing, product testing, determining product specifications, building the final product and launch activities can be increased through encouraging greater extent of knowledge and information transfer between HQ and subsidiaries. Barriers (e.g., centralization of decision-making) to information flow stemming from the relationship between HQ and subsidiaries also need to be removed. Decentralization of decision-making is appropriate to companies who want to introduce more product lines in foreign markets or to modify products to meet local demand (Gates and Egelhoff, 1986). In addition, hiring HQ managers with an international background is part of a proper staffing/training system (Jain, 1989) in order to reduce the detrimental effects of cultural differences between HQ and subsidiary managers. Socialization (i.e., rotation of individuals between HQ and subsidiaries) is also one of the recommended mechanisms to create an integrative culture and a verbal information network (Kumar and Seth, 1998).

In addition, companies in emerging economies must recognize international spillovers of R&D for technical proficiency resulting in timeliness in NPD and INPR. Innovative subsidiaries appear to have greater knowledge exchanges with the host country and are located in technologically diverse host countries (Almeida and Phene, 2004). Companies in emerging economies should reconsider the importance of the role of subsidiaries as well as the problem of resource allocation to this area, so as to avoid getting into a competitively disadvantaged position. To quickly upgrade production capabilities, a strategy pursued by Korean firms is to import or imitate foreign technologies from advanced countries (Im *et al,* 2003). Therefore, companies in less developed countries may need to emphasize the strategic role of technology transfer on their subsidiary in advanced countries in order to increase technical proficiency. The role of a subsidiary for technology transfer is apparently necessary to overcome the weaknesses of a domestic R&D base. Companies can improve their chances of new product success when they intensify their learning efforts in a foreign market.

Sixth, this study has important implications for managers in relation to external environments. Managers who are planning to maximize product performance should look for a fit between environmental factors and other factors that have direct effects on timeliness in NPD and INPR, and performance. Environment affects a firm's internal decisions and behaviour. It was found that cross-functional linkages are more important for the NPD timeliness of low technology change products than for that of high technology change products. In low technology change markets, managers have to consider seriously the flow and dissemination of knowledge and information among functions. Therefore, managers should pay attention to effective knowledge and information sharing among functions depending on situational factors (e.g. technology change) to reduce costs and improve efficiency as well as reduce risks due to uncertainty.

With respect to the moderating effects of external environments on the relationship between timeliness in NPD and INPR and new product success, this research demonstrates that a higher level of NPD timeliness leads more strongly to a higher level of new product performance in market conditions characterized by higher competitive intensity and in higher technology change. This research also reveals that a higher level of INPR timeliness leads to a higher level of new product performance under conditions of lower technology change. In view of the influence of external environments on timeliness in NPD and INPR, companies need to assess external environments to maximize the effect of timeliness in NPD and INPR on new product performance. That is, managers launching new products into highly competitive environments and markets facing rapid technology change should focus on achieving NPD timeliness as it enhances product performance. In addition, firms operating in a lower technology change environment should devote substantial resources and effort to ensuring INPR timeliness to secure product success.

Finally, the present study also suggests that the on-time development of a new product is more strongly associated with its timely roll-out into target markets under conditions of higher standardization. Product standardization was found to vary in accordance with foreign market situations (e.g., Leonidou, 1996). No firm can operate without taking into account various cultural or geographic differences. In other words, specific features of markets such as host government policies, differences in technical standards, language, culture etc. impact on the degree to which firms can adopt standardized marketing techniques across countries (Rau and Preble, 1987). Accordingly, managers should select target markets by combining common segments in different country markets to increase the positive effect of NPD timeliness on INPR timeliness (Jain, 1989). A key determinant of performance in global markets lies in managers' ability to establish common needs among the customer segments worldwide so that core product features are kept intact (Zou and Cavusgil, 2002). Global segmentation helps the firm to deal with the heterogeneity that exists among consumers and nations through identifying segments that can be targeted cost-effectively using a standardized marketing programme (Özsomer and Simonin, 2004).

7.5 Study Limitations

This research has achieved its overall research objectives. The results of this study should make a valuable contribution to both research and business practice. However, several limitations should also be considered when interpreting the study's findings. In the following, key limitations of the study that must be acknowledged will be discussed.

7.5.1 Limitations of the Research Framework

This study has several shortcomings in the present research framework. Some limitations may provide opportunity for future research. There is a lack of explanation of how NPD timeliness leads to product success as well as INPR timeliness. This study shows the mediating effect of proficiency in NPD activities (i.e., marketing proficiency and technical proficiency) in the relationships between marketing synergy and NPD timeliness and between organizational context factors (i.e., cross-functional linkages and HQ-subsidiary/agent relationship) and timeliness in NPD and INPR. These findings explain how key determinants influence timeliness in NPD and INPR in the INPR process. However, the research framework I tested did not offer a clear explanation of how the on-time development of a new product influences INPR timeliness and product performance.

This research framework does not include variables to explain how or why INPR timeliness leads to product performance. Furthermore, the proposed framework does not address the differences between two modes of rollout (i.e., simultaneous rollout and sequential rollout) and the extent to which they might influence INPR timeliness. In speed of product delivery to markets, the construct of INPR timeliness is a key contributor to product performance in target markets. In the test of the moderating effect of external environments on the INPR timeliness-product performance relationship, the results in the present study show that there is a weaker relationship between INPR timeliness and new product performance when technology change is higher. Therefore, frequent market changes (e.g., technology change and competitive intensity) are so far-reaching that the competence of the firm to continue to compete effectively is called into question (Abell, 1978). As a pioneer or follower, a firm pursues international opportunities for its new product's advantage. Although competitive advantage accrues to early movers (Lieberman and Montgomery, 1988), the rationale of absolute competitive advantage cannot explain why late entrants often become winners.

On the contrary, based on the rationale of comparative advantage according to the product life cycle concept (PLC) (Abell, 1978; Robinson *et al.,* 1992), the notion of "strategic windows" may be applicable to understanding why companies that ensure INPR timeliness become winners. This is because a firm's planned INPR time frame, reflected by its strategic approach on the basis of the optimal timing of the new product launch conditions in each target market, is likely to be related to not only international product life cycle (IPLC) (i.e., diffusion of innovation in multiple countries) but also PLC in each national market. For instance, following PLC theory, many US companies enter foreign markets in the hope of taking advantage of differences in life cycle stages of a product between their home market and export markets (Li *et al.,* 1999).

Therefore a firm, seeking to attain a comparative advantage at the right time in each target market, is likely to adopt a strategic approach of sequential rollout. It may then seek to exploit a comparative advantage in a certain stage of the PLC in each target market due to differences in life cycle stages of its product across target-country markets. This implies that sequential rollout may cause a delay in INPR in order to avoid a substantial risk of new product failure originating from mismatching comparative advantage to the targeted life cycle stage of a product in each national market. On the other hand, a firm that wants to simultaneously launch its new products across target-country markets is likely to achieve absolute competitive advantage or comparative advantage depending on the target-country market conditions. Therefore, simultaneous rollout does not appear to cause a delay in INPR (Chryssochoidis and Wong, 1998).

Moreover, product characteristics (namely customized or standardized products) may influence modes of rollout (i.e., simultaneous rollout and sequential rollout). In order words, some products which inherently need technical adjustment or customization are like to be subject to sequential rollout to fit the different customer's production requirements across target-country markets. On the contrary, standardized products are likely to be subject to simultaneous product introductions across different international markets.

In addition, the proposed model does not include the contingency effects of internal factors (e.g., organizational structure and culture) to explain the strong and weak effects of key antecedents on timeliness in NPD and INPR. Jaworski and Kohli (1993) found that formalization had no significant effect on market orientation. Moreover, Chryssochoidis and Wong (1998) found that both formalization and centralization constructs do not appear to significantly effect timeliness in INPR. However, as organizational variables, formalization and centralization of decision making are important factors influencing market information gathering and its dissemination in companies. With respect to the moderating effect of formalization on the relationship between task complexity and the use of information, Low and Mohr (2001) found that high levels of formalization offset the impact of complexity on the use of information. In other words, when formalization is low, the positive relationship between task complexity and information use is strong. However, when formalization is high, the positive relationship between task complexity and information use is weakened.

7.5.2 Limitations of the Research Design and Questionnaire

The current study design reveals some potential measurement limitations that warrant examination. The standardization-related questions used in this study represent a new measure of the construct. Previous research on standardization has focused on the degree to which marketing activities are conducted (e.g., Doherty and Ennew, 1995; Samiee and Roth, 1992). The construct of interest in this study, however, was the overall standardized activities including not only marketing activities but also technical activities on the new product. Although I conducted tests to assess the respondents' ability to accurately respond to the questions, I was unable to carry out extensive research assessing the external validity of the measure. Moreover, this study employed new items for this construct.

A limitation of this research is also in the measurements for timeliness dimensions. Two items for measuring the construct of each timeliness dimension (i.e., NPD and INPR) were employed by adopting them from the existing literature (Cooper and Kleinschmidt, 1994; Chryssochoidis and Wong, 1998). However, multi-item scales covering more than three items for the structural equation modelling methodology (LISREL) would have been preferable. Further research efforts are needed for the development of additional measurement items of NPD and INPR timeliness constructs.

This research has a limitation in generalising the results from the current research. Generalization from a Korean-based sample to firms operating in other regions of the world is risky. Therefore, the restricted focus on a single nation's companies may reduce the external validity and the possibility of generalising the findings of this study to other settings. Replication in other contexts is needed to assess the likelihood of generalizing my findings and conclusions.

Although our 200+ sample size is adequate for SEM and multiple regression techniques, the large number of latent variables (i.e., twelve constructs) limits the statistical power, on the basis of the chi-square test, to demonstrate perfect data-model fit (i.e., p values over than .05) (Bentler and Bonett, 1980; Jöreskog and Sörbom, 1981). This lack of perfect data-model fit, however, seems to suggest robustness in an alternative to χ^2 (i.e., χ^2/df ratio) and good alternative indices (i.e., RMSEA, NNFI and CFI) as well as in the direct, mediated and moderated relationships I found. Therefore, given the limitations involved, future research should seek to extend this work by using a larger sample as well as multi-item measures to increase both validity and reliability.

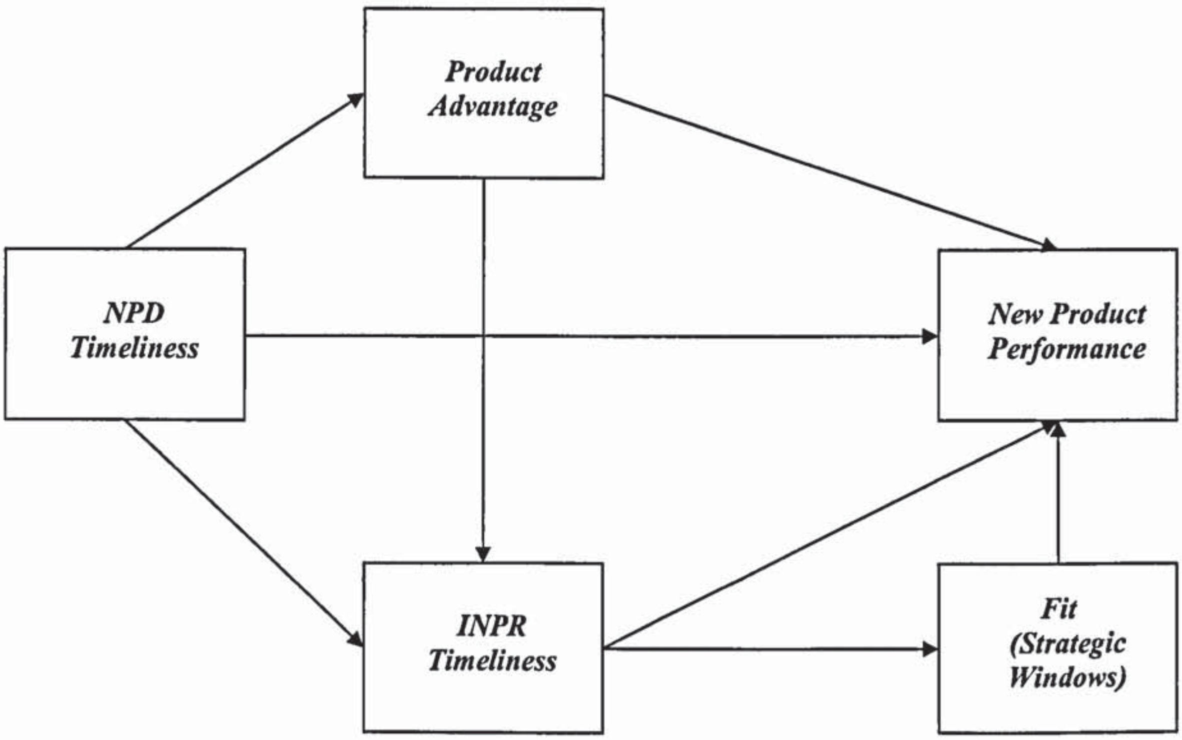
7.5.3 Limitations in the Data-gathering Process

In addition, sample size has an important limitation. The size of the sample (i.e., 232) is relatively small compared to the number of constructs (i.e., 12) this study sought to examine. This limitation is attributed to the number of Korean companies which operate R&D functions. There are still many Korean manufacturers that have marketing and manufacturing but no R&D functions. The study did not collect data from manufacturing companies which have no R&D function because the construct of cross-functional linkages is related to cooperation and collaborating among functions including R&D. The process of selecting the sample reflected this point and resulted in the selection of only manufacturers which have an R&D function. Additional research could attempt to collect a larger data set in order to test the direct, mediated and moderated effects in the INPR process.

7.6 Future Research

The limitations of this study create opportunities for future research. Additional research is required in order to gain a better understanding of the relationships uncovered in this study. A potential avenue for such research is the assessment of how additional constructs influence the NPD timeliness-INPR timeliness relationship and the INPR timeliness-product performance relationship. Depending on this, Figure 7.3 depicts a conceptual framework for future study. Such further research might provide additional insight into the INPR process.

Figure 7.3 Conceptual Framework for Future Research



The Effect of Product Advantage in the INPR process

To understand clearly subsequent stages of the INPR process, one direction for further refinement of the model might be to investigate the potential relevance of additional product features (e.g., product competitive advantage) as mediators in the relationships (see Figure 7.3). It has been argued for some time that a primary means for achieving competitive advantage is by accelerating the new product development process (Karagozoglu and Brown, 1993; Lynn *et al.,* 1999). Similarly, Ittner and Larcker (1997) suggest that faster product development alone does not lead to higher returns, sales growth or perceived overall performance. Specifically, Brown and Eisenhardt (1995) argued that the most important determinant of product success is product advantage. This construct may have a mediator role on the relationships between NPD timeliness, INPR timeliness and product performance because it is not only positively related to new product success (Li and Calantone, 1998) but also increases the adoption rate at the commercialization stage (Rogers, 1995). Consequently, future research might investigate the propositions that:

Proposition 1: The level of product advantage mediates the association between NPD timeliness and INPR timeliness.

Proposition 2: The level of product advantage mediates the association between NPD timeliness and new product performance.

The Effect of Fit (Strategic Windows) in the INPR process

Strategic windows pertain to the timing of the firm's product offerings in relation to the market's readiness and willingness to accept those offerings (Abell, 1978). Therefore, a second direction for further refinement of the present model is to incorporate additional strategic fit variables (e.g., strategic windows) to explain how INPR timeliness influences product performance. That is, the INPR timeliness construct is likely to influence product performance in target markets through an appropriate match, or fit, between the particular competencies of the new product and the requirements of the market.

Proposition 3: The level of fit or presence of strategic window opportunities mediates the association between INPR timeliness and new product performance.

Additional Moderators in the INPR process

Future models of the INPR process should consider additional moderators in the relationships. The environment is broader than that captured by competitive intensity and technology change. For instance, industry munificence (or growth) may be important. High growth markets are often characterized by relatively higher gross margins, rising productivity, increased investment to keep pace with growth, more new customers, higher levels of demand per customer, and a higher profitability (Szymanski *et al*, 1993). Therefore, all things being equal, the higher profit potential of high-growth markets should make those markets more attractive to currently nonparticipating businesses. This implies that the connection between new product performance and timeliness in NPD and INPR may be strengthened in fast growing industries where firms may be more concerned with the development of a new product and launching it into target markets to meet consumers' needs.

In addition, internal factors may be important moderators in explaining the influences on the INPR process and outcomes. For example, both formalization and centralization of decision making constructs are likely to moderate the relationships between organizational context factors (e.g., cross-functional linkages and HQ-subsidiary relationship) and timeliness in NPD and INPR. In particular, as a moderator, centralization of non-product decisions influences the effect of HQ-subsidiary/agent relationship on INPR timeliness because Özsomer and Simonin (2004) found that centralization of non-product decisions such as pricing, sales force and sales promotion appears to have a stronger negative impact on communication efficiencies between HQ and subsidiaries than centralization of product decisions (e.g., product characteristics, branding and packaging).

Several Other research studies in Multiple settings

Future research could also focus on NPD and INPR timeliness processes in other Asian countries such as China and India as this region of the world contains about one quarter of the world's population, is rapidly growing, and has generally experienced success in international markets. It is also necessary to conduct a comparative study of the INPR process in advanced countries and emerging economies to find similarities and differences between them.

7.7 Conclusions

In summary, the study presents the answers to research questions which concern what factors are predictors of criterion variables, how antecedents influence timeliness in NPD and INPR and when the direct relationships in the INPR process are strengthened. In particular, the empirical evidence provides that the conceptual framework has external validity and can be extended by additional research. The findings of this study will hopefully stimulate further research in the area and the suggestions provided above should provide preliminary interest and direction.

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Appendix 4.1 Pre-testing Questionnaire

Please be assured that the identities of individuals or companies participating in this study will be held in the strictest confidence"
(Please attach your Name Card so that we can send you a copy of the executive report of the survey)

Your Name : __________ **Designation :** ________ **Years of Service :** ________

Company Name : _________________________ **Tel :** ___________ **Fax :** ____________

SECTION A: General Information

A1. Select a recent international new product development project whereby the new product has been launched in overseas markets. Please briefly describe the new product:

____

____

A2. For the selected international new product development project, please indicate whether your CEO's strategy for rollout in overseas markets was simultaneous or sequential by circling the appropriate number, 1 or 2, below.

1. CEO's strategy for rollout in overseas markets: simultaneous
2. CEO's strategy for rollout in overseas markets: sequential

A3. Please indicate your company's size in terms of:

1. Number of employees: ① < 50 ② 50 to 500 ③ > 500
2. Annual sales turnover: ① < US$10million ② US$10 to US$100 million ③ > US$100million

A4. Please indicate the number of years your company has been operating in the selected new product:

1. < 3 years 2. 3 to 7 years 3. 7 to 10 years 4. > 10 years

A5. What percentage of your company's sales is generated from overseas markets (i.e. export)?

1. < 25% 2. 25% to 49% 3. 50% to 75% 4. > 75%

A6. Your company's preferred mode of entry into overseas market (if applicable) tasks the form of

1. Not applicable 2. Licensing 3. Joint Venture 4. Direct investment

5. Subsidiary 6. Franchising 7. Distributorship 8. Others: ___________

A7. **Please answer the following two questions:**

(i) **For the new product development project you have selected, please tick the countries at which the new product was targeted.**

(ii) **For the new product development and international market rollout project that you have selected, please rank the countries in which the new product was launched accordingly to the order of entry into those markets.**

Country	(i) Tick as appropriate	(ii) Rank in order of entry
1. China		
2. India		
3. Japan		
4. Taiwan		
5. Malaysia		
6. Singapore		
7. Hong Kong		
8. Indonesia		
9. Thailand		
10. Vietnam		
11. Philippine		
12. Saudi Arabia		
13. Iran		
14. Turkey		
15. U.S.A		
16. Canada		
17. Mexico		
18. Brazil		
19. Argentina		
20. Chile		
21. U.K		
22. France		
23. Germany		
24. Italy		
25. Netherlands		
26. Spain		
27. Greece		
28. Poland		
29. Russia		
30. Hungary		
31. Australia		
32. New Zealand		
33. Other areas (Please state: ________________)		

Based on your experiences regarding the new product development and international market rollout project that you have selected, please respond to the following questions

SECTION B: Internal Factors for Developing and Exporting New Products

Thinking about the new product development and international market rollout project that you have selected, to what extent do the following statements describe the selected project. Please indicate the degree you agree or disagree with each statement by circling a number from zero (0) to ten (10) on the scale to the right of each statement. (0 = strongly disagree, 10 = strongly agree)

B1. Cross-functional Linkages:

'Cross-functional Linkages' is defined as interaction, cooperation and integration between marketing, R&D and manufacturing for developing the selected new product.

	Strongly disagree										Strongly agree
1. The degree of integration between R&D and manufacturing was high.	0	1	2	3	4	5	6	7	8	9	10
2. The development of this product involved frequent interaction between customers and our cross-functional product development team – it was a truly a cross-functional team effort.	0	1	2	3	4	5	6	7	8	9	10
3. The degree of integration between marketing and R&D was high.	0	1	2	3	4	5	6	7	8	9	10
4. The degree of integration between manufacturing and marketing was high.	0	1	2	3	4	5	6	7	8	9	10

B2. Marketing Synergy:

'Marketing Synergy' is defined as the project's fit with your firm's existing marketing skills and resources in terms of the available market research, sales force, distribution, advertising and promotion.

	Strongly disagree										Strongly agree
1. Our company's marketing research skills were more than adequate for this selected project.	0	1	2	3	4	5	6	7	8	9	10
2. Our company's salesforce skills were more than adequate for this selected project.	0	1	2	3	4	5	6	7	8	9	10
3. Our company's distribution skills were more than adequate for this selected project.	0	1	2	3	4	5	6	7	8	9	10
4. Our company's advertising/promotion skills were more than adequate for this selected project.	0	1	2	3	4	5	6	7	8	9	10
5. Our company's marketing research resources were more than adequate for this selected project.	0	1	2	3	4	5	6	7	8	9	10
6. Our company's salesforce resources were more than adequate for this selected project.	0	1	2	3	4	5	6	7	8	9	10
7. Our company's distribution resources were more than adequate for this selected project.	0	1	2	3	4	5	6	7	8	9	10
8. Our company's advertising/promotion resources were more than adequate for this selected project.	0	1	2	3	4	5	6	7	8	9	10

B3. Technical Synergy:

'Technical Synergy' is defined as the project's fit with your firm's existing technical skills and resources in terms of the available R&D, engineering and production skills and resources.

	Strongly disagree										Strongly agree
1. Our company's R&D skills were more than adequate for this selected project.	0	1	2	3	4	5	6	7	8	9	10
2. Our company's engineering skills were more than adequate for this selected project.	0	1	2	3	4	5	6	7	8	9	10
3. Our company's manufacturing skills were more than adequate for this selected project.	0	1	2	3	4	5	6	7	8	9	10
4. Our company's R&D resources were more than adequate for this selected project.	0	1	2	3	4	5	6	7	8	9	10
5. Our company's engineering resources were more than adequate for selected this project.	0	1	2	3	4	5	6	7	8	9	10
6. Our company's manufacturing resources were more than adequate for this selected project	0	1	2	3	4	5	6	7	8	9	10

B4. Marketing Proficiency:

'Marketing Proficiency' is defined as how well marketing-related activities (e.g., evaluating consumers and competitors, determining market characteristics and trends, carrying out marketing research, test marketing, and executing product launch) were conducted during the development of this particular new product.

	Strongly disagree										Strongly agree
1. Our company correctly determined market characteristics and trends.	0	1	2	3	4	5	6	7	8	9	10
2. Our company correctly appraised competitors and their products – both existing and potential.	0	1	2	3	4	5	6	7	8	9	10
3. Our company correctly identified "appeal" characteristics that would differentiate and sell the product.	0	1	2	3	4	5	6	7	8	9	10
4. Our company correctly conducted a market study or market research – a detailed study of market potential, customer preferences, purchase process, etc.	0	1	2	3	4	5	6	7	8	9	10
5. Our company correctly executed test marketing programs in line with the plans for commercialization.	0	1	2	3	4	5	6	7	8	9	10
6. Our company correctly launched and introduced the product into the marketplace – selling, promotion and distribution.	0	1	2	3	4	5	6	7	8	9	10

B5. Technical Proficiency:

'Technical Proficiency' is defined as how well technical-related activities (e.g., conducting engineering and manufacturing evaluations, product testing, determining product specifications, prototyping, and building the final product) were conducted during the development of this particular new product.

	Strongly disagree										Strongly agree
1. Our company correctly conducted preliminary engineering, technical and manufacturing assessments.	0	1	2	3	4	5	6	7	8	9	10
2. Our company correctly built the product to designated or revised specifications.	0	1	2	3	4	5	6	7	8	9	10
3. Our company correctly evaluated laboratory tests to determine basic performance against specifications.	0	1	2	3	4	5	6	7	8	9	10
4. Our company correctly executed prototype or "in house" sample product testing.	0	1	2	3	4	5	6	7	8	9	10
5. Our company correctly determined the final product design and specifications.	0	1	2	3	4	5	6	7	8	9	10
6. Our company correctly and continuously worked for cost reduction and quality control.	0	1	2	3	4	5	6	7	8	9	10

B6. HQ-subsidiary/agent Relationship:

'HQ-subsidiary/agent Relationship' is defined as HQ-subsidiary/agent cooperation which means complementary coordinated actions taken by the headquarters and subsidiary/agent.

	Strongly disagree										Strongly agree
1. People from the marketing operations at both headquarters and our overseas subsidiaries/agents regularly interacted.	0	1	2	3	4	5	6	7	8	9	10
2. There was open communication between the marketing operations at headquarters and our overseas subsidiaries/agents.	0	1	2	3	4	5	6	7	8	9	10
3. The marketing operations at headquarters and our overseas subsidiaries/agents had similar goals.	0	1	2	3	4	5	6	7	8	9	10
4. Overall, our overseas subsidiaries/agents' marketing departments were satisfied with its interaction with the marketing operation at headquarters.	0	1	2	3	4	5	6	7	8	9	10
5. There was a give-and-take relationship between the marketing operations at headquarters and our overseas subsidiaries/agents.	0	1	2	3	4	5	6	7	8	9	10

SECTION C: External Environmental Factors for Developing and Exporting New Products

Thinking about the new product development and international market rollout project that you have selected, to what extent do the following statements describe the selected project. Please indicate the degree you agree or disagree with each statement by circling a number from zero (0) to ten (10) on the scale to the right of each statement. (0 = strongly disagree, 10 = strongly agree)

C1. Competition Intensity:
'Competition Intensity' is defined as the degree of competitive strength in a product market.

	Strongly disagree										Strongly agree
1. There was no price competition in target country-markets.	0	1	2	3	4	5	6	7	8	9	10
2. There were many competitors in target country-markets.	0	1	2	3	4	5	6	7	8	9	10
3. There was a strong, dominant competitor - with a large market share - in target country-markets.	0	1	2	3	4	5	6	7	8	9	10
4. Potential customers were very loyal to competitors' products in target country-markets.	0	1	2	3	4	5	6	7	8	9	10
5. New product introductions by competitors were frequent in target country-markets.	0	1	2	3	4	5	6	7	8	9	10

C2. Technology Change:
'Technology Change' is defined as the speed of technology development in a product market.

	Strongly disagree										Strongly agree
1. The rates (speed and pace) of changes in the technology employed in this project were very fast.	0	1	2	3	4	5	6	7	8	9	10
2. The technology used in this product was changing rapidly.	0	1	2	3	4	5	6	7	8	9	10
3. Changes in R&D technology for this project were very unpredictable.	0	1	2	3	4	5	6	7	8	9	10
4. The technology involved in this project was an "undeveloped science," i.e., the technology was not well understood, the phenomena were not well-defined and the predictive state-of-the-art was very low. There was much trial and error research.											
5. It was very difficult to predict where the technology used in this product would be in the following 2 to 3 years.	0	1	2	3	4	5	6	7	8	9	10
6. Product life cycle was short in target country-markets.	0	1	2	3	4	5	6	7	8	9	10
7. The rate of new product introduction was fast in target country-markets.	0	1	2	3	4	5	6	7	8	9	10
8. The rate of technology change was fast in target country-markets.	0	1	2	3	4	5	6	7	8	9	10

SECTION D: Timeliness in New Product Development & International New Product Rollout

D1. NPD (New Product Development) Timeliness:

'NPD timeliness' is defined as the time required to complete the development of the new product relative to its anticipate time frame.

1. Please indicate the degree to which the project w as done in a time-efficient manner by circling a nu mber from zero (0) to ten (10) (0 = very slowly and inefficiently, 10 = very quickly and efficiently)	0 1 2 3 4 5 6 7 8 9 10
2. Please indicate the degree to which the project adhered to the time schedule by circling a number from minus 5 (-5) to plus 5 (+5). (-5 = slow; inefficient; took too long, 0 = stayed on schedule, +5 = done fast; in a very time-efficient manner)	-5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5

D2. INPR (International New Product Rollout) timeliness:

'INPR timeliness' is defined as the actual availability of the new product within- or faster than- the planned (scheduled/anticipated) time frame for product availability in the firm's target country-markets.

1. Please indicate the degree to which the actual availability of the new product for sale in the firm's target country-markets was achieved in a time-efficient manner by circling a number from zero (0) to ten (10) (0 = very slowly and inefficiently, 10 = very quickly and efficiently)	0 1 2 3 4 5 6 7 8 9 10
2. Please indicate the adherence of the new products to the rollout schedule by circling a number from minus 5 (-5) to plus 5 (+5). (-5 very long; far behind schedule, 0 = stayed on schedule, +5 very fast; ahead of schedule)	-5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5

SECTION E: Balance in standardization-customization

'Standardization (conversely, customization)' refers to using a common programme and process on a worldwide basis.

Marketing-related activities refer to programme(i.e., various aspects of the marketing mix, which can be classified as product design, product positioning, brand name, packaging, retail price, basic advertising message, sales promotion, role of salesforce, management of salesforce type of retail outlets, and customer service) and process (i.e., tools that aid in programme development and implement).

Technical activities are a selected set of activities which go beyond simply producing the goods, for instance, process engineering and improvement, after-sales service, decision making on procurement and distribution and, ultimately, product development.

	Strongly disagree										Strongly agree
1. Our company tended to standardize marketing-related activities over the countries at which the new product was targeted.	0	1	2	3	4	5	6	7	8	9	10
2. Our company tended to standardize technical-related activities over the countries at which the new product was targeted.	0	1	2	3	4	5	6	7	8	9	10

SECTION F: New Product Performance

New product performance can be measured in a number of ways. Please indicate, from what you know today, how successful this selected project was, or has been, using the following criteria.

1. How successful was this selected project from an overall profitability standpoint? (0 = a great financial failure, i.e., far less than our minimum acceptable profitability criteria, 10 = a great financial success, i.e., it far exceeded our minimum acceptable profitability criteria)	0	1	2	3	4	5	6	7	8	9	10
2. Relative to your firm's other new products, how successful was this selected project in terms of profits? (0 = far less than our other new products, 10 = it far exceeded our other new products)	0	1	2	3	4	5	6	7	8	9	10
3. Relative to competitors' products, how successful was this selected project in terms of profits? (0 = far less than the competing products, 10 = it far exceeded the competing products)	0	1	2	3	4	5	6	7	8	9	10

4. Relative to your firm's objectives for this selected project, how successful was this selected project in terms of profits? (0 = far less than the objectives, 10 = it far exceeded the objectives)	0 1 2 3 4 5 6 7 8 9 10
5. Relative to your firm's other new products, how successful was this selected project in terms of sales? (0 = far less than our other new products, 10 = it far exceeded our other new products)	0 1 2 3 4 5 6 7 8 9 10
6. Relative to competitors' products, how successful was this selected project in terms of sales? (0 = far less than the competing products, 10 = it far exceeded the competing products)	0 1 2 3 4 5 6 7 8 9 10
7. Relative to your firm's objectives for this selected project, how successful was it in terms of sales? (0 = far less than the objectives, 10 = it far exceeded the objectives)	0 1 2 3 4 5 6 7 8 9 10
8. Relative to your firm's other new products, how successful was this selected project in terms of market share? (0 = far less than our other new products, 10 = it far exceeded our other new products)	0 1 2 3 4 5 6 7 8 9 10
9. Relative to competitors' products, how successful was this selected project in terms of market share? (0 = far less than the competing products, 10 = it far exceeded the competing products)	0 1 2 3 4 5 6 7 8 9 10
10. Relative to your firm's objectives for this selected project, how successful was it in terms of market share? (0 = far less than the objectives, 10= it far exceeded the objectives)	0 1 2 3 4 5 6 7 8 9 10

Appendix 4.2 The Final Questionnaire

SECTION A: General Information

A1. Select a recent international new product development project whereby the new product has been launched in overseas markets. Please briefly describe the new product:

____

A2. For the selected international new product development project, please indicate whether your CEO's strategy for rollout in overseas markets was simultaneous or sequential by circling the appropriate number, 1 or 2, below.

CEO's strategy for rollout in overseas markets: 1. simultaneous, 2. sequential

A3. Please state the number of years your company has been operating in the selected new product:
(______________)years

A4. What percentage of your company's sales is generated from overseas markets (i.e. export)?
(______________)%

A5. Your company's preferred mode of entry into overseas market (if applicable) takes the form of:

1. Not applicable 2. Licensing 3. Joint Venture 4. Direct investment
5. Subsidiary 6. Franchising 7. Distributorship 8. Others: ___________

A6. For the new product development and international market rollout project that you have selected, please rank the countries in which the new product was launched accordingly to the order of entry into those markets.

Country	(Rank)	Country	(Rank)	Country	(Rank)
China	( )	India	( )	Japan	( )
Taiwan	( )	Malaysia	( )	Singapore	( )
Hong Kong	( )	Indonesia	( )	Thailand	( )
Vietnam	( )	Philippine	( )	Saudi Arabia	( )
Iran	( )	Turkey	( )	U.S.A	( )
Canada	( )	Mexico	( )	Brazil	( )
Argentina	( )	Chile	( )	U.K	( )
France	( )	Germany	( )	Italy	( )
Netherlands	( )	Spain	( )	Greece	( )
Poland	( )	Russia	( )	Hungary	( )
Australia	( )	New Zealand	( )	Other Countries (Please state:	( )

Based on your experiences regarding the new product development and international market rollout project that you have selected, please respond to the following questions

SECTION B: Internal Factors for Developing and Exporting New Products

Thinking about the new product development and international market rollout project that you have selected, to what extent do the following statements describe the selected project. Please indicate the degree you agree or disagree with each statement by circling a number from one(1) to seven(7) on the scale to the right of each statement (1 = strongly disagree, 7 = strongly agree).

B1. Cross-functional Linkages:

'Cross-functional Linkages' is defined as interaction, cooperation and integration between marketing, R&D and manufacturing for developing the selected new product.

	Strongly disagree — Strongly agree
1. The degree of integration between R&D and manufacturing was high.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
2. The development of this product involved frequent interaction between customers and our cross-functional product development team – it was a truly a cross-functional team effort.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
3. The degree of integration between marketing and R&D was high.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
4. The degree of integration between marketing and manufacturing was high.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7

B2. Marketing Synergy:

'Marketing Synergy' is defined as the project's fit with your firm's existing marketing skills and resources in terms of the available market research, sales force, distribution, advertising and promotion.

	Strongly disagree — Strongly agree
1. Our company's marketing research skills were more than adequate for this selected project.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
2. Our company's salesforce skills were more than adequate for this selected project.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
3. Our company's distribution skills were more than adequate for this selected project.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
4. Our company's advertising/promotion skills were more than adequate for this selected project.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
5. Our company's marketing research resources were more than adequate for this selected project.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
6. Our company's salesforce resources were more than adequate for this selected project.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
7. Our company's distribution resources were more than adequate for this selected project.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
8. Our company's advertising/promotion resources were more than adequate for this selected project.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7

B3. Technical Synergy:
'Technical Synergy' is defined as the project's fit with your firm's existing technical skills and resources in terms of the available R&D, engineering and production skills and resources.

	Strongly disagree — Strongly agree
1. Our company's R&D skills were more than adequate for this selected project.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
2. Our company's engineering skills were more than adequate for this selected project.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
3. Our company's manufacturing skills were more than adequate for this selected project.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
4. Our company's R&D resources were more than adequate for this selected project.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
5. Our company's engineering resources were more than adequate for selected this project.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
6. Our company's manufacturing resources were more than adequate for this selected project.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7

B4. Marketing Proficiency:
'Marketing Proficiency' is defined as how well marketing-related activities (e.g., evaluating consumers and competitors, determining market characteristics and trends, carrying out marketing research, test marketing, and executing product launch) were conducted during the development of this particular new product.

	Strongly disagree — Strongly agree
1. Our company correctly determined market characteristics and trends.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
2. Our company correctly appraised competitors and their products – both existing and potential.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
3. Our company correctly identified "appeal" characteristics that would differentiate and sell the product.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
4. Our company correctly conducted a market study or market research – a detailed study of market potential, customer preferences, purchase	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
5. Our company correctly executed test marketing programs in line with the plans for commercialization.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
6. Our company correctly launched and introduced the product into the marketplace – selling, promotion and distribution.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7

B5. Technical Proficiency:
'Technical Proficiency' is defined as how well technical-related activities (e.g., conducting engineering and manufacturing evaluations, product testing, determining product specifications, prototyping, and building the final product) were conducted during the development of this particular new product.

	Strongly disagree — Strongly agree
1. Our company correctly conducted preliminary engineering, technical and manufacturing assessments.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
2. Our company correctly built the product to designated or revised specifications.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
3. Our company correctly evaluated laboratory tests to determine basic performance against specifications.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
4. Our company correctly executed prototype or "in house" sample product testing.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
5. Our company correctly determined the final product design and specifications.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
6. Our company correctly and continuously worked for cost reduction and quality control.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7

B6. HQ-subsidiary/agent Relationship:
'HQ-subsidiary/agent Relationship' is defined as HQ-subsidiary/agent cooperation which means complementary coordinated actions taken by the headquarters and subsidiary/agent.

	Strongly disagree — Strongly agree
1. People from the marketing operations at both headquarters and our overseas subsidiaries/agents regularly interacted.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
2. There was open communication between the marketing operations at headquarters and our overseas subsidiaries/agents.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
3. The marketing operations at headquarters and our overseas subsidiaries/agents had similar goals.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
4. Overall, our overseas subsidiaries/agents' marketing departments were satisfied with its interaction with the marketing operation at headquarters.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
5. There was a give-and-take relationship between the marketing operations at headquarters and our overseas subsidiaries/agents.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7

SECTION C: External Environmental Factors for Developing and Exporting New Products

Thinking about the new product development and international market rollout project that you have selected, to what extent do the following statements describe the selected project. Please indicate the degree you agree or disagree with each statement by circling a number from one(1) to seven(7) on the scale to the right of each statement (1 = strongly disagree, 7 = strongly agree).

C1. Competition Intensity:
'Competition Intensity' is defined as the degree of competitive strength in a product market.

	Strongly disagree — Strongly agree
1. There were many competitors in target country-markets.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
2. There was a strong, dominant competitor - with a large market share - in target country-markets.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
3. Potential customers were very loyal to competitors' products in target country-markets.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
4 New product introductions by competitors were frequent in target country-markets.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7

C2. Technology Change:
'Technology Change' is defined as the speed of technology development in a product market.

	Strongly disagree — Strongly agree
1. The rates (speed and pace) of changes in the technology employed in this project were very fast.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
2. The technology used in this product was changing rapidly.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
3. Changes in R&D technology for this project were very unpredictable.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
4. The technology involved in this project was an "undeveloped science," i.e., the technology was not well understood, the phenomena were not well-defined and the predictive state-of-the-art was very low. There was much trial and error research.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
5. Product life cycle was short in target country-markets.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
6. The rate of new product introduction was fast in target country-markets.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
7. The rate of technology change was fast in target country-markets.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7

SECTION D: Timeliness in New Product Development & International New Product Rollout

Thinking about the new product development and international market rollout project that you have selected, to what extent do the following statements describe the selected project. Please indicate the degree you agree or disagree with each statement by circling a number from one(1) to seven(7) on the scale to the right of each statement (1 = strongly disagree, 7 = strongly agree).

D1. NPD (New Product Development) Timeliness:
'NPD timeliness' is defined as the time required to complete the development of the new product relative to its anticipate time frame.

1. Please indicate the degree to which the project was done in a time-efficient Manner by circling a number from one (1) to seven (7). (1 = very slowly and ine fficiently, 7 = very quickly and efficiently)	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
4. Please indicate the degree to which the project adhered to the time schedule by circling a number from minus 3 (-3) to plus 3 (+3). (-3 = slow; inefficient; took too long, 0 = stayed on schedule, +3 = done fast; in a very time-efficient manner)	-3 -2 -1 0 +1 +2 +3

D2. INPR (International New Product Rollout) timeliness:

'INPR timeliness' is defined as the actual availability of the new product within- or faster than- the planned (scheduled/anticipated) time frame for product availability in the firm's target country-markets.

1. Please indicate the degree to which the actual availability of the new product for sale in the firm's target country-markets was achieved in a time-efficient manner by circling a number from one (1) to seven (7). (1 = very slowly and inefficiently, 7 = very quickly and efficiently)	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
4. Please indicate the adherence of the new products to the rollout schedule by circling a number from minus 3 (-3) to plus 3 (+3).(-3 very long; far behind schedule, 0 = stayed on schedule, +3 very fast; ahead of schedule)	-3 -2 -1 0 +1 +2 +3

SECTION E: New Product Performance (Target country-markets)

New product performance can be measured in a number of ways. Please indicate, from what you know today, how successful this selected project was, or has been, using the following criteria

1. How successful was this selected project from an overall profitability standpoint? (1 = a great financial failure, i.e., far less than our minimum acceptable profitability criteria, 7 = a great financial success, i.e., it far exceeded our minimum acceptable profitability criteria)	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
2. Relative to your firm's other new products, how successful was this selected project in terms of profits? (1 = far less than our other new products, 7 = it far exceeded our other new products)	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
3. Relative to competitors' products, how successful was this selected project in terms of profits? (1 = far less than the competing products, 7 = it far exceeded the competing products)	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
4. Relative to your firm's objectives for this selected project, how successful was this selected project in terms of profits? (1 = far less than the objectives, 7 = it far exceeded the objectives)	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
5. Relative to your firm's other new products, how successful was this selected project in terms of sales? (1 = far less than our other new products, 7 = it far exceeded our other new products)	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
6. Relative to competitors' products, how successful was this selected project in terms of sales? (1 = far less than the competing products, 7 = it far exceeded the competing products)	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
7. Relative to your firm's objectives for this selected project, how successful was it in terms of sales? (1 = far less than the objectives, 7 = it far exceeded the objectives)	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
8. Relative to your firm's other new products, how successful was this selected project in terms of market share? (1 = far less than our other new products, 7 = it far exceeded our other new products)	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
9. Relative to competitors' products, how successful was this selected project in terms of market share? (1 = far less than the competing products, 7 = it far exceeded the competing products)	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
10. Relative to your firm's objectives for this selected project, how successful was it in terms of market share? (1 = far less than the objectives, 7 = it far exceeded the objectives)	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7

SECTION F: Balance in standardization-customization

Thinking about the new product development and international market rollout project that you have selected, to what extent do the following statements describe the selected project. Please indicate the degree you agree or disagree with each statement by circling a number from one(1) to seven(7) on the scale to the right of each statement (1 = strongly disagree, 7 = strongly agree).

'Standardization (conversely, customization)' refers to using a common programme and process on a worldwide basis.

Marketing-related activities refer to programme(i.e., various aspects of the marketing mix, which can be classified as product design, product positioning, brand name, packaging, retail price, basic advertising message, sales promotion, role of salesforce, management of salesforce type of retail outlets, and customer service) and process (i.e., tools that aid in programme development and implement).

Technical activities are a selected set of activities which go beyond simply producing the goods, for instance, process engineering and improvement, after-sales service, decision making on procurement and distribution and, ultimately, product development.

	Strongly disagree Strongly agree
1. Our company tended to standardize marketing-related activities over the countries at which the new product was targeted.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
2. Our company tended to standardize technical-related activities over the countries at which the new product was targeted.	1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7

Thank you.

Please be assured that the identities of individuals or companies participating in this study will be held in the strictest confidence"

(Please attach your Name Card so that we can send you a copy of the executive report of the survey)

Your Name : ______________ **Designation :** _______ **Years of Service :** _______

Company Name : ______________________ **Tel :** __________ **Fax :** ___________

Appendix 4.3 Cover Letter

Dear Sir/Madam,

I am writing to you in hope that you will be able to assist me by providing information for an academic survey in the field of Marketing. The survey is being conducted nationwide among executives and managers in the manufacturing sector which is involved in developing new products and exporting them to foreign markets.

The purpose behind the research is to ascertain your opinions on international new products launches, particularly *the effects of external environments and proficiency in NPD (new product development) on the relationships between key determinants and timeliness in NPD and INPR (international new product rollout).* Your answers will hopefully enable companies in future to be aware of the importance/requirements of new product rollout timeliness in international markets and this, in turn, will enable them to prevent delays.

Your company is publicly recognized as being one of the top manufacturing companies in South Korea. This makes your company special to my study because it is among those manufacturing companies that are acknowledged for their excellence among many others. I can assure you that all responses will remain absolutely confidential.

Thank you very much indeed for your response to the questionnaire.

Yours faithfully,

Keon Bong Lee
PhD student in Marketing
Aston Business School
Aston University, Birmingham B4 7ET, UK

Appendix 5.1 The Process of Model Respesification

Model	Largest positive and negative standardised residuals	Chi-square	GFI	AGFI	NNFI	CFI	RMSEA
Initial Model (see Figure 6.1)	10.783 for Item TECH2 and Item TECH1 5.265 for Item TECH2 and Item COM4 -3.048 for Item TECH2 and Item COM1	3784.68 df = 1763 (p = 0.000)	0.654	0.617	0.809	0.822	0.070
Excluding Item TECH2	8.247 for Item MS8 and Item MS4 -3.550 for Item MS8 and Item MS3 -3.080 for Item MS8 and Item MS2 -2.735 for Item MS8 and Item MS1	3599.98 df = 1703 (p = 0.000)	0.662	0.624	0.815	0.827	0.069
Excluding Item TECH2 and MS8	6.850 for Item NPP10 and Item NPP9 5.983 for Item NPP10 and Item NPP8 -4.663 for Item NPP10 and Item NPP1 -4.135 for Item NPP10 and Item NPP2 -3.380 for Item NPP10 and Item TP3 -3.023 for Item NPP10 and Item NPP3 -2.756 for Item NPP10 and Item MP5 -2.640 for Item NPP10 and Item TS5 -2.593 for Item NPP10 and Item TECH7	3398.92 df = 1644 (p = 0.000)	0.671	0.634	0.823	0.835	0.068
Excluding Item TECH2, MS8 and NPP10	7.772 for Item NPP9 and Item NPP8 2.917 for Item NPP9 and Item TECH4 2.658 for Item NPP9 and Item NPP6 -3.783 for Item NPP9 and Item NPP4 -3.527 for Item NPP9 and Item TP3 -3.274 for Item NPP9 and Item TS5 -3.112 for Item NPP9 and Item COM1 -2.994 for Item NPP9 and Item NPP5 -2.763 for Item NPP9 and Item TECH7	3163.38 df = 1586 (p = 0.000)	0.683	0.646	0.830	0.842	0.066
Excluding Item TECH2, MS8, NPP10 and 9	5.556 for Item TECH6 and Item COM4 2.644 for Item TECH6 and Item TECH5 -2.945 for Item TECH6 and Item CFL4	2983.88 df = 1529 (p = 0.000)	0.692	0.655	0.838	0.850	0.064
Excluding Item TECH2, MS8, NPP10, 9 and TECH6	5. 060 for Item TECH1 and Item COM4 3.581 for Item TECH1 and Item HQSR5 3.433 for Item TECH1 and Item MS3 3.394 for Item TECH1 and Item MP3 3.373 for Item TECH1 and Item TS4 3.336 for Item TECH1 and Item TS5 3.278 for Item TECH1 and Item TP2 3.185 for Item TECH1 and Item TP1 2.988 for Item TECH1 and Item TS6 2.970 for Item TECH1 and Item TS1 2.759 for Item TECH1 and Item MS7 2.747 for Item TECH1 and Item CFL2 2.715 for Item TECH1 and Item MP5 2.708 for Item TECH1 and Item MP6 2.687 for Item TECH1 and Item TP3 2.684 for Item TECH1 and Item TS3 2.602 for Item TECH1 and Item TP5	2850.98 df = 1473 (p = 0.000)	0.698	0.661	0.843	0.855	0.064
Excluding Item TECH2, MS8, NPP10, 9, TECH6 and 1	5.199 for Item MP2 and Item MP1 2.901 for Item MP2 and Item TP2 -3.079 for Item MP2 and Item MP5 -2.671 for Item MP2 and Item TS5	2750.88 df = 1418 (p = 0.000)	0.702	0.664	0.845	0.857	0.064
Excluding Item TECH2, MS8, NPP10, 9, TECH6, 1 and MP2	5.056 for Item MS5 and Item MS4 -3.741 for Item MS5 and Item MS2 -2.829 for Item MS5 and Item CFL3 -2.753 for Item MS5 and Item CFL4 -2.589 for Item MS5 and Item MS3	2623.13 df = 1364 (p = 0.000)	0.708	0.670	0.847	0.859	0.063
Excluding Item TECH2, MS8, NPP10, 9, TECH6, 1, MP2 and MS5	4.599 for Item TP3 and Item TP4 -5.090 for Item TP3 and Item MS4 -4.011 for Item TP3 and Item MP6 -3.314 for Item TP3 and Item INPRT1 -3.133 for Item TP3 and Item MP4 -3.128 for Item TP3 and Item NPP7 -2.998 for Item TP3 and Item NPP8 -2.790 for Item TP3 and Item NPP6	2484.63 df = 1311 (p = 0.000)	0.715	0.677	0.853	0.866	0.062

Excluding Item TECH2, MS8, NPP10, 9, TECH6, 1, MP2, MS5 and TP3	4.888 for Item NPP8 and Item NPP7 -3.374 for Item NPP8 and Item CFL4 -3.195 for Item NPP8 and Item NPP4	2361.13 df = 1259 (p = 0.000)	0.722	0.684	0.857	0.869	0.062
Excluding Item TECH2, MS8, NPP10, 9, TECH6, 1, MP2, MS5, TP3 and NPP8	4.068 for Item NPP2 and Item NPP1 3.964 for Item NPP2 and Item TECH4 -2.608 for Item NPP2 and Item COM1	2229.03 df = 1208 (p = 0.000)	0.729	0.691	0.860	0.872	0.061
Excluding Item TECH2, MS8, NPP10, 9, TECH6, 1, MP2, MS5, TP3, NPP8 and 2	3.056 for Item NPP3 and Item NPP6 2.948 for Item NPP3 and Item TECH4 2.807 for Item NPP3 and Item TS3 2.736 for Item NPP3 and Item TECH3 -3.449 for Item NPP3 and Item NPP7	2167.08 df = 1158 (p = 0.000)	0.731	0.692	0.860	0.872	0.061
Excluding Item TECH2, MS8, NPP10, 9, TECH6, 1, MP2, MS5, TP3, NPP8, 2 and 3	3.123 for Item NPP4 and Item TECH4 2.575 for Item NPP4 and Item NPP1 -2.844 for Item NPP4 and Item NPP6	2049.74 df = 1109 (p = 0.000)	0.738	0.699	0.861	0.874	0.061
Excluding Item TECH2, MS8, NPP10, 9, TECH6, 1, MP2, MS5, TP3, NPP8, 2, 3 and 4	3.037 for Item NPP5 and Item TECH4 -2.798 for Item NPP5 and Item TECH5	1982.85 df = 1061 (p = 0.000)	0.741	0.700	0.862	0.875	0.061
Excluding Item TECH2, MS8, NPP10, 9, TECH6, 1, MP2, MS5, TP3, NPP8, 2, 3, 4 and 5	2.917 for Item TP6 and Item HQSR3 2.682 for Item TP6 and Item CFL2	1900.89 df = 1014 (p = 0.000)	0.745	0.704	0.862	0.876	0.061
Excluding Item TECH2, MS8, NPP10, 9, TECH6, 1, MP2, MS5, TP3, NPP8, 2, 3, 4, 5 and TP6	3.413 for Item TS2 and Item TS1 3.286 for Item TS2 and Item CFL1 2.591 for Item TS2 and Item TS5 -2.956 for Item TS2 and Item TS4	1849.79 df = 968 (p = 0.000)	0.746	0.704	0.859	0.875	0.061
Excluding Item TECH2, MS8, NPP10, 9, TECH6, 1, MP2, MS5, TP3, NPP8, 2, 3, 4, 5, TP6 and TS2	3.622 for Item MP5 and Item TS1 2.775 for Item MP5 and Item TS5 -4.298 for Item MP5 and Item MP3 -3.372 for Item MP5 and Item MP1	1756.25 df = 923 (p = 0.000)	0.752	0.709	0.858	0.873	0.061
Excluding Item TECH2, MS8, NPP10, 9, TECH6, 1, MP2, MS5, TP3, NPP8, 2, 3, 4, 5, TP6, TS2 and MP5	4.374 for Item TP1 and Item TS1 4.227 for Item TP1 and Item TS6 3.563 for Item TP1 and Item MS2 3.504 for Item TP1 and Item MP6 3.184 for Item TP1 and Item TS3 2.804 for Item TP1 and Item MS3 2.693 for Item TP1 and Item CFL1	1619.52 df = 879 (p = 0.000)	0.762	0.720	0.864	0.879	0.060
Excluding Item TECH2, MS8, NPP10, 9, TECH6, 1, MP2, MS5, TP3, NPP8, 2, 3, 4, 5, TP6, TS2, MP5 and TP1	-3.698 for Item MS3 and Item MS1	1517.98 df = 836 (p = 0.000)	0.770	0.728	0.869	0.884	0.059
Excluding Item TECH2, MS8, NPP10, 9, TECH6, 1, MP2, MS5, TP3, NPP8, 2, 3, 4, 5, TP6, TS2, MP5, TP1 and MS3	3.614 for Item TS5 and Item TS4 2.675 for Item TS5 and Item CFL1	1466.01 df = 794 (p = 0.000)	0.772	0.728	0.869	0.884	0.059
Excluding Item TECH2, MS8, NPP10, 9, TECH6, 1, MP2, MS5, TP3, NPP8, 2, 3, 4, 5, TP6, TS2, MP5, TP1, MS3 and TS5	5.069 for Item HQSR5 and Item HQSR4 2.659 for Item HQSR5 and Item TS6 2.585 for Item HQSR5 and Item TS3 -4.581 for Item HQSR5 and Item HQSR1	1397.32 df = 753 (p = 0.000)	0.776	0.732	0.869	0.884	0.059
Excluding Item TECH2, MS8, NPP10, 9, TECH6, 1, MP2, MS5, TP3, NPP8, 2, 3, 4, 5, TP6, TS2, MP5, TP1, MS3, TS5 and HQSR5	3.456 for Item HQSR4 and Item MS7 2.978 for Item HQSR4 and Item MP4 2.594 for Item HQSR4 and Item MS1	1282.97 df = 713 (p = 0.000)	0.787	0.743	0.871	0.888	0.059
Excluding Item TECH2, MS8, NPP10, 9, TECH6, 1, MP2, MS5, TP3, NPP8, 2, 3, 4, 5, TP6, TS2, MP5, TP1, MS3, TS5, HQSR5 and 4	3.779 for Item CFL2 and Item MS1 3.321 for Item CFL2 and Item CFL1	1204.48 df = 674 (p = 0.000)	0.793	0.748	0.873	0.891	0.058
Excluding Item TECH2, MS8, NPP10, 9, TECH6, 1, MP2, MS5, TP3, NPP8, 2, 3, 4, 5, TP6, TS2, MP5, TP1, MS3, TS5, HQSR5, 4 and CFL2	3.714 for Item MS1 and Item CFL1 2.662 for Item MS1 and Item CFL4 3.656 for Item MS1 and Item CFL3	1132.40 df = 636 (p = 0.000)	0.799	0.754	0.876	0.894	0.058
Excluding Item TECH2, MS8, NPP10, 9, TECH6, 1, MP2, MS5, TP3, NPP8, 2, 3, 4, 5, TP6, TS2, MP5, TP1, MS3, TS5, HQSR5, 4, CFL2 and MS1	4.329 for Item MS2 and Item MP6 3.078 for Item MS2 and Item TS1	1048.37 df = 599 (p = 0.000)	0.807	0.761	0.884	0.901	0.057

Excluding Item TECH2, MS8, NPP10, 9, TECH6, 1, MP2, MS5, TP3, NPP8, 2, 3, 4, 5, TP6, TS2, MP5, TP1, MS3, TS5, HQSR5, 4, CFL2, MS1 and 2	2.792 for Item TS6 and Item CFL1 -2.759 for Item TS6 and Item TS1	971.56 df = 563 (p = 0.000)	0.815	0.769	0.889	0.906	0.056
Excluding Item TECH2, MS8, NPP10, 9, TECH6, 1, MP2, MS5, TP3, NPP8, 2, 3, 4, 5, TP6, TS2, MP5, TP1, MS3, TS5, HQSR5, 4, CFL2, MS1, 2 and TS6	2.937 for Item MP4 and Item MP6 2.673 for Item MP4 and Item TECH4 -3.344 for Item MP4 and Item MP1	920.03 df = 528 (p = 0.000)	0.819	0.771	0.889	0.906	0.056
Excluding Item TECH2, MS8, NPP10, 9, TECH6, 1, MP2, MS5, TP3, NPP8, 2, 3, 4, 5, TP6, TS2, MP5, TP1, MS3, TS5, HQSR5, 4, CFL2, MS1, 2, TS6 and MP4	4.495 for Item COM4 and Item TECH5 3.611 for Item COM4 and Item TECH3 -3.742 for Item COM4 and Item COM2	854.66 df = 494 (p = 0.000)	0.825	0.777	0.891	0.910	0.056
Excluding Item TECH2, MS8, NPP10, 9, TECH6, 1, MP2, MS5, TP3, NPP8, 2, 3, 4, 5, TP6, TS2, MP5, TP1, MS3, TS5, HQSR5, 4, CFL2, MS1, 2, TS6, MP4 and COM4	3.827 for Item TECH4 and Item TECH3	766.33 df = 461 (p = 0.000)	0.837	0.789	0.906	0.923	0.054
Final Model: Excluding Item TECH2, MS8, NPP10, 9, TECH6, 1, MP2, MS5, TP3, NPP8, 2, 3, 4, 5, TP6, TS2, MP5, TP1, MS3, TS5, HQSR5, 4, CFL2, MS1, 2, TS6, MP4, COM4 and TECH4		706.30 df = 429 (p = 0.000)	0.844	0.796	0.913	0.929	0.053