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The antecedents and consequences of the marketing manager and R&D manager working relationship during new product development: an empirical study

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THE ANTECEDENTS AND CONSEQUENCES OF THE MARKETING MANAGER AND R&D MANAGER WORKING RELATIONSHIP DURING NEW PRODUCT DEVELOPMENT: AN EMPIRICAL STUDY

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DECLARATION

I hereby certify that this thesis has not been submitted previously as part of the requirements of another degree and that it is the result of my own independent research.

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Many years ago a fellow academic told me that the “loneliest time of his life was while he was doing his PhD”, happily this was not my experience! I have had support and understanding from many quarters. At home from my long suffering wife, Roni, who at times felt like a widow, yet has been a rock when the PhD storm raged. Our young children, Demee and Ross, who have endured Daddy “writing his book” far too often yet have always given me “big kisses and cuddles” when I came home! My parents, Spyridon and Demetra, and the in-laws Ron, Robyn and Cameron, have always been there when help was needed. Without their love and understanding this would have been a far more painful experience. Special thanks also goes to my supervisor, Associate Professor Paul Couchman who has provided invaluable support and guidance, thus greatly enhancing this study. From my dear friend, Dr. Graham Massey I have received much moral support, encouragement and excellent advice and consider him a “Brother-in-Arms”. Also my colleagues and close friends, Jennifer Thornton, Robert Grant, Gary Noble, Karin Wells, Janette Rowland, and recently Lars Bergkvist, deserve special thanks as they patiently and empathetically endured many of my PhD driven tirades! My appreciation also goes to the support of Associate Professor Lesley White and Phil Scott, who as Departmental Heads kept at me to finish! Professor Rossiter has also given excellent advice as has Dr. Peter Caputi “the stats guru”.

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ABSTRACT

The antecedents and consequences of "interdepartmental working relations" have been examined in detail in the new product development (NPD) literature, however, less attention has been given to the relationship between functional managers at the interpersonal level. The study presented in this thesis developed and empirically tested a model of the antecedents and consequences of the working relationship between the Marketing Manager and R&D Manager at the NPD project level. By including interpersonal trust as a two-dimensional construct (affective and cognitive-based trust) and conceptualising it as a key mediating variable, the study provides great explanatory power regarding the interplay of important interpersonal dynamics such as communication frequency, quality of communication, functional conflict and interpersonal collaborative behaviour on the dependent variable of perceived relationship effectiveness. Further, the role that interpersonal politics play in shaping working relationships has not been previously addressed in the NPD literature and the new construct of "Perceptions of the Marketing Manager as a Political Ally" was found to be one of the key antecedents of interpersonal trust and positive relationship dynamics.

The data used to test the conceptual model was collected from 184 technically-trained respondents (e.g., R&D Managers and Engineers) from Australian firms predominantly involved in manufacturing activities. The model tested was found to be rich in meaning

and explained 80.5% of the variance in Perceived Relationship Effectiveness thus providing a greater understanding of the complexities of the working relationship at the Manager level than previous conceptualisations.

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CHAPTER 1: INTRODUCTION

With the increased acceptance of the marketing concept within organisations (Kohli and Jaworski 1990) the nature of working relationships between Marketing personnel and other specialist functions has been the focus of considerable researcher attention (e.g., Ruekert and Walker 1987; Hutt 1995; Workman, Homburg and Gruner 1998). Of these cross-functional relationships (CFRs) the critical interface between Marketing and the technically-oriented functions of R&D, Engineering, and Manufacturing, during new product development (NPD) activities has been the focus of numerous studies (Souder 1981; Gupta, Raj and Wilemon 1985; Ruekert and Walker 1987; Fisher, Maltz and Jaworski 1997; Song, Xie and Dyer 2000) with many of these studies examining the "quality" of the working relationship between these functions, and any consequent effect on NPD success. Unfortunately, empirical evidence suggests that NPD as a key corporate activity is very problematic in nature, often resulting in unsuccessful new products and poor relations between the functional participants (Souder 1981, 1988; Shaw and Shaw 1998). The study presented in this thesis aims to develop a better understanding of the antecedents and consequences of effective cross-functional working relationships between the Marketing Manager and their technically trained counterparts. Specifically, by taking a "socio-psychological" approach this study attempts to add to the existing knowledge concerning the vital Marketing and Technical working relationship between functional managers by better integrating many individual-level relationship marketing constructs into a new theoretical conceptualisation.

1.1 The Importance of New Product Development

That new product development is a necessary activity for many firms to remain financially viable and competitive in an increasingly global economy is now widely recognised (Crawford 1994; Cooper 1996). Several studies over the last three decades have highlighted the important role that new products play as a percentage of company sales revenue with figures ranging between 40 - 50% of total revenue for many firms (Pessemier and Root 1973; Booz, Allen and Hamilton 1982). Griffin and Page (1993) found that 32% of company sales came from new products introduced during the previous 5 years. In their follow up study (1996) they found that, respondents expected that 38% of sales would come from products introduced in the last 5 years. As such studies indicate, it seems that new product development is an essential corporate activity for many organisations. However, one of the major problems facing organisations is the high failure rates of new products, which Crawford (1987) found range between 33% and 86%. Subsequently, Griffin and Page (1993, 1996) found failure rates of 42% and 41% providing further empirical support for the view that new product failure rates continue to remain high.

So why do new products continue to fail? Several reasons have been identified, with one of the most important being the lack of effective integration between the Marketing and technical functions resulting in many key activities not being performed adequately or not performed at all. The nature of the working relationship between Marketing Managers and the Technical function managers (e.g., R&D Managers, Engineering Manager and Manufacturing Manager) involved in NPD, forms the primary focus of this thesis. The following section will expand on this issue and highlight the role that effective cross-functional relationships play in the NPD process.

1.2 The Role of Effective Cross-Functional Relationships in New Product Development Process

The NPD process is typically viewed as a set of activities designed to help eliminate uncertainty and risk for the firm attempting to develop new products (Booz, Allen and Hamilton 1982; Cooper 1996). Several NPD process models have been suggested which describe the complex set of activities involved in developing new products (Booz, Allen and Hamilton 1982; Gruenwald 1997; Cooper and Kleinschmidt 1995). Olson, Ruekert and Walker (1995) succinctly describe the issues involved in new product development activities:

> "Converting an abstract idea into a tangible product, delivering it to potential customers when and where they want it, providing it at a price they are willing to pay, and earning at least a reasonable profit, require the application of many different skills and the solution of a variety of functional problems. Thus most product development projects require the participation of many functional specialists……..And specialists rely on each other – as well as the parent organisation – to provide resources (e.g., information, expertise, and money) needed to perform their own jobs effectively (p.7)."

Of the specialised functions involved in NPD, the two most critical are the R&D and Marketing functions, with the R&D function often eliciting significant involvement from the other technical functions, Engineering and Manufacturing. The more effective the cross-functional integration, where "cross-functional integration" is viewed as effective information sharing and co-operation between these specialised functions (Ruekert and Walker 1987) the greater likelihood of successful new product outcomes.

This is supported by a large body of empirical evidence which indicates that a positive relationship exists between effective cross-functional integration and successful new product outcomes (Maidique and Zirger 1985; Rothwell et al 1974; Ruekert and Walker 1987; Griffin 1992, 1997; Griffin and Hauser 1996). A major difficulty for top management lies in attempting to effectively integrate functional specialists in often complex NPD processes, where Gupta, Raj and Wilemon (1986) have identified 19 areas which require Marketing and R&D to effectively integrate (Fig 1.1).

Figure 1.1 Areas Requiring R&D/Marketing Integration

(Gupta, Wilemon and Raj 1986)

A: Marketing is involved with R&D in

1. Setting new product goals and priorities
2. Preparing R&D's budget proposals
3. Establishing product development schedules
4. Generating new product ideas
5. Screening new product ideas
6. Finding commercial applications for R&D's new product ideas/technologies

B: Marketing provides information to R&D on

7. Customer requirements of new products
8. Regulatory and legal restrictions on product performance and design
9. Test-marketing results
10. Feedback from customers regarding product performance on a regular basis
11. Competitors strategies

C: R&D is involved with Marketing in

12. Preparing marketing's budget
13. Screening new product ideas
14. Modifying products according to marketing's recommendations
15. Developing new products according to the market need
16. Designing communication strategies for the customers of new products
17. Designing user and service manuals
18. Training users of new products
19. Analysing customer needs

This list of NPD activities clearly highlights the need for the working relationship between the functions, and especially the key decision makers in these functional units to be effective. Effective cross-functional relationships can help prevent the most serious of all new product errors from occurring i.e., not introducing a product that is perceived by customers as "superior" compared to existing market offerings (Cooper and Kleinschmidt 1987). In this instance, the "Voice of the Customer" (Griffin and Hauser, 1992) is often ignored due to insufficient, poor market research or under-utilised market research. The new product is seen by customers to offer no real advantages over existing products. Research suggests that effective relations between Marketing and the technical services will lead to a greater likelihood of market research information being used in the development process, with an associated increase in success rates (Moorman 1995; Moenaert et al 1994). In contrast, ineffective relationships have lead to market research information provided by the Marketing function being totally disregarded by the technical functions (Maltz, Souder and Kumar 2001). Similarly, in relation to "inaccurate market analysis", a clear lack of adequate

market research and inappropriate analysis of research that has been conducted, has lead to serious overestimates of market size and product adoption rates by consumers. Evidence suggests that where both Marketing and technical services are involved in market estimation there is less likelihood of these kinds of forecasting errors (Cooper 1990). Another key success factor, "time to market", is affected by the relationship between the two functions. Disharmony often leads to dysfunctional conflict and defensive behaviours which delay a product launch and can be very costly if a competitor gains a first mover advantage. It is clear from this prior research that many of the antecedents of new product success are dependent on effective cross-functional relationships. The focus of this study will be on the degree of successful functional integration between the Marketing and the technical functions of the firm achieved through effective interpersonal cross-functional working relationships between the two key functional decision makers, the Marketing Manager and the R&D Manager. The importance of effective cross-functional relationships cannot be overemphasised when the important roles that these interdependent yet disparate functions can play in the NPD (Griffin and Hauser 1996) are considered:

> "Marketing and R&D both provide input to many tasks. Some are core tasks upon which the success of the enterprise rests. For example, Marketing and R&D share responsibilities for setting new product goals, identifying opportunities for the next generation of product improvement, resolving engineering design and customer-need trade-offs, and understanding customer needs. These responsibilities require co-operation throughout the entire task and the combined expertise of the combined groups (p.192)."

It is the contention of this thesis that companies which (a) regularly develop and introduce new products, and (b) have functionally specialised departments or units, are far more likely to be effective in these NPD activities where the key marketing decision maker i.e., the Marketing Manager (other titles may include Marketing Director, Sales and Marketing Manager, New Products Manager) has an "effective working relationship" with the key technical decision maker i.e., the R&D Manager (other titles may include New Products Manager, Technical Manager, Engineering Manager, Manufacturing Manager) during new product projects. Gabarro (1979) suggests that the development of working relationships between people involves the creation of interpersonal contracts where there is "an unwritten but living document that evolves over time as two people work together, learn about each other, and implicitly or explicitly test the limits of what each wants from the relationship and is willing or able to give (p.10)". Ruekert and Walker (1987) view that this personal level of analysis is the most appropriate for the study of marketing integration issues as it can fundamentally shape relations between departments as functional specialists follow the "relational norms" displayed by their superiors as to what types of behaviours are expected between the two parties. The examination of this critical, manager level, working relationship and the antecedent variables proposed to affect the perceptions of this relationship between the two managers will form the central focus of this research.

Thus the level of analysis for this study is the working relationship between the Marketing Manager and R&D Manager as a critical factor in cross-functional integration. Ruekert and Walker (1987) have argued that:

> "the individual employee or job level of analysis is the most appropriate starting point for studying interfunctional interactions. The major reason

> for this view is that the flow of resources and information between individuals in different departments serves as the *primary* link between departments as they carry out their daily activities (p.4)."

By explicitly acknowledging that this working relationship is a critical cross-functional linkage in the NPD process (Ruekert and Walker 1987; Jassawalla and Shashittal 1998), it is acknowledged that the signals that each functional manager sends to their own staff about the "other" function and how relations between them should be conducted, will inevitably shape the nature of the interactions between Marketing and R&D personnel respectively (Workman 1993). A poor working relationship between the two functional heads is not going to be conducive to effective cross-functional integration at the departmental level. Consequently, much of this research will focus on relational variables that are thought to directly affect this critical working relationship.

1.3 Research Problem and Research Questions

This research aims to determine the extent to which individual level factors contribute to effective working relations between the Marketing Manager and the R&D Manager during NPD. The antecedents and consequences of "interdepartmental working relations" have been examined in detail in the literature, although less attention has been given to the relationship between functional managers at the interpersonal level. Specifically, this study aims to determine which factors lead to the development of interpersonal trust between functional managers, and in turn, addresses the question: does the existence of interpersonal trust in the relationship lead to organisationally beneficial behaviours? By developing and testing a new conceptualisation of the Marketing Manager and R&D Manager working relationship, this study has the following research objectives:

1. To determine the extent to which individual level variables are related to the development of interpersonal trust in the new product development process.
2. To determine the extent to which interpersonal trust perceptions affect the working relationship between functional managers.

1.4 Contributions to the Literature

The study presented here develops and empirically tests a model of the antecedents and consequences of interpersonal working relationships at the NPD project level. Though the concept of "interpersonal trust" features significantly in discussions of buyer-seller relationships in the marketing literature (Morgan and Hunt 1994; Smith and Barclay 1997), this study addresses its absence in the NPD. Interpersonal trust is found to be a key mediating variable with great explanatory power in the interpersonal dynamics between the functional managers. By incorporating interpersonal trust as a two-dimensional construct, affective and cognitive-based trust, and including key relationship variables such as functional conflict and interpersonal collaborative behaviour, the proposed theoretical model provides great explanatory power of the antecedents of perceived relationship effectiveness than previous conceptualisations.

This study provides empirical support for the viewpoint that a collaborative approach to working relationships is a far more effective mechanism for improving managerial cross-functional working relationships than approaches based only on task specified interaction (Kahn 1996; Kahn and Mentzer 1998). Affect-based trust, which reflects the social aspects of relationships based on through the "care and concern" of others, has a direct positive effect on interpersonal collaborative behaviour. On the other hand, cognitive-based trust, which reflects perceptions of competence, reliability and

dependability, does not have an effect on interpersonal collaborative behaviour. As the display of interpersonal collaborative behaviours between functional managers offers numerous advantages for the organisation in terms of the reduced need for formalisation, a reduction in monitoring and defensive behaviours between individuals and increased role flexibility (Williams 2001), the implication of this finding for NPD researchers and top management is significant as interpersonal collaborative behaviours occur only when the affect-based trust exists between managers. Consequently, top management must also consider ways to improve the social aspect of working relationships between managers in order to maximise the effectiveness of cross-functional working relationships.

The concept that social exchange is important in working relationships is not a new one (Blau 1964), and has been addressed in many literatures (e.g., relationship marketing, buyer-seller, sociology and organisational behaviour). However, given its theoretical importance to the study of relationships it has so far received little attention in the NPD research literature. The conceptual model and results presented in this thesis address this major gap in our understanding of cross-functional working relationships between Marketing Managers and R&D Managers.

1.5 Thesis Structure

Chapter 2 provides a review of the relevant literature concerning the NPD and notably, "functional integration". The main purpose of the chapter is to provide background and historical support for this study, in particular highlighting areas which require further research.

Chapter 3 develops a general taxonomy of key variables that were identified in the literature review as affecting functional integration. From this taxonomy a re-conceptualisation of the cross-functional relationship at the interpersonal level is developed and several research hypotheses developed and presented.

Chapter 4 describes the research design and the methodology used in this study and provides some descriptive statistics of the sample and respondents.

Chapter 5 discusses the development of the SEM model and the subsequent hypothesis testing.

Chapter 6 addresses the key hypotheses and findings of the study, the contribution of this study to the understanding of the working relationship between the Marketing Manager and the R&D Manager during the NPDP. Also the limitations of the study and directions for future research will be discussed.

CHAPTER 2: REVIEW OF THE LITERATURE

2.1 Preamble

This review examines the various academic literatures which have added to knowledge regarding Marketing's working relationships with other functional specialisations. Specifically, it reviews studies in marketing which have focused in areas such as: (a) the acceptance of the marketing concept and marketing specialists within companies, (b) the development of new product process models designed to facilitate cross-functional integration, (c) organisational studies which examine functional specialisation, co-ordination and integration, and (d) management issues faced by organisations which develop new products i.e., the organisation, utilisation and control of resources used in the NPD process.

This chapter is structured in the following manner. Firstly, early studies which addressed the emergence of the "marketing concept" and the need to integrate the new marketing function into the mainstream processes of the organisation and especially the NPD process are reviewed. Secondly, reviewed are the studies which provide prescriptive approaches to successful integration. Thirdly, studies which examined the barriers to successful integration are reviewed. Fourthly, the existing conceptualisations of the Marketing function and technical functions relationship are reviewed. Finally, gaps in the existing NPD knowledge will be discussed, especially those relating to interpersonal relationships between the two key functional managers in the NPD.

2.2 Early Studies of Cross-Functional Relationships

The need to co-ordinate various functional specialists from differing departments was recognised by early organisational theorists (Fayol 1949; Follett 1949). Follett (1949), in particular, emphasised the need for co-ordination, co-operation, and integration between differing departments to achieve better corporate outcomes:

> "In businesses that I have studied, the greatest weakness is in the relation of departments. In some cases the efficiency of many plants is lowered by an imperfectly worked-out system of co-ordination. In some cases all the co-ordination there is depends on the degree of friendliness existing between the heads of departments, on whether they are willing to consult, sometimes it depends on the mere chance of two men coming up to town on the same train every morning (p.61)."

Follett continued by placing this argument in the context of a conference that she had attended between Works Managers and Sales Managers (the ancestors of Marketing Managers) where the main discussion was of ways that the two departments could work more closely together. Various methods were discussed e.g., regular lunches, meetings, committees, co-ordinating departments, with the ultimate goal to be "voluntary co-operation" between Sales and Works departments. There was clear recognition that there would be differences of opinion between the parties, e.g., "there will be constantly antagonistic policies, antagonistic methods, confronting each other, wanting right of way……. there are three ways of settling differences: by domination, by compromise or by integration (p.66)." Domination was viewed as unsatisfactory in the long run, as it would promote opportunistic behaviour, whereas compromise was considered to lead to

neither party being satisfied, however "integration means finding a third way which will include both what A wishes and what B wishes, a way in which neither side has to sacrifice anything (p.66)". Follett, thus introduced the concept of "cross functioning" into the literature whereby the heads of the departments would either, formally or informally, communicate with each other in an attempt to promote integration. This early discussion into the complexities of cross-functional co-ordination, the issue of voluntary co-operation, and the potential for conflict that ensues, provided an excellent starting point for discussion of the complex nature of the working relations between different functional departments.

These issues were further addressed in a seminal work by Lawrence and Lorsch (1965) who examined the problems companies face in organising specialist personnel for product innovation activities. Their research involved case studies of 2 plastics manufacturing firms where they outlined the role of top management in the organisation in structuring the firm to "provide a means by which units working on different parts of the total task may co-ordinate their activities to come out with a unified effort (p.109)". Lawrence and Lorsch proposed an "idealised" process which was designed to improve co-ordination between the three key functions in the innovation process: sales, production and research. The purpose of this co-ordination was to provide a two-way flow of technical information and "also to develop mutual trust and confidence between the members of the units which are required to collaborate in product development (p.111)". "Trust" was mentioned as an outcome of information flow between parties, however it was not defined. The term "mutual confidence" was not defined but rather was implied to be the satisfactory task completion by the various functions. The authors argued that for successful product innovation to occur, "collaboration" i.e., a close

working relationship, between all key units was required. The authors suggested using two co-ordinating mechanisms to overcome communication problems between the functions: co-ordinating departments and cross-functional co-ordinating committees. These two mechanisms bring an element of formalisation to the communication process ensuring that some communication does occur between functions and this helps improve co-operation between functions. Though limited in its generalisability, this study addressed critical issues for management, firstly, the effective co-ordination of specialists due to diverse knowledge and orientations, and, secondly, the role of the organisation in providing mechanisms to help resolve the inevitable conflicts that arise from these working relationships.

One of the earliest examinations of the Marketing function's role in the organisation was Hise (1965) who examined the adoption of the marketing concept in American manufacturing firms and also the cross-functional use of market research information. According to Hise (1965), the marketing concept encompassed:

> "(1) customer orientation, that is, a knowledge of customers needs and wants before the marketing process starts, (2) profitability of marketing operations, and (3) an organisational structure where all marketing activities are performed by the marketing department, and where the chief marketing executive is accorded a place on the company's organisation chart equal to that given the top financial and manufacturing executives (p.90)".

Surveying 273 manufacturing firms, measured was the use of market research surveys in identifying customer needs and wants. It was found that 97% of large

firms and 87% of medium firms did perform this type of market research activity. Of major importance to the study of cross-functional issues, respondents were asked whether or not the responsibility for using this customer information for developing new products should lie solely with the Marketing function or solely with the R&D department. Approximately three quarters of all large and medium-sized firms favoured a joint responsibility for new product development activities, rather than either function having total responsibility. Many firms in the survey having realised that joint responsibilities were necessary, either had, or were developing structures and processes for this "joint responsibility" to occur effectively.

2.3 Integration of the Marketing and R&D Functions

Due to a lack of empirical research into this area at that time, some of the early studies described the experiences of senior managers who had worked in organisations where functional integration was an issue. Typical of these studies was Monteleone (1976) who provided suggestions as to how R&D and Marketing could "integrate" i.e., work more efficiently together. A key recommendation was that "there must be a thorough understanding of each other's priorities and capabilities (p.21)". To achieve this understanding it was suggested that key personnel interact with one another in the form of joint field trips, tours of the production line and so forth. The issue of joint responsibility for NPD decisions was also raised by advocating that both Marketing and R&D should share in any new product success and, more importantly, also share the blame for any failures.

Shapiro (1977) provided further anecdotal evidence regarding interfunctional conflict and its potential sources, drawing upon his experience in a research project

where 8 marketing/manufacturing interface problem areas were identified. Two types of interfunctional difficulty were: (1) “basic causes” – differing evaluation and rewards, inherent complexity of the problem areas, orientation and experience and, cultural differences, and (2) “complicating factors” – the role of the R&D Manager as an intermediary, and company growth which lead to expanded product lines and changing technologies. Suggested solutions for managing the conflict between the functions were: (1) to provide explicit corporate policy, (2) the modification of evaluation and rewards system to support interfunctional co-operation, and (3) the use of a “social interaction approach” which facilitates interpersonal communication in non-work situations.

Though anecdotal studies are clearly limited in their generalisability, both Monteleone and Shapiro, highlighted the need for functional specialists to “appreciate the needs” of the other participants in the NPD process, and they also emphasised the important role that senior management must play in facilitating integration. By highlighting the NPD process from the perspective of the actual individuals involved in NPD activities these studies provided avenues for future research especially in terms of the role of the organisation in influencing the behaviour of its staff.

Souder (1977) used an experimental design to test the effectiveness of group decision-making processes as possible methods for dealing with interfunctional conflict and achieving integration between Marketing and R&D personnel. Recognising that consensus and organisational integration which was defined as “a team spirit of collaboration and joint commitment” between Marketing and R&D

personnel is critical for effective new product development, three group decision-making processes (i.e., nominal, interacting, and combined nominal-interacting) processes were tested in an experiment assessing group decision-making. Nominal processes involved task-oriented individual activities where decisions or opinions could be exchanged but with no confrontation. Interacting processes were ones involving open, face-to-face confrontations amongst members. Nominal-interacting processes where those group members were alternately exposed to nominal and interacting activities. The participants in the experiment were Marketing and R&D personnel from US companies enrolled in a management training program. At the end of the decision-making exercises the participants where asked to complete questionnaires indicating their attitudes to these 3 decision-making approaches. The results indicated that the nominal process on its own was not as effective as the interacting process in achieving integration. The interacting process was then found not to be as effective as the nominal-interacting process. It was suggested that to achieve "lasting collaborative behaviours" an atmosphere of openness, trust and leader sensitivity for others be promoted to reduce conflict rather than encouraging avoidance behaviours or confrontation. The concept of "trust" was mentioned in this study, however it was not defined nor was it the focus of the study. The implication for management trying to better integrate the two functions is that merely placing personnel together in group situations is not a guarantee that good working relationships will ensue, but rather processes which promote long term collaborative behaviour are required.

In a seminal study, Souder (1981) empirically examined the state of the "interface" between Marketing and R&D. The term "interface" was not clearly defined yet was

used in the same context as a cross-functional working relationship (CFR). 296 in-depth interviews were used to collect case histories on 116 new product projects in the USA. Content analysis found that interfunctional disharmony problems were a major factor contributing to new product "failures". The degree of "harmony" experienced by key participants within each project was measured on the basis of three dimensions: the co-operation experienced by the two parties, the feelings of warmth expressed by each party towards each other, and the sense of mutual commitment felt by the two parties toward each other. The scores on these three dimensions were used to identify 3 distinctive "states":

- Mild Disharmony state (21.5% of projects) – typified by the Lack of Communication syndrome, Lack of Interaction syndrome.
- Severe Disharmony state (32.8% of projects) – typified by the Lack of Appreciation syndrome, Distrust syndrome
- Harmony State (45.7% of projects) – typified by the Equal partners syndrome, Dominant partner syndrome

Each of these syndromes was defined by behaviours and associated attitudes. Of particular interest to top management is the "Distrust syndrome", as it incorporates the extreme case of deep-seated jealousies, negative attitudes, fears and hostile behaviours. No single cause for this distrust syndrome was found, however all of these cases began as either a Lack of Appreciation or Lack of Communication Syndrome and escalated into distrust where they often became institutionalised and part of the departmental and organisational culture. In contrast, the Harmony state was characterised by a situation where "each party had great professional regard for

each other, each felt the other was competent in their respective areas, each felt dependent upon the other, and each felt very trusting and open toward the other (p.70)". Souder defined a state of “harmony” where there was co-operation, warmth towards one another and mutual commitment. On the basis of these findings Souder concluded that the role of top management during the new product development process should be:

> “taking a proactive stance toward the R&D/marketing interface problems, breaking projects into smaller ones, avoiding power and status differentials, rotating personnel, encouraging dyadic relationships at lower organisational levels, using new product committees, implementing open door policies, selecting effective project managers, using nominal-interacting meetings, and developing decision authority policies – all of these management methods are time consuming and time costly. However as this study has shown, their cost is minuscule relative to the long term regrets in product failures and organisational disruptions that can be incurred when a severe disharmony state exists (p.73).”

As this comprehensive study used a large representative sample to determine the main interface issues from a participants’ perspective the findings are generalisable to other NPD contexts. The results clearly indicated that relational variables such as “feelings of warmth”, “mutual commitment” and “co-operation” contributed to a harmonious working relationship between functional specialists. Unfortunately, the study provided no definition of co-operation or trust.

Gupta, Raj and Wilemon (1985) seeking to gain a better understanding of interface issues between the Marketing and R&D functions during NPD surveyed 109 Marketing Managers and 107 R&D Managers in 167 US hi-tech companies. The study focused on the extent to which both functions felt that their NPD tasks should be integrated. The results indicated several areas that R&D and Marketing agreed required integration: customer product requirements, reviews of product performance, information on competitors' strategies, setting new product goals and priorities, and developing new products according to market needs. Also examined were the levels of dissatisfaction with areas of integration between the two functions. The main causes of this dissatisfaction were the infrequency of communication between the functions, and the perception that Marketing's information lacked credibility indicated by 60% of the R&D Managers and 56% of the Marketing Managers. As information is the most important input into the NPDP that Marketing provides this finding is very worrying and has implications for effective integration. An open-ended question was used to determine the barriers to effective integration from the managers and by using content analysis, the top five barriers were identified as: (1) communication barriers, (2) insensitivity to each others' capabilities and perspectives, (3) a lack of senior management support, (4) personality and cultural differences, and (5) a lack of market knowledge about competitors, markets, customers and product applications.

This study highlighted that there existed significant barriers to effective integration between the two functions, especially when the complexity of the activities that they are typically expected to jointly undertake during NPD is taken into account (Fig 1.1). An ineffective CFR will lead to many of these critical tasks either not being performed or

being delayed, with negative consequences for the project. In particular, this study highlighted the importance of an effective CFR between the two key decision makers as their actions will have a significant bearing as to whether or not the required integration does or does not occur. Much of the focus of this early research has been on identifying barriers to effective integration. A consistent theme that emerged was the need for specialised functions to "understand and appreciate" the needs and concerns of each other. Senior management has an important role to play in developing processes and organisational cultures that foster positive relationships amongst NPD participants.

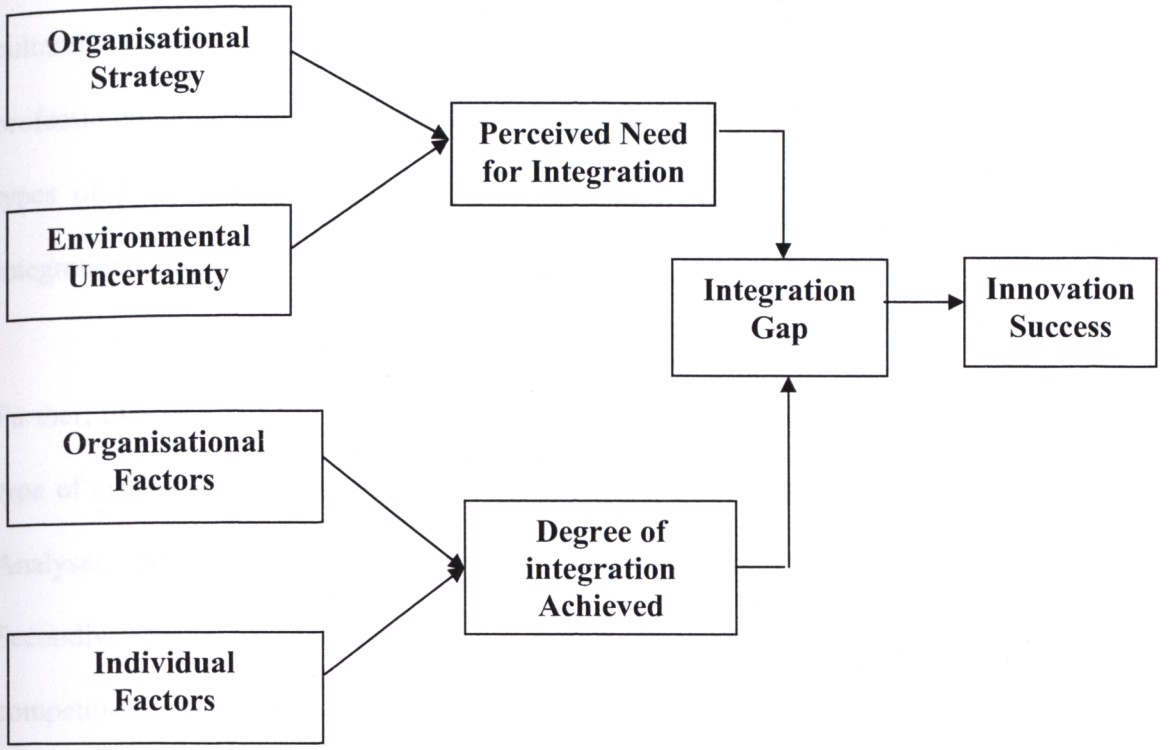
2.4 Early Conceptual Models of the Marketing/R&D Interface

Gupta, Raj and Wilemon (1986) developed a conceptual framework (Fig 2.1) by synthesising both theoretical and empirical work in marketing, organisational behaviour, new product development and R&D management. The conceptual framework they developed sought to better explain the role of functional integration between Marketing and R&D in the innovation process and its effect on innovation success.

Specifically, they addressed 2 key questions: (1) How much integration was required between the two functions? (2) How much integration was actually achieved? The authors suggested that rather than trying to maximise the level of R&D/Marketing integration, organisations must first assess the need for integration and then attempt to reduce the gap between the degree of integration ideally required and currently achieved.

Figure 2.1: A Model for the Study of R&D-Marketing Interface

(Gupta, Raj & Wilemon 1986)



Two factors were thought to be of importance in determining the degree of integration achieved: firstly, organisational factors, and secondly, individual factors. Organisational factors were thought to affect the integration level achieved by directly affecting the motivation of key participants to integrate. Specifically, the role of senior management was seen to be important in providing cues to its employees in terms of: (1) how much integration is valued, (2) their attitude towards risk taking, (3) the establishment of joint reward systems, and (4) the tolerance of failure. Senior management were viewed as responsible for the innovation environment within a firm in that their actions were either helpful or a hindrance to an effective R&D/Marketing interface. As well as the cues to employees, senior management were responsible for the structural issues relating to the degree of formalisation, centralisation, the method of organising the NPD

process and the physical proximity of key players to each other. Individual factors were also thought to affect the amount of integration required. Specifically, socio-cultural differences between R&D and Marketing Managers such as professional/bureaucratic orientation, time orientation, tolerance of ambiguity, and types of products/projects preferred were thought to affect the actual level of integration achieved by an organisation.

Further, two factors were thought to affect the perceived need to integrate. Firstly, the type of organisational innovation strategy pursued by management such as Prospector, Analyser, Defender, Reactor (based on the Miles and Snow (1978) typology). Secondly, environmental uncertainty, where the organisation's perceptions of competition, consumer requirements, technological changes and regulatory constraints affect the motivation of functional specialists to integrate. This framework was intended to focus research more on the key variables and relationships during the NPDP rather than just focussing on the importance of R&D/Marketing integration on innovation success. The authors developed 14 research propositions to help guide further research in this area. Many of these research propositions were subsequently empirically tested (Table 2.1). Their model explicitly identified interpersonal factors as potential explanatory variables in achieving an effective CFR between Marketing and R&D personnel, and as such serves as a valuable starting point for further investigation. It also highlighted the role of senior management in providing a culture where integration efforts between key participants are encouraged and not hindered.

Table 2.1: Theoretical and Conceptual Research Related to the Functional Integration of Marketing with R&D in the New Product Development Process

Author(s)	Method (Samples)	Subjects	Study Aims/Focus	Key Findings	Analysis Method
Follett (1949)	• Anecdotal Evidence	Functional Managers	A general discussion of the need for company functions to more effectively integrate	Communication, cross-functioning, integration, co-operation	N/A
Hise (1965)	• Mail surveys • n = 296 Manufacturing firms • USA	Not reported	To determine the extent of the adoption of the "marketing concept" of manufacturing firms	Many firms had adopted a customer orientation and would like increased involvement in NPD activities between Marketing and R&D	
Lawrence and Lorsch (1965)	• Case Study • 2 Manufacturing firms • USA	Department Heads	To solve organisational problems for product innovation activities	Dimensions of functional specialists: orientation to time, orientation to environment, orientation to others and departmental structure. Co-ordinating mechanisms	N/A
Monteleone (1976)	• Anecdotal evidence • Own US chemical firm	Marketing & R&D Managers	A discussion of management options for creating a climate for "co-operative" relationships between R&D and Marketing Managers	Suggests an interaction approach for developing good relationships, and the acceptance of mutual responsibility for NPD outcomes by both functions	N/A
Souder (1977)	• Experiments - completing group tasks • n = 3 groups • USA	Marketing & R&D Managers	Determine the most effective group decision making processes for cross functional teams	Group decision-making with mutual exchange and no confrontation was the most effective method of group decision making	Correlation Analysis
Shapiro (1977)	• Anecdotal evidence • USA	Marketing & Manufact., R&D Managers	To identify problem areas in the interface	Identifies 8 problem areas in the interface between R&D and Marketing Managers Suggests approaches to solving problem e.g., social interaction, joint rewards, and better appreciation of each others needs	N/A

In a seminal study, Ruekert and Walker (1987) responding to what they perceived as a lack of theoretical and conceptual development in the Marketing literature on Marketing's interaction with other functional units, developed a conceptual framework and empirically tested it. They examined how, how effectively, and why Marketing personnel interact with people in other functional areas when planning, implementing and evaluating marketing activities. Their attempt at a predictive theoretical framework was designed to overcome what they perceived as an overemphasis in the Marketing literature on a normative perspective i.e., how Marketing *should* interact with other functions, rather than understanding why and how they do actually interact. This explicit acknowledgement of the importance of interpersonal interaction in integrating functional units is a major contribution to the study of CFRs. The interaction between individuals is what actually causes integration to occur but most previous studies had focused on the preconditions to individuals deciding to interact. Ruekert and Walkers' study examined the actual behaviours and processes that occurred during functional interaction. Ruekert and Walker used a system – structural perspective (c.f Van de Ven 1976) which holds that a social system can be examined by exploring the interrelationships among its environment, its organisational structure and processes and its outcomes to provide a contrast with the Gupta et al (1986) model. Rather than examining desired and actual levels of integration within a firm it focused not only on the situations and processes that govern whether interaction and integration are achieved but also how they have been achieved. In particular their model examined integration outcomes not only from a functional perspective, (i.e., met goals) but also from a psychosocial perspective where the concepts of perceived effectiveness of interfunctional relationships and conflict arising from these relationships are introduced

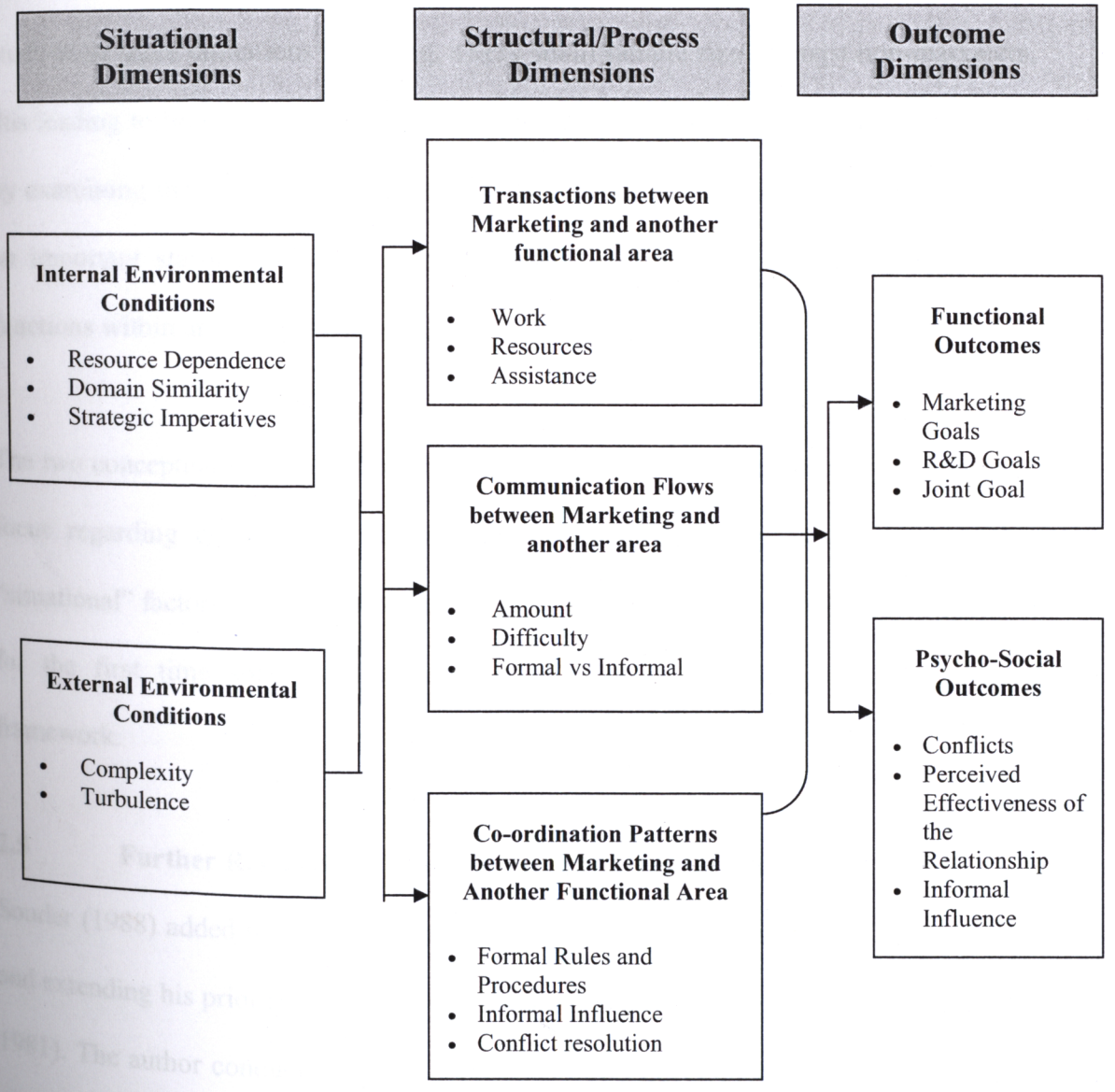
into a marketing integration model. Ruekert and Walkers' model (Fig 2.2) is particularly appropriate for examining the Marketing/R&D interface during the NPDP:

> "as the system-structural view holds that there are *contingent* relationships among these three system dimensions. Different types of systems and dimensions are thought to be best suited to specific environment conditions thus systems in different environments are likely to adopt different internal structures and processes (p2)."

This contingency approach recognises that as new product projects vary, from the modification of existing products to "new to the world" projects (Booz, Allen and Hamilton, 1982), the appropriate amount and type of integration will vary. The structural/process dimensions examine actions the firm can take to achieve integration, be it the use of formalised NPD approaches, cross functional teams, concurrent engineering, task forces, etc. The outcome dimensions measure the impact of integration on both the end result and the intermediate processes. This framework was empirically tested by conducting a small scale pilot study in 3 divisions of one US manufacturing company (n=95). They examined four components of their framework: (1) the impact of perceived interdependence, (2) co-ordination mechanisms, (3) communication, and (4) the outcomes of interfunctional interaction. Firstly, using correlation analysis, support was found for the basic proposition that interaction involving Marketing personnel with other functions results from resource dependencies with other units. Secondly, co-ordinating mechanisms were found to be positively associated with the level of interaction, as was the influence one function had over another. Thirdly, the closer the two functions were in their tasks and objectives the greater the level of communication.

Finally, the degree of conflict between Marketing personnel and personnel in other functional areas was positively related to the amount of interaction or resource flows between them. In particular, the authors introduced conflict as an outcome variable and discussed its role and the method of conflict resolution adopted as important factors in achieving better interaction between functions. Where parties were allowed to address the conflict themselves, there tended to be a higher level of perceived relationship effectiveness.

Figure 2.2: A Framework for Assessing Marketing's Interaction with Another Functional Area (Ruekert and Walker 1987)



Also introduced into the CFR literature by this study was the psychosocial concept of the perceived effectiveness of interdepartmental relationships resulting from interactions between personnel from differing functions. It was defined as the perception that the relationship was worthwhile, equitable, productive and satisfying (Van de Ven 1976). This focus on relationships and *social processes* is a key step in the development of the CFR literature, and will be a key area for examination in this study reported here. By explicitly taking into account the fact that successful NPDP is not a result of a "mechanised" process but rather relies on the behaviours of the key participants and their motivations this study introduced the necessary level of complexity to what had been rather simplistic prior approaches to cross-functional issues. However, as with any study there were limitations including: a very small sample size amongst non-marketers, this leading to limited generalisability, and the limited nature of statistical analysis. Yet by examining the socio-psychological aspects of working relationships it still serves as an important starting point to better understand Marketing's interaction with other functions within an organisation .

The two conceptual models reviewed here, played a major role in shaping the academic focus regarding cross-functional integration in that they emphasised the role that "situational" factors played in determining integration levels within NPD processes, and for the first time socio-psychological variables were included in an explanatory framework.

2.5 Further Research on the Marketing/R&D Interface

Souder (1988) added to the understanding of Marketing's CFR with R&D by updating and extending his prior research into the relationship between the two functions (Souder 1981). The author conducted 584 in-depth interviews developing case histories on 289

new product projects from 53 firms in the USA. Content analysis was used to analyse the transcripts of interviews and subsequent factor analysis resulted in the items being reduced to 42 attitudinal and behavioural descriptors of the R&D-Marketing interface. Cluster analysis then created 7 profile groupings which characterised the relationship between R&D and Marketing during the project (Table 2.2). A key finding was that 59.2% of the 289 new product projects experienced one of five types of "disharmony" that the author used to classify the state of relationships between the functions. The "distrust syndrome" identified was viewed as extremely destructive and difficult to correct. According to Souder (1988): "Distrust is the extreme case of deep-seated jealousies, negative attitudes, fears and hostile behaviours (p.11)". No single cause for the occurrence of the "distrust state" was identified. A pattern did appear where poor working relations had similar beginnings with a "Lack of Appreciation" or a "Lack of Communication" occurring, and then the relationship would dissolve into the "Distrust state". Many of the "distrust" cases then became institutionalised "surprisingly often" and part of the culture at a functional unit e.g., where one respondent stated in regards to a counterpart in another department "He once did some things to us. I'm not sure what they were. It all happened before I came into this group. So, you see, you really have to watch out for him (p.14)".

This latter finding highlights the need for a greater focus on the generation of trust and a better understanding of interpersonal relationships in the CFR literature. Souder suggested eight guidelines for top management to help overcome disharmony before it reaches the Distrust state and also proposed a framework (Customer-Developer–Conditions, CDC) to define the appropriate roles that R&D and Marketing parties must play to succeed with various types of innovations. Souder's research contributes to the

understanding of CFR issues by clearly indicating the role that certain variables play on determining effective relationships between R&D and Marketing. The role of management, interpersonal issues (especially trust) and structure are all antecedent variables for effective CFR and new product success according to Souder's research.

Table 2.2 Incidence of Harmony and Disharmony States in the Marketing/R&D Interface

(Souder 1988, p.8)

Relationship States	% of Projects experiencing each state
Mild Disharmony:	
Lack of Interaction	7.6
Lack of Communication	6.6
Too good friends	6.3
Subtotal	**20.5**
Severe Disharmony	
Lack of Appreciation	26.9
Distrust	11.8
Subtotal	**38.7**
Harmony	
Equal partner	11.7
Dominant partner	29.1
Subtotal	**40.8**

Gupta and Wilemon (1988) developed measures for two very important concepts in the CFR literature. Firstly, the concept of "quality of marketing information" was introduced and was based on seven dimensions: realistic and valid, analysed and presented well, objective, consistent and complete, useful, appealing. Secondly, the use of psychosocial measures of the respondents' perceptions of their marketing

counterparts' credibility were developed. The Marketing Manager was measured on seven dimensions: co-operative, open, and trustworthy (one dimension only), competent and helpful, friendly and social, fair and easy to work with, knowledgeable about R&D, rational decision maker, and respected. An Information and Source Credibility framework was used to examine the relationship between credibility of the source and co-operation outcomes. Using correlation analysis they found a positive association between integration, and satisfaction with marketing information, where the information was perceived to be realistic, well analysed and presented, objective, consistent and complete. Importantly, the Marketing Managers themselves were then perceived by the R&D Managers as being co-operative, trustworthy, competent, friendly, and knowledgeable.

Limitations of the study exist in that certain constructs used are multi-dimensional, for example, "co-operative, open and trustworthy", which has been found to be three separate constructs in subsequent research, and so require separate analysis. Nonetheless, one crucial point regarding Marketing and R&D integration emerges from this study, that Marketing's credibility problems must be addressed. As R&D Managers are the key users of Marketing's main input into NPD, the perceived credibility of that information is of vital importance in increasing the amount of co-operation between the parties. R&D Managers will not use marketing information inputs that they feel are fundamentally flawed. Overall, the study contributed significantly to the understanding of the interface between Marketing and the R&D function as it clearly highlighted some of the key areas of difficulty that lie between the two functions.

Lucas and Bush (1988) in an exploratory study examined the role that personality barriers play in the R&D-Marketing interface. Drawing on previous research (Souder 1981, 1988, Gupta and Wilemon 1988) they proposed that personality traits would influence the success and perceived satisfaction of the functional interface between R&D and Marketing. Using a mail questionnaire, 234 usable responses (response rate of 11.7%) from a cross -section of US companies were obtained. Of these 118 responses were from Marketers and 116 responses from R&D Managers. Three main research issues questions were addressed. Firstly, are there personality differences between Marketing and R&D personnel? Secondly, is personality related to new product success? Finally, is personality related to satisfaction with the R&D/Marketing interface? Measuring 16 personality factors, Marketers and R&D Managers were found to have different personality characteristics to Marketers. Marketers were more dominant and assertive, as well as more "happy go lucky" and enthusiastic, more venturesome and spontaneous than their R&D counterparts. Their R&D counterparts scored significantly higher on the self-sufficiency dimensions. No other major differences were found indicating that the groups were fairly equal in intelligence, ego strength, conscientiousness and other factors.

To assess the impact of personality on new product success (which was operationalised two ways; as the number of new products introduced in one year, and the product success rate) regression analysis was used to determine if there was an association with the personality factors. Greater humility and conformity was positively related to success for the R&D group in terms of number of new products introduced while being "Tough minded" and "Realistic" impacted upon the success rate (r^2=.12, $p<.05$). For the

Marketers being “happy go lucky” was the most significant factor for both measures of new product success (r^2=.13, p<.05).

Finally, was personality related to perceived satisfaction with the R&D/Marketing interface? To determine the level of satisfaction that respondents had with the R&D/Marketing interface, four focus groups were conducted, from which 34 items were identified. From these 34 items, 8 factors were extracted and used as dependent variables in regression analysis. Of importance for the study of CFRs was that there was a strong relationship between satisfaction with the interdependency and a personality trait of “more casual and following own urges” where Marketing staff were not strictly constrained in their relations with R&D by organisational policy and NPD procedures, informal relationships were sought. This study contributes to our understanding of a key aspect of the NPD process by focusing on an individual level variable – personality. Though this study was limited in its sample size, response rate and rigour of statistical analysis, it does further emphasise the role that effective interpersonal relationships play in effective new product development.

Gupta and Wilemon (1990) examined the interface between Marketing and R&D in 83 high technology firms and provided useful insights from the perspective of R&D Managers as to what Marketing, R&D and top management could do to improve the relationship between the functions. Most R&D Managers (60%) felt that the level of integration had improved in the previous five years and this was largely due to the increasing importance of successful new product development for the firm. They provided a summary table of actions the three parties could undertake from their three perspectives. Of particular interest is the recommendation to change hiring policies for

Marketing staff. Some of the R&D directors were concerned with the quality of the Marketing personnel in their firms and 27% felt that many of the Marketing people did not really know enough about marketing to be really effective. Also a concern was that many of the Marketers had a sales orientation and not real marketing expertise. As R&D Managers are the key recipients of many of Marketing's inputs, this study does raise serious concerns regarding an effective cross-functional interface.

Saghafi, Gupta and Sheth (1990) investigated the effectiveness of the R&D/Marketing interface in the context of the US telecommunication industry. Using the same measurement instrument as Gupta et al (1985) they surveyed 73 R&D Managers and 103 Marketing Managers in a total of 5 companies. Functional integration had not been achieved effectively in any of the companies. Respondents perceived that there was a positive trend towards better relationships between the two groups, however a lack of effective communication and involvement were cited as the most significant barriers to effective integration. There was also a feeling that senior management needed to improve the way they managed the interface between the two functions.

Moenaert and Souder (1990a) proposed a new conceptual model of information transfer aimed at integrating the R&D and Marketing functions during the innovation process. Organisations were viewed as information processing social structures, with an effective flow of information between functions essential for new product success. Their review of the communication literature highlighted a belief amongst academics and practitioners that "increasing" communication flows between functions will automatically lead to great improvements in functional integration.

Moenaert and Souder (1990b) developed a conceptual model which showed that the value of information received from other functions was determined by channel, message, source, and receiver attributes. The value of this information was thought to vary and was dependent on the stages of the new product process, organisational characteristics, such as formalisation, centralisation, climate and the type of project structure. The findings from an exploratory pilot study (16 in-depth interviews with both Marketing and R&D Managers, in 6 Belgian manufacturing companies) provided insights into the role of interpersonal communication in NPD. It was found that Marketing highly regarded interpersonal (face-to-face) communication due to the benefits of speed, reciprocal feedback and the breaking down of language barriers, where these factors were seen as critical for successful information use. In contrast, R&D were highly critical of the value of face-to-face information due to a lack of accountability, and a written format was regarded more highly by the technologists. A key finding was that many (R&D) respondents acknowledged that incoming information was "screened" on the identity of the source. Credibility was a pre-requisite for information transfer, "one must accept that the other person is competent in his/her discipline (p.223)".

This study specifically addressed Marketing's major input into the NPD, marketing information, and the factors affecting its use. A major implication for management in terms of developing an efficient CFR is that "trust" and "source credibility" are critical issues for the R&D managers. Many of these R&D Managers were dissatisfied with information inputs from Marketing and also were concerned that Marketing staff were not true marketing professionals as they had technical or sales backgrounds.

Carlsson (1991) examined interfunctional co-operation from the perspective of companies facing “time to market pressures” and needing “the right product: at the right time, to the right customer, with the right design, at the right cost (p.55)”. Surveying 57 production technology managers from 4 Swedish and 2 West German companies it was found that incomplete design solutions resulting in low levels of customer adoption could be traced back to inadequate co-operation. All respondents indicated that integration was not at a satisfactory level during NPD tasks. Overall, information exchange was found to be the most effective way to facilitate co-operation. This study confirms the communication difficulties that can exist between separate functions and the general view that there needs to be more communication for effective co-operation to occur.

Moenaert et al (1992) empirically tested their conceptual model (1990b) and examined the individual information styles of Marketing and R&D personnel during the new product development process in an attempt to determine which factors influenced perceptions of information utility. 40 Belgian companies from a cross section of industries were surveyed, with 386 questionnaires completed. Four underlying information dimensions were identified: perceived relevance, perceived comprehensibility, perceived novelty, and the perceived credibility of the information. Correlation analysis indicated that the perceptions of the relevance and the credibility of received information had a strong relationship with its perceived utility. A key finding from this study with implications for the creation of effective CFRs was that the quality of the working relationship between the source and the receiver had a strong effect on the perceived credibility of the information.

Song and Parry (1992) explored the R&D/Marketing interface in Japanese high-technology firms. Replicating the Gupta, Raj, and Wilemon (1985) framework they compared the perceptions of 223 R&D Managers and 223 Marketing Managers in Japan compared to those of their US counterparts. The findings were consistent with those of Gupta, Raj and Wilemon (1985), with the following points of agreement between the two studies: (1) there was disagreement between Marketing and R&D functions on the appropriate level of integration between the two functions, (2) there was high dissatisfaction with the current levels of integration, and (3) Marketing and R&D agreed on the areas which require the greatest amount of integration. Other findings indicated that the Japanese Marketing Managers perceived a greater need to understand their competitors and customers than the US Marketing Managers. They also seemed to prefer greater integration in the initial stages of the development process than the US managers, again reflecting a greater customer focus.

Dougherty (1992) introduced the term “thought worlds” into the NPD literature, when seeking to explain why innovators fail to develop a comprehensive appreciation of their product in its market. The term “thought worlds” is used to describe the differences that Marketing and R&D have in their perceptions of the marketplace due to their training and differing orientations. Data regarding 18 new products from 5 firms were collected by interviewing 80 people from different departments. Two interpretive schemes were found to inhibit development of technology–market knowledge. Firstly, departmental thought worlds, where the socio-cultural differences between Marketing and R&D personnel were thought to affect their perceptions of situations. Secondly, interpretive differences were found to play a strong role in problems with functional collaboration over technology-market linking. Each functional thought world (Marketing and R&D)

was found to be genuinely concerned with developing successful new products, however, “it is more like witnesses at an accident, or individuals in a troubled relationship – each tells a “complete story”, but tells a different one (p.191).”

Two important implications were suggested for the study and practice of innovation. Firstly, “innovation requires *collective action*, or efforts to create shared understandings form disparate perspectives. The advocation of rational tools and processes, the infusion of market research information, and the redesign of structures, while important are not enough (p.195)”. Secondly, three intermediary processes were suggested to overcome interpretative barriers: (1) the development of unique insights into these thought worlds (2) the development of collaborative mechanisms which deal directly with interpretive as well as structural barriers to collective action, and (3) the development of an organisational context for collective action that enables both unique insights and collaboration to occur.

Workman (1993) examined the limited role that Marketing played in the new product development process within one US high-tech firm. Although the findings are not easily generalisable, useful insights were gained in this study. The study was based on 9 months of participant observation into the new product development process from both an Engineering perspective and that of Marketing. From Engineering’s perspective, Marketers were looked down upon, they were viewed as having a strictly selling role in the organisation. Engineering also felt that Marketing expected too much from them and that they did not fundamentally understand the constraints of Engineering. Marketing on the other hand viewed Engineering as lacking perspective, they were seen to just turn out products looking for markets. Marketers viewed themselves as “empathetic

Marketers" versus "analytical Engineers" where engineers tended to build a new product and then wash their hands of it leaving Marketing with the mess if it goes wrong. It was also felt that Engineering did not appreciate customers' prior investments nor did they appreciate the high level of market segmentation within the industry. There was however, consensus between the two functions regarding the sources of conflict between them i.e., that it arises over the level and type of information each other wants from the other. Implications for the study of CFRs lie in a clear lack of mutual understanding between both parties revealed by Workman's observations and the issue of Marketing's role in the organisation as perceived by the R&D function.

Moenaert et al (1994) further analysed and reported the findings of their previous study of 40 Belgian firms by examining the interaction between Marketing and R&D during one commercially successful project and one unsuccessful project within each respondent firm. Using an information-processing perspective they investigated the effects of four important variables on cross-functional communication and innovation success, these being: formalisation, centralisation, role flexibility, and interfunctional climate. Communication flows were increased between Marketing and R&D under the following conditions, high formalisation, decentralisation, a positive interfunctional climate and role flexibility. Project formalisation and the quality of the interfunctional climate were found to have a significant effect on project success. However, the construct of "interfunctional climate" was operationalised using only 3 items. One of these items used was "trust", but as trust is a very complex construct, the results must be interpreted with caution. A more rigorous operationalisation of interfunctional climate and trust would have provided more useful findings.

A key recommendation arising from this study was the need for formal mechanisms that enhance the communication process, without creating a bureaucratic burden and an overload of procedures. This empirical study contributed to the literature by investigating organisational factors and their effect on communication between Marketing and R&D. However because there was no examination of causality in the study, it points to an opportunity for further research.

Hutt (1995) addressed the perceived imbalance in the Marketing literature regarding the knowledge of cross-functional working relationships, where “in contrast to the number of empirical studies devoted to buyer-seller relationships, scant attention has been given to the web of cross-unit working relationships that constitute a major component of the managerial work of a marketing manager (p.351)”. Further he argued that many of the constructs used to examine buyer-seller relationships can be applied equally well to CFRs. His conceptual development was directed at the formation and development of working relationships between Marketing Managers and other constituents within the firm. Marketing was viewed as “occupying a boundary position between the firm and its customers and an integrative role across functional areas, a central challenge for the business marketing manager is to minimise interdepartmental conflicts while fostering shared appreciation of interdependencies (p.351)”. It was suggested that to serve as an effective advocate for the customer, Marketing Managers must initiate, develop, nurture, and sustain a network of relationships with multiple constituencies within the firm. Identified were three barriers which could prevent or damage effective cross-functional relationships: turf barriers, interpretive barriers and communication barriers. Further research was suggested on these relationship-formation processes, most notably the role

that trust, influence and communication can play in developing effective working relationships.

Olsen, Walker and Ruekert (1995) developed and tested a contingency model which suggested a relationship between product innovativeness, the type of integration mechanisms used by top management and new product success. Their sample covered 15 divisions from 12 US firms which provided complete case histories on 45 NPD projects, from both the consumer and industrial sectors. The authors used a resource dependence framework to examine the interdependence between the Marketing and R&D functions. Using correlation analysis the results indicated that the better the fit between the newness of the product concept, and the level of participation in the co-ordination mechanism used, the better the NPD outcomes for the firm. The newness of the new product task also had a strong positive correlation with the level of perceived interdependency. Where the sense of interdependency between functions increased there was a strong positive correlation with the greater flows of information and resources between the functions. The implication for future CFR research was that perceived interdependency is related to perceptions of both task newness and difficulty, and therefore should be taken into account when considering relationship motivation.

Menon, Bharadwaj and Howell (1996) provided a differing perspective on interfunctional conflict by examining functional conflict as well as the traditional approach of viewing all conflict as dysfunctional in nature. Directors, senior vice-presidents, and vice-presidents in 236 US companies were the respondents from a cross-section of industry. A causal model was developed and empirically tested which proposed organisational antecedents for the “quality” of new product strategy and subsequent market performance of new products. Their results indicated that functional

and dysfunctional conflict are distinct constructs and have differing effects on organisational effectiveness. Not surprisingly, dysfunctional conflict was found to have a negative effect on the "quality" of strategy and market performance, whereas functional conflict was found to have a positive effect. Specifically, organisational design characteristics such as formalisation, interdepartmental interconnectedness, low communication barriers and "team spirit" improved new product performance by enhancing functional conflict. Centralisation and high communication barriers had a negative effect on new product performance. This research has implications for the study of CFRs, especially, the finding that not all conflict is destructive. Future studies in this area must distinguish between the type of conflict that is occurring in the CFR of interest.

Kahn (1996) reviewed the conceptualisation of "interdepartmental integration" in the Marketing literature by addressing the inconsistent approach that had been previously undertaken. Whereby the concept of interdepartmental integration had been variously defined as: (1) increased interaction between departments (e.g., more meetings and other formal information flows between, R&D and Marketing), (2) co-operation between departments, (3) "collaboration", where departments work collectively toward common goals, and (4) a combination of interaction and collaboration. Kahn presented results from a study exploring how functional collaboration and functional interaction affect product development and post launch product management performance. Surveying electronic industry manufacturers in the US, 177 Marketing Managers, 157 Manufacturing Managers and 180 R&D Managers responded to a mail-out questionnaire. The results indicated that "collaboration" had a strong positive effect on new product market performance. Two measures of interaction, meetings and the exchange of information, had a negative effect on performance. The major implication

of these findings was that company policies overemphasising increased interaction may not be the most appropriate NPD strategy, as it was "collaboration" that made a significant difference between success and failure, not the number of times members of each department had contact with each other. Kahn suggests that "collaboration" between functions, where the major participants have a far more effective CFR, should be the goal of an effective NPD rather than achieving basic levels of co-operation and communication between the functions. Therefore the concept of "collaboration" should become the focus for future CFR research (refer Chapter 3).

Griffin and Hauser (1996) provided an extensive review of the literature regarding the integration of R&D and Marketing functions and argued that there was a need to reassess the previous research in light of a movement toward flatter organisational structures and the greater use of cross-functional teams. They concluded that (Table 2.3): "research to date helps us understand that co-operation, when it occurs, often leads to success (p.212)". Griffin and Hauser developed a "causal map" (Fig 2.3) which sought to provide an overarching conceptual framework for the study of Marketing/R&D integration at the project level. Combining key elements of previous models (i.e., Gupta et al 1986; Ruekert and Walker 1987; Mohr and Nevin 1990) they also used a system-structure approach incorporating situational, structural, process, and outcome dimensions of Marketing/R&D integration. Their conceptualisation highlights the "people" aspect of achieving effective functional integration by focusing attention on the several organisational factors that directly influence NPD participant's behaviours towards one another e.g., organisational culture, rewards and incentives, personnel movement. Several integration mechanisms are proposed which are designed to improve interpersonal working relationships by increasing mutual understanding and trust between Marketing and R&D staff.

Figure 2.3: Causal Map for Studying the Project-Level Marketing/R&D Interface

Griffin and Hauser (1996) (p.201)

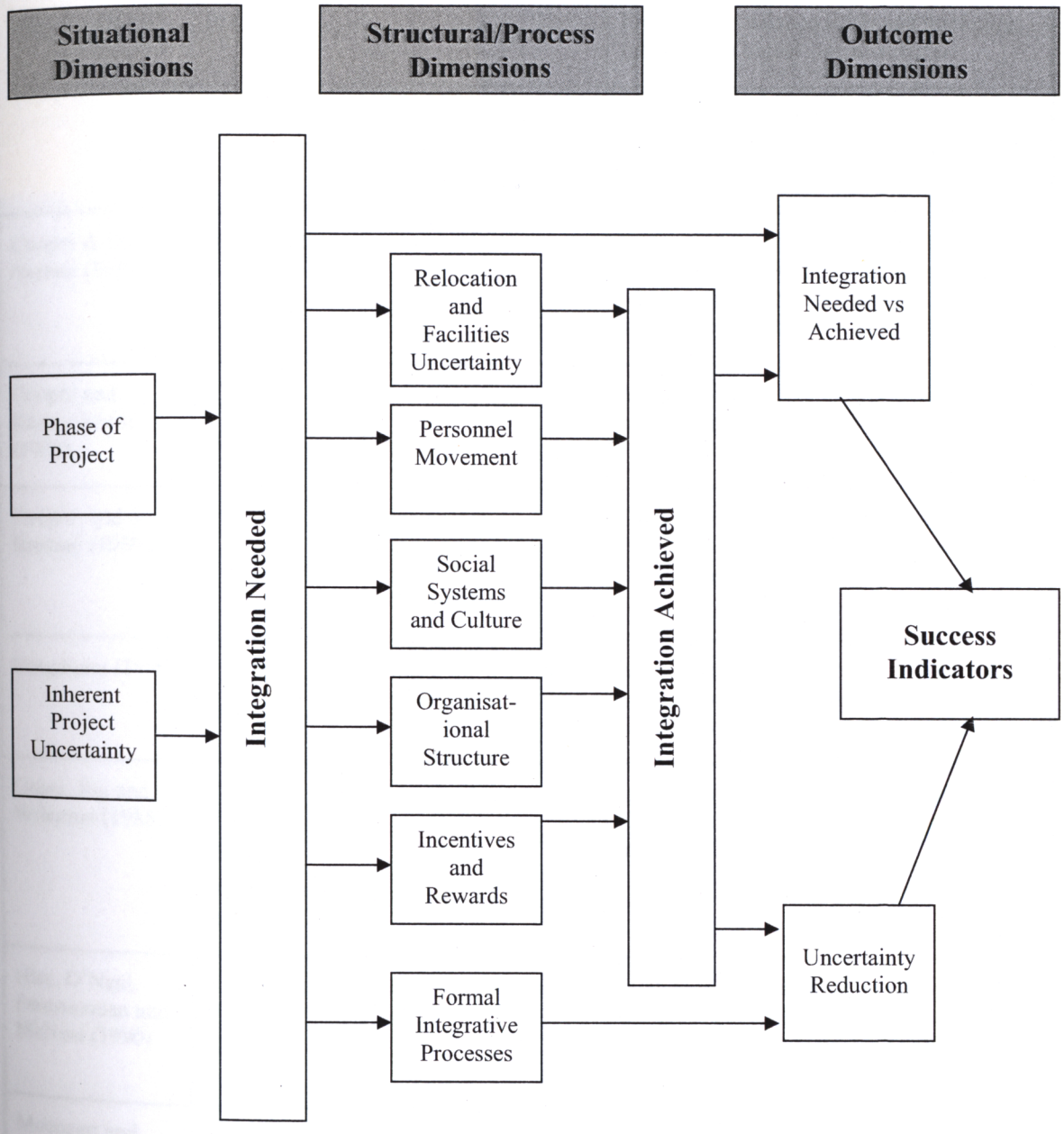


Table 2.3: Examples of the Scientific Evidence suggesting that Communication and Co-operation among Marketing and R&D Enhances New Product Success

Griffin and Hauser (1996) (p.194)

AUTHOR(S)	SAMPLE	INDUSTRY	KEY FINDINGS
Cooper (1983)	58 Projects	Industrial firms	Projects that balance R&D and marketing inputs had a higher rate of success.
Cooper (1984)	122 Firms	Electronic, heavy equipment, chemicals, materials	Management strategies that balance Marketing/R&D have a greater percentage of their sales coming from new products.
Cooper & De Bretani (1987)	106 Projects	Financial Services	Synergy (e.g., fit with the firms expertise, management skills, and market research resources) was the number one correlate of success (correlation = 0.45).
Cooper and Kleinschmidt (1981)	125 Firms 203 Projects	Manufacturing	Market Synergy and technical synergy are both significantly related to success.
Cooper and de Bretani (1989)	115 Firms 276 Projects	Financial and management services, transportation and communication	Sales, communication between functions (Correlation with sales and marketshare = 0.38 , correlation with reduced cost = 0.29)
Dougherty (1990)	5 Firms 18 Projects	Industrial, consumer and services	More communication on ALL relevant topics separated successful projects from unsuccessful projects.
Gupta, Raj and Wilemon (1985)	67 Firms 107 R&D Managers 109 Marketing Managers	Hi technology	Lack of communication was listed as the number one reason for lack of integration among RD/marketing.
Hise, O'Neal, Parasuraman and McNeal (1990)	252 Marketing Vice Presidents	Large manufacturing firms	High level of joint effort in new product design is a significant factor in determining success. This is true for both industrial and consumer firms
Moenaert and Souder (1990)	Literature review	Products and services	Function integration positively relates to innovation success.
Moenaert, Souder, Demeyer and Deschoolmeester (1994)	40 Belgian firms	Technology innovative firms	Significant correlation between commercial success and interfunctional climate, and information received by R&D.

AUTHOR(S)	SAMPLE	INDUSTRY	KEY FINDINGS
Pelz and Andrews (1966)	1311 Scientists and Engineers	Scientists and engineers	Positive relationships between the amount of interaction and performance.
Pinto and Pinto (1990)	72 Hospital teams 262 Team members	Health services	Strong relationship between cross functional co-operation and the success (the perceived task outcomes) of the project. Correlation 0.71.
Souder (1988)	56 Firms 289 Projects	Consumer and industrial	The greater the harmony between Marketing and R&D, the greater the likelihood of success.
Souder and Chakabarti (1978)	18 firms 117 Projects	Consumer and industrial	Interaction, integration and information exchange significantly differentiate between technical and commercial success and failure.
Takeuchi and Nonaka (1986)	6 Projects US and Japan	Consumer and industrial	Organising teams lead to success.

Song, Neeley and Zhao (1996) examined the Marketing/R&D interface from an information exchange perspective, where increased communication is thought to improve new product outcomes. They surveyed Marketing Managers and R&D Managers in 376 US high technology companies. Regression analysis indicated that information exchange was positively affected by several factors: (1) a formalised system of NPD interaction between functions, (2) the quality of cross-functional relationship, and (3) a joint rewards system, whereas, information exchange was negatively affected by the perception that the other NPD participants lacked credibility as functional specialists. Managers interviewed in the preliminary stages of the study felt that one of the greatest barriers to integration was a lack of mutual trust and respect. Respondents suggested that Marketing personnel did not trust the information received from R&D, and vice versa. Other key barriers to integration identified in the survey were: (1) different functional orientations, (2) a lack of physical proximity, (3) a lack of formal communication structures, and (4) a lack of perceived managerial support for

integration. Of importance for the study of CFRs was that a major barrier to integration was a lack of trust or respect. Unfortunately, the authors did not make a distinction between these two constructs, which are not conceptually the same (e.g., McAllister 1995). Future studies should distinguish between these two constructs to provide a more accurate picture of CFRs.

Song, Montoya-Weiss and Schmidt (1997) contributed to a better understanding of the drivers, and consequences, of cross-functional co-operation by investigating the perceptions of Mexican, R&D, Marketing and Manufacturing Managers regarding their NPD activities. Surveying high-technology firms using a mail-out questionnaire, 291 R&D Managers, 122 Manufacturing Managers and 185 Marketing Managers responded, giving a total response rate of 66%. Applying a model of cross-functional co-operation they found that internal drivers (i.e., evaluation and reward procedures and top management support) have a greater effect on cross-functional co-operation than external drivers (i.e., market competitiveness, technological change, competitor response time, environmental uncertainty). Another significant finding was that "the effect of cross-functional co-operation on performance is statistically significant in *all three* groups (p.44)". The implications of this study for future research lie in a better understanding of these "internal facilitators" and the effect they have on co-operation and ultimately collaboration during the NPDP.

Kahn and McDonough III (1997) explored collocation of functions and the implications this has for effective functional integration, performance and satisfaction. 514 department managers (177 Marketing, 157 Manufacturing and 180 R&D) from member companies of the Electronics Industries Association (USA) responded to the mail

questionnaire (20% response rate). was found to have a positive effect on integration of departments, but it was also found to have department-specific effects. An interesting finding was that the degree of interaction did not change between R&D and Marketing in non co-located situations. R&D's collaboration with Marketing was found to increase in co-located situations, as did collective goal accomplishment, mutual understanding, informal work interaction, the sharing of resources, and the proposing of ideas and team performance. No significant relationship was found between and new product market performance, though there was a significant positive relationship between interfunctional collaboration and NPD performance. It seems that given an opportunity to form a relationship through physical proximity R&D and Marketing personnel will seek to collaborate during NPD.

Fisher, Maltz and Jaworski (1997) introduced the construct of "relative functional identification (RFI)" into the NPD literature, which they defined as "the extent to which managers feel a sense of connection with their function compared with the organisation as a whole (p.56)". They examined the moderating role of RFI on communication between Marketing and Engineering (where the Engineering-related functions incorporated R&D). Two key methods of managing interfunctional communications were identified. The first relied on the development of norms that encourage information sharing behaviours among functions, while the second involved the formulation of integrated goals emphasising organisational outcomes that require interfunctional collaboration. One of their studies was a mail-out survey to a single high-tech organisation, with 100 Marketing personnel responding (a usable response rate of 49%). The results indicated that the effectiveness of the traditional functional integration strategies depended on the extent of the Engineering Managers relative

functional identification, high levels of RFI had a negative effect on communication behaviour. This study was expanded by illustrating that "bi-directional communication" i.e., two way communication characterised by feedback between managers, is as important as communication frequency in increasing both information use by Engineering personnel and subsequently, the perceived effectiveness of their working relationship with Marketing personnel.

Maltz (1997) expanded the Griffin and Hauser (1996) conceptual framework for improving co-operation between Marketing and other functions by developing several research propositions which aimed to: (1) extend the work on the Marketing/R&D interface to other functions, (2) develop a hierarchical relationship between "barriers" to integration. Of particular importance to the integration literature, Maltz introduced the concept of "structural flux" as a direct and moderating variable into a functional integration model. Structural flux refers to the rate of change within an organisation in terms of personnel, structure, rules and procedures where "structural flux introduces uncertainty for employees into a model as managers become unsure of their current and future standing in the firm. They can therefore be expected to try to defend and even expand their influence and the resources allocated to their respective functions (p.87)". The concept of structural flux potentially has serious implications for trust development between functions, if defensive behaviours begin to dominate cross-functional interactions, working relationships will suffer and inevitably the effectiveness of NPD activities will be reduced.

Shaw and Shaw (1998) examined conflict between Engineers and Marketers from an Engineering perspective. Using a mail-out survey, 151 engineers from 15 manufacturing

companies responded. The survey aimed to: (1) assess the quality of relationship between Engineers and Marketers, (2) determine the extent of conflict between the parties, and identify possible sources of conflict, and (3) examine how conflict between the two groups could be reduced. The findings revealed that Engineers view their relationship with Marketers in a generally favourable way. Conflict between Engineers and Marketers was found to be relatively low, with the most commonly cited reasons for conflict being, poor communication, a lack of understanding between the functions, and separate locations. This study again highlighted the role that relationship variables, notably, mutual understanding and communication, play in effective CFRs.

Workman Jr (1998) continued his investigations into factors limiting Marketing's role in the product development activities of high-tech firms by interviewing Marketing and R&D managers in 34 US companies. His findings suggest that Marketing's role in product development is limited by three major factors: (1) the need for technical expertise to understand business opportunities, (2) the development of technology-oriented organisational cultures, and (3) the way Marketing is defined in many high-tech firms. It was suggested that Marketing could better contribute to NPD outcomes through more accurate market assessment and effective development, as well as better interpretation of feedback from customers, OEMs and distributors. These "credibility" issues reflecting the perceived role performance of the Marketing function require further investigation at the functional level as well as at the interpersonal level.

Jassawalla and Sashittal (1998) examined the extent of interfunctional collaboration in high-technology new product development processes. Using a "grounded theory" approach to collect data from 10 US high technology firms, several factors seemed to

have increased the achievement of cross-functional collaboration. A conceptual framework that related those factors to cross-functional collaboration achieved was then developed. The results of the study indicated that high levels of functional integration did not necessarily correspond to high levels of collaboration. However, collaborative behaviour amongst NPD participants was found to be far more effective in achieving successful NPD outcomes. Another key finding was that when trust was higher between individuals, there were higher levels of collaboration. The significance of this finding for CFR research is that interpersonal trust does affect participants' behaviours towards one another, and therefore necessitates that its role in working relationships be studied in greater detail. A major limitation of this study was that interpersonal trust is not defined at all, and it is measured using a dichotomy i.e., either as high or low trust, thus not fully capturing the complexity of the construct.

Song, Xie and Dyer (2000) examined the antecedents and consequences of conflict-handling behaviours of Marketing Managers. This study examined the management of functional conflict in the NPDP, viewing this as shift away from cross-functional integration and conflict-elimination. Data was collected from 968 companies in total from the United Kingdom (49.4% response rate), the United States (60% response rate), China (42% response rate) and Japan (59.1% response rate). Posited as having an effect on cross-functional integration were 5 antecedent variables: (1) goal congruity, (2) top management support for integration, (3) participative management, (4) early involvement, and (5) job rotation. They proposed 2 mediating variables "avoiding conflict behaviour" and "collaborative conflict behaviour" as having an effect on cross-functional integration. A key finding of the study was that "the empirical results from four countries suggest that the keys to cross-functional integration are greater emphasis

on cross-functional involvement and increased information exchange, rather than harmonious cross functional relations alone (p.62)". A limitation of the study is that the concept of trust was not explicitly included, especially as the context was conflict resolution. The organisational behaviour literature suggests a strong relationship between interpersonal conflict and trust (Williams 2001) and this should have been incorporated in the conceptual model.

Leenders and Wierenga (2001) examined the effectiveness of the integration mechanisms suggested by Griffin and Hauser (1996) on effective cross-functional integration by examining their direct and indirect effects. Using an international mail survey (Europe, USA and Japan), 148 responses (19% response rate) were received from Marketing and R&D executives. The results indicated that all of the integration mechanisms used by organisations did have a positive effect on functional integration, with and the use of a cross-functional phase review board as the most effective mechanisms for integrating Marketing and R&D having a direct effect on functional integration. Only the use of information and communication technologies were found to have a positive direct effect on NPD success, with the use of formal integrative mechanisms improving the level of functional integration but having a negative direct effect on NPD success. The study provides some support for the role of formal management initiatives in assisting integration. However the way that the functional integration was operationalised in the form of a 15 item index which including items clearly measuring separate constructs such as information quality, functional conflict, blame sharing, and cognitive trust, provides little opportunity to determine the differential effects of these mechanisms.

2.6 Overview and Knowledge Gaps

From this review, it can be seen that the knowledge base regarding Marketing's working relationship with the R&D function has grown over the past three decades, from an early realisation that there were benefits for the organisation by "integrating" its specialist functions to the development of conceptual frameworks describing the complex dynamics of functional integration. Much of the research attention has focused on identifying barriers to functional integration and this has lead to numerous studies focussing on ways to improve this troublesome area. As evidenced in the literature review, increasing the volume of information between the two functions was often prescribed as an appropriate way to increase co-operation and foster better working relations. Yet, recent evidence suggests that obtaining "co-operation" between the functions is not on its own a guarantee of new product success (Kahn 1996, Jassawalla and Shashital 1998, Song et al 2000). The studies examining the Marketing/R&D interface have found that situations of "true collaboration", characterised by volitional interaction i.e., of communication and co-operation between participants, are more likely to generate new product successes than basic co-operation.

This leads to the major gap in our knowledge regarding the Marketing Manager's working relationship with the R&D Manager i.e., our understanding of the complex interpersonal dynamics that lead to effective working relationships during the NPD is limited both conceptually and empirically. The omission of "trust" as a major explanatory variable in the cross-functional integration literature is apparent, especially its examination at the interpersonal level. "Trust" has played a minor role in all of the studies of functional integration, and it is an expected outcome which is rarely defined or operationalised effectively. If it is measured at all, it is done so uni-dimensionally

(Kahn 1996), which is inappropriate as the concept of "trust" has received significant research attention in the management and organisational sciences literature (addressed in Chapter 3) and is widely treated as a complex multi-dimensional concept. The role that trust plays in shaping managers' "collaborative" work behaviours towards one another (McAllister 1995) requires that it is adequately measured and included in any conceptualisations of functional integration if researchers are to adequately address this area.

Another significant gap in our knowledge concerns the role that "politics" play during the NPD process. Organisational and interpersonal politics exist in all organisations (Pfeffer 1981; 1992; Vigoda 2003), yet "politics" has not been addressed as an explanatory variable in the NPD literature (Jones and Stevens 1999). Manifestations of organisational politics such as "interfunctional rivalry" have been measured and found to be detrimental to effective functional integration (Moenaert and Souder 1996), however, there has been no examination of "interpersonal politics" in the NPD and its possible effects on "trust development" and working relationships. This is an area where further research is required when examining interpersonal level CFRs.

The purpose of this research is to develop an explanatory model of the antecedents of effective cross-functional relationships in NPD projects. Substantial research efforts have been made at the departmental or functional level regarding integration, yet at the critical dyad between the two key players (Marketing Manager and R&D Manager) our knowledge is limited. A key research question is to determine which factors affect a manager's decision to move his or her working relationship beyond basic communication, beyond basic co-operation, to a state of interpersonal collaboration with

their counterpart. The research presented here aims to close this knowledge gap and contribute to a better understanding of this critical cross-functional linkage. The following chapter will develop a taxonomy of key explanatory variables drawn from this literature review to synthesise the NPD integration literature. From this taxonomy will be selected the individual level variables considered to most directly affect the interpersonal dynamics between the Marketing Manager and the R&D Manager.

CHAPTER 3: PROPOSED THEORETICAL MODEL AND HYPOTHESES

3.1 Preamble

This chapter presents a new conceptualisation of the working relationship between the R&D Manager and the Marketing Manager during the NPD process. NPD researchers have developed various models to explain the critical interface between Marketing and R&D personnel (e.g., Gupta, Raj and Wilemon 1986; Ruekert and Walker 1987; Griffin and Hauser 1996; Fisher Maltz and Jaworski 1997) yet there still remain gaps in our knowledge of this key relationship. Specifically, the role of "trust" in shaping collaborative behaviour between key participants requires further examination. To address this gap a new conceptualisation of the Marketing/R&D relationship is presented and research hypotheses are developed for empirical testing. Specifically, the following sections will, firstly, define the term "functional integration" and identify the factors that act as its antecedents and then, in turn, affect interpersonal working relationships. These key variables will then be presented in a taxonomy (Fig 3.1) to provide a context for this research. Secondly, a justification for the focus on individual level working relationships rather than the traditional departmental level of analysis will be given. Thirdly, the "collaboration" philosophy of functional integration will be explained and a justification for its use as the theoretical framework for the proposed conceptual model will be provided. Fourthly, the proposed theoretical model which provides a new conceptualisation of the CFR between Marketing and R&D Managers using individual level variables will be presented. Finally, the testable hypotheses derived from the model are presented.

3.2 Functional Integration

Lawrence and Lorsch (1965) defined functional integration as "the process of achieving unity of effort among the various sub-systems in the accomplishment of company tasks (p.12)". Souder and Chakabarti (1978) defined functional integration as "the symbiotic interrelating of two or more entities that results in the production of net benefits to those entities that exceed the benefits they would produce in a non-symbiotic relationship (p.95)". In a later work, Lawrence and Lorsch (1986) revised their earlier definition of integration to include the "quality or state of collaboration" that exists among departments required to achieve unity of effort by the demands of the environment. This new definition was very influential in guiding later research on functional integration as it specifically highlighted the quality of the relationship or "state of collaboration" between two functions. Thus, Moenaert and Souder (1990) defined functional integration as:

> "the strategic linking of functionally specialised groups while preserving their original orientations ……. where the objective is not to eliminate their functional specialisation, that is, the R&D party should continue to think and act like an R&D function, and the marketing function should think and act like a marketing function. However, when integrated, the parties will willingly co-operate and collaborate on the strategic decisions and actions that are essential for innovation to occur (p.95)."

These definitions of functional integration have consistent themes. Firstly, there is an acknowledgement that people with differing functional backgrounds and expertise need to interact to solve NPD problems. Secondly, the goal of net benefits from a

relationship, where the end result is greater than the sum of the two parties' individual efforts is recognised. Finally, the concept of "willing co-operation" or "collaboration", where participants see the benefits of a united effort and actively seek the involvement of the other party without feeling as if they are being "coerced" or "pressured" to do so by senior management is identified. From this viewpoint, successful integration between two functional units will occur when it is "volitional", with both parties wanting it to occur.

3.3 Top Management Approaches to Achieving Functional Integration

The challenge for top management (e.g., CEO, senior executive) when trying to improve functional integration has focused traditionally on increasing communication and information-sharing between functions. This improved communication was in turn found to affect the level of co-operation between functions. As many researchers have found (Table 2.2), improving communication flows between functions does indeed improve the efficiency of NPD processes. However, Kahn (1996), and Kahn and Mentzer (1998), have voiced concerns that this previous research has failed to appreciate the complex nature of interfunctional integration and the interpersonal dynamics involved. This lack of appreciation has resulted in limitations in the widely accepted approaches to achieving effective, enduring integration between departments in the Marketing literature. Kahn and Mentzer's (1998) views will be examined in detail below as they are central to the conceptual framework for this thesis. Specifically, they identified three key integration perspectives in the NPD literature: the "interaction perspective", the "collaboration perspective", and the "information sharing and involvement" perspective. The "interaction perspective" focuses on the structural nature of cross-departmental activities, including formally co-ordinated activities such as

routine meetings, planned teleconferencing, routine conference calls, the exchange of memoranda, and the flow of documentation (Ruekert and Walker 1987; Griffin and Hauser 1992; Moenaert et al 1994). According to Kahn and Mentzer (1998):

> "The Marketing Manager ascribing to this interactive view of integration would favour more meetings, greater written documentation, and increased information flows to promote interdepartmental unity – the focus being communication between marketing and other departments. In this way, the Marketing Manager would rely on activities to structure the relationships between marketing and other departments through the diffusion of market information (p.53)."

The "collaboration perspective" is typified by an affective, volitional, mutually shared process where two or more departments work together, have mutual understanding, have a common vision, share resources and achieve collective goals (Lawrence and Lorsch 1986; Kahn 1996; Souder and Moenaert 1990). Thus, a Marketing Manager who (Kahn and Mentzer 1998):

> "….. ascribes to a collaborative view of integration would promote efforts that instill collective goals, mutual respect, and teamwork between departments ……. therefore would rely on those activities that are more affective and relational-based, thereby building *esprit de corp* within the organisation as well as encouraging relationships between departments. (p.53)."

The “information sharing and involvement” perspective is a composite view of the interaction and collaboration perspectives (Gupta, Raj and Wilemon 1986; Song and Parry 1993; Song, Xie and Dyer 2000) where a Marketing Manager would try to balance both perspectives in an attempt to achieve integration.

These three integration perspectives were empirically tested by Kahn and Mentzer (1998) to determine which had the greatest effect on organisational performance outcomes. The findings indicated that the collaboration approach had the strongest effect on organisational performance with both the R&D Managers and their Marketing counterparts reporting collaboration as the most effective approach to integration. Interestingly, “interaction” through formal meetings was found to have a negative effect on performance, with both R&D and Marketing Managers “preferring informality between the two departments via collaboration.”

Further support for an interpersonal collaborative approach to cross-functional integration came from Jassawalla and Shahittal (1998) where they defined “collaboration” as a more complex, higher intensity cross-functional linkage where “in addition to high levels of integration, is characterised by participants who achieve high levels of at-stakeness, transparency, mindfulness and synergies in their interactions (p.240)”. They found that high levels of trust existed amongst functional managers who had achieved collaboration between themselves. In particular, they found that managers “in high trust NPD processes more eager to share information, more likely to admit their confusions and ask for assistance, and more likely to take the risk of voicing new creative ideas (p.248).”

The proposition that effective working relationships are beneficial in exchange situations is not new in the Marketing literature. For example, Hutt (1995) made the point that while the Marketing literature had focused extensively on business-to-business relationships and interorganisational trust (e.g., Anderson and Narus 1990; Dwyer, Schurr and Oh 1987; Ganesan 1994; Moorman, Zaltman and Deshpande 1992; Morgan and Hunt 1994; Doney and Cannon 1997; Smith and Barclay 1997; Sivadas and Dwyer 2000) and had emphasised the development of long term relationships rather than short term exchange-focused situations, scant attention had been paid to the formation and development of working relationships between Marketing Managers and other constituents within the firm.

To address this shortcoming in the literature, the study reported here uses constructs that have been shown empirically to explain the antecedents of long-term collaborative interpersonal relationships in business-to-business markets. In particular, the role of "trust" has been a central focus of much of this research (e.g., Anderson and Narus 1990; Smith and Barclay 1997), yet, trust as a concept has not been adequately conceptualised in many of these studies and consequently its role as a mediating variable not fully appreciated in the context of interpersonal working relationships.

The findings of the in-depth interviews which were conducted as preliminary research (Chapter 4) support the view that "collaboration", either at the interpersonal level or the organisational level, is a very effective way of achieving successful NPD outcomes. Many of the interviewees clearly expressed views that their "successful new product projects" were usually developed in a "collaborative organisational environment", often by-passing formal NPD procedures and using their "friends" and the "informal

network" within the organisation to achieve positive NPD results. Interpersonal trust was viewed as a very important element of their working relationship with other managers: where they "trusted" the other manager, they felt that most problems could be overcome. On the other hand, where they did not trust their functional counterpart, many defensive behaviours (e.g., stalling, blocking, documenting all actions, etc) were used to "cover their backs". Given these findings, this study will focus upon "interpersonal trust" and the collaborative nature of cross-functional working relationships rather than the more traditional approach of measuring information flows and formalised interaction during NPD projects. The following section will define the concept of interpersonal trust and discuss the benefits of trust in facilitating effective interpersonal working relationships. Specifically, the role that "trust" plays in developing long term collaborative working relationships will be discussed.

3.4 Definitions of Trust

There have been generally been two approaches taken in regards to the concept of trust. One approach, has viewed trust as a belief or an expectation about an exchange partner's trustworthiness that results from the partner's expertise, reliability or intentions (Anderson and Weitz 1989; Blau 1964; Dwyer Schurr and Oh 1987; Rotter 1967; Schurr and Ozanne 1985). This is cognition-based trust, where "trust is the belief in the ability, integrity, and motivation of the other party to act to serve one's needs and interests as agreed upon implicitly or explicitly" (Mittal 1996, p.232). The second approach, is where trust has been viewed as behaviour or behavioural intention that reflects a reliance on a partner, and involves vulnerability and uncertainty on the part of the trustor (Deutsch 1962; Zand 1972). This is affect-based trust, where trust is the subjective feeling of being secure against exploitation in a relationship and of having

the comfort that comes from assurance of having one's interests served by another party (Mittal 1996 p.232). Many researchers in the social science literatures have also focused on trust as being a confidence about another party acting with benign or benevolent intentions (Deutsch 1960; Moorman, Deshpande and Zaltman 1992; Morgan and Hunt 1994). Mayer et al (1995) argued that it is the willingness to make one-self vulnerable to risk that defines the act of trust and provided the following definition of trust as the:

> "….. willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party (p.712)."

Recent literature suggests that examining trust as being either cognitive or affective does not fully cover its multi-dimensional nature or its effect on trusting behaviours (Mittal 1996; McAllister 1995). McAllister (1995) empirically examined interpersonal trust in the context of peer manager working relationships, on both the dimensions of cognitive and affective trust (c.f. Lewis and Wiegart 1985) where cognition-based trust was defined in terms of individual beliefs about peer reliability, competence and dependability. Affect-based trust was defined in terms of reciprocated interpersonal care and concern (Pennings and Woiceshyn 1987; Rempel et al 1985). McAllister's (1995) conceptualisation of trust as two separate but related constructs, affect-based trust and cognitive based trust will be used for this thesis, where the cognitive based trust is relevant for dealing with a functional specialist from another unit, and affect based trust is a feature of all human interactions in relationships. The following section will identify the benefits of trust to organisations as suggested by the Management literature.

3.5 The Benefits of Trust for Positive Interpersonal Dynamics

Blau (1964) proposed social exchange theory as way of understanding human exchange relationships, and suggested that trusting behaviours signal interest in, and commitment to, such relationships. When these trusting behaviours are reciprocated they foster beneficial outcomes for the relationship such as creating a positive atmosphere, reducing or removing barriers of task-related risk, and allowing the relationship to further develop. Interpersonal trust was seen to emerge through the repeated exchange of benefits between two individuals. Other researchers have also found trust important in developing co-operative behaviours among individuals, work groups and organisations (Axelrod 1984; Gambetta 1988; Mayer, Davis and Schoorman 1995; McAllister 1995; Smith and Barclay 1997).

Salmond (1994) found that, apart from the insight that trust is a necessary condition for the subjective well-being of individuals and for people living together in social systems, trust yields benefits for the corporate world, for example: mutually trusting partners may realise increased economic efficiency (c.f. Arrow 1974), communication may be more open and problem-solving more effective when partners are trusting (Zald and Zikmund 1972; Anderson and Weitz 1989). As a result of trusting there is facilitation of joint action and co-ordination among interdependent partners and this diminishes the need for hierarchical and/or legalistic controls (Granovetter 1985; Achrol 1991). Williams (2001) has further identified many of the ways trust can affect co-operation and organisational process in organisations:

> "Trust can facilitate co-operation and co-ordinated social interaction, it reduces the need to monitor others' behaviour, formalise procedures and

> create specific contracts. It also facilitates informal co-operation and reduces negotiation costs, it is invaluable to organisations that depend on cross-functional teams, interorganisational partnerships, temporary work groups, and other co-operative structures to co-ordinate work (p.377)."

Jones and George (1998) studied teamwork and suggested that the existence of "unconditional trust" i.e., the positive mood of and degree of "affect" in the relationship, has a beneficial effect on several social processes: the existence of broad role definitions leading to greater citizenship behaviours, better communal relations, high confidence in others, help-seeking behaviour, free exchange of knowledge and information, subjugation of personal needs and ego for the greater common good, and high involvement in processes. Their description of the behaviours which characterise the existence of "unconditional trust" is very similar to that of the behaviours exhibited by managers in collaborative relationships (Jassawalla and Shashittal 1998) and therefore further strengthens the argument for the study of interpersonal trust in working relationships.

Dirks and Ferrin (2001) in an extensive review of the trust literature, found that in 90% of the studies reviewed, trust within organisations has benefits for an organisation in terms of more positive employee attitudes, higher levels of co-operation and superior levels of performance. This view is also held by McEvily, Perrone and Zaheer (2003) who state that because trust "represents a positive assumption about the motives and intentions of another party, it allows people to economise on information processing and safeguarding behaviours …….. Trust also makes decision-making more efficient by simplifying the acquisition and interpretation of information (p.93)."

There is obviously a strong consensus amongst researchers that the existence of trust is usually beneficial for working relationships, however Dirks (1999) provides a corollary, where "distrust" may exist between co-workers:

> "distrusting one's co-workers may cause an individual to be anxious when working with them because of the risks involved in engaging in co-operative behaviour. The anxiety, in turn, would likely cause the individual to lose focus on achieving the group outcome as he or she attempts to "protect their backside" by monitoring partners' actions, working to ensure personal success, and so on. (p.448)."

McAllister (1995) also identifies two negative behaviours associated with a lack of trust. Firstly, there are monitoring behaviours, where one person is dependent on another but perceives them not to be dependable, they then take actions such as the use of formal control mechanisms to reduce the uncertainty inherent in the situation. Secondly, defensive behaviours, are used when there is a lack of trust and such behaviours may include requesting assistance well in advance of time, drawing upon multiple and redundant sources when making requests for assistance, expending extra resources working around and avoiding others, and using official and formal (rather than informal) means to document requests (c.f. Ashforth and Lee 1990).

So it is clear that interpersonal trust is an important aspect of effective working relationships and that its development and maintenance is a means of facilitating functional integration. The concept of interpersonal trust therefore warrants greater examination and will be included in the conceptual model presented in this chapter. To

further assist in the development of the theoretical model proposed for this study a broad taxonomy of the variables thought to affect cross-functional integration (i.e., information sharing and co-operation, at both the departmental and individual level) is presented below. From this broad taxonomy, the key variables that have been identified in the literature as having a direct effect on individual level cross-functional relationships will be drawn. The following section will present this taxonomy.

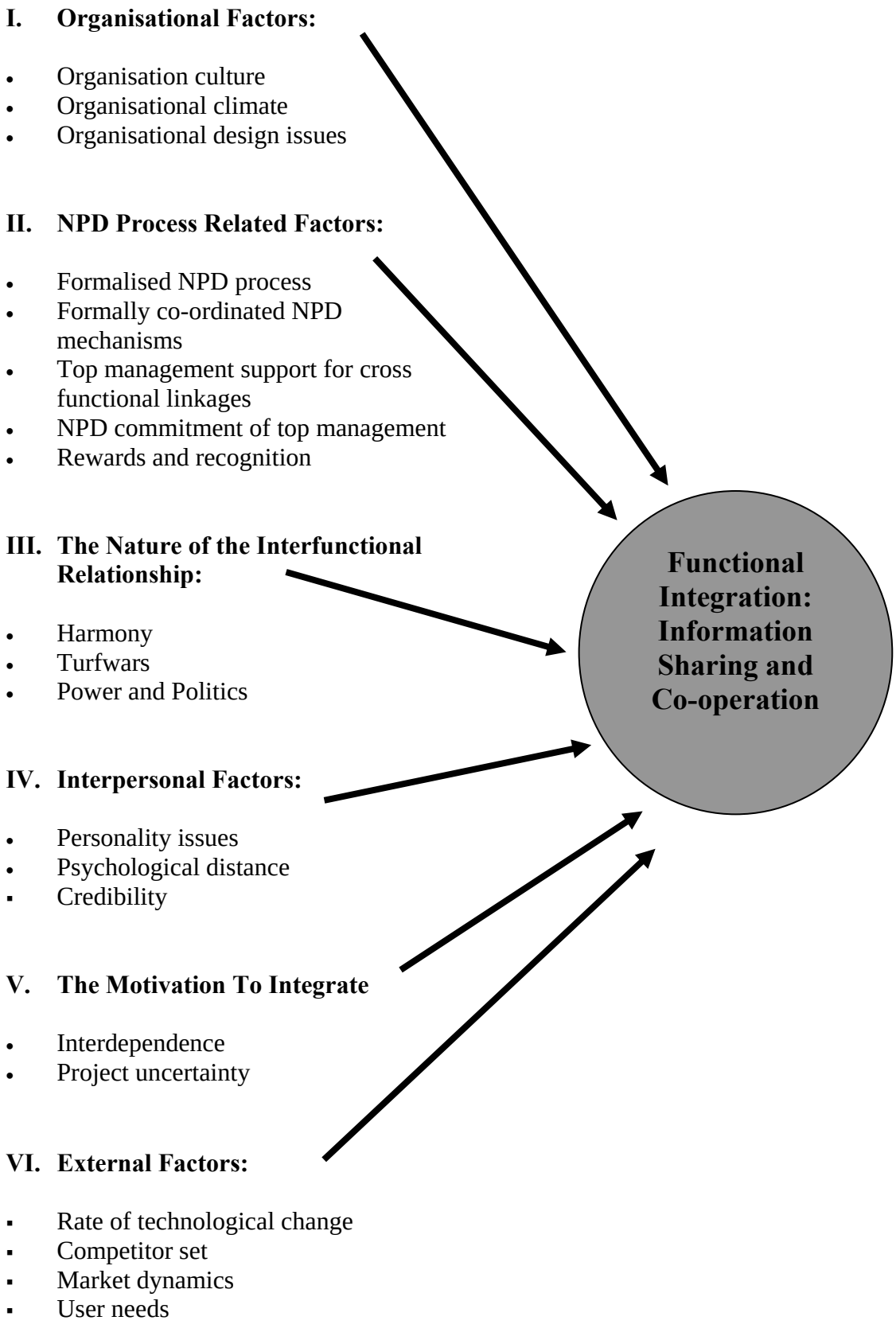
3.6 The Antecedents of Functional Integration between Marketing and R&D Functions

Researchers have found that many variables affect the level of integration between R&D and Marketing Managers (e.g., Gupta and Wilemon 1986; Ruekert and Walker 1987; Fisher, Maltz and Jaworski 1997; Song, Xie and Dyer 2000). These variables fall into six general categories: organisational factors, interfunctional rivalry, NPD process factors, interpersonal factors, the motivation to integrate, and environmental factors. These variables are thought to affect the level of information sharing and co-operation between both functions and individual managers and are presented in Figure 3.1. The following sections consider each of these categories individually.

3.6.1 Organisational Factors

Organisational factors have long been considered important variables in determining the levels of integration achieved between functional units during the NPDP (Lawrence and Lorsch 1965; Gupta, Raj and Wilemon 1988; Souder 1988; Griffin and Hauser 1996; Kahn 1996; Jassawalla and Shashittal 1998; Song, Xie and Dyer 2000). These organisational factors are: (1) organisational culture, (2) organisational climate, and (3) organisational design issues.

Figure 3.1: A Taxonomy of Factors Affecting Functional Integration in the New Product Development Process



3.6.1.1 Organisational Culture

Deshpande and Webster (1989) have defined organisational culture as the pattern of shared values and beliefs that help individuals understand organisational functioning and that provide norms for behaviour in an organisation. Whitener et al (1998) suggest that the culture of the organisation can impact on the behaviour of managers where:

> "cultures that value risk taking (a task related value) will reward and support managers who take such risks as sharing or delegating control to a subordinate regardless of the outcome. Similarly, cultures that share such interpersonal values as inclusiveness, open communication, and valuing people, will reward managers for collaborating, sharing information, explaining decisions, discussing issues openly, and showing concern (p.520)."

Deshpande, Farley and Webster (1992) distinguish between four types of organisational culture which can have effects on employee and manager behaviours: (1) clans – which emphasise cohesiveness, participation and teamwork, (2) adhocracies – which emphasise entrepreneurship, creativity and adaptability, (3) hierarchies – which emphasise order, uniformity and efficiency, and (4) markets – which emphasise competitiveness and goal achievement. Moorman (1995) investigated the role that these four types of cultures can play in organisational marketing information processes and new product outcomes for the firm. Conceptualising the NPD process as a series of information systems and processes internal to a firm, the results indicated that a clan culture is the best predictor of effective organisational information processes leading to better NPD outcomes. Further, these "information processes" are fundamentally "people

processes" that involve commitment and trust between co-workers. Fisher, Maltz and Jaworski (1997) suggested that managers who perceived that interfunctional information sharing was strongly encouraged or required by the organisation's culture were more likely to engage in behaviour that is consistent with that norm.

3.6.1.2 Organisational Climate

Desphande and Webster (1989) claimed that there was a need to more clearly distinguish between organisational culture and organisational climate as many organisational theorists had previously confused the two constructs. They viewed organisational climate as relating to employees' perceptions about the extent to which the organisation is fulfilling their expectations and to further clarify the distinction they cite Schneider and Rentsch (1987):

> "climate refers to the ways organisations operationalise the themes that pervade everyday behaviour – the routines of organisations and the behaviours that get rewarded, supported and expected by organisations (the 'what happens around here'). Culture refers to the history and norms and values that members believe underlie climate (the 'why do things happen the way they do') and the meanings organisational members share about the organisation's imperative (p.7)."

The role of organisational climate in facilitating functional integration has been of key interest to NPD researchers for some time (Souder 1981; Gupta, Raj and Wilemon 1986; Ruekert and Walker 1987). In particular, the role of top management in creating an organisational climate that supports product innovation has been a key focal point in

this research. Souder (1981) in particular emphasised the importance of top management in creating an organisational climate which would promote integration between functions and avoid the dysfunctional "Severe Disharmony" state which he identified as existing in many organisations between the R&D and Marketing functions. Souder suggested several process, cultural and leadership issues that could be addressed by top management to create an organisational climate conducive to effective functional integration:

> "Taking a proactive stance toward R&D/Marketing interface problems, breaking larger projects into smaller ones, avoiding power and status differentials, rotating personnel, encouraging dyadic relationships at lower organisational levels, using new product committees, implementing "Open Door" policies, selecting effective project managers, using nominal-interacting meetings and developing decision authority policies …… as ways of avoiding long-term regrets in product failures and organisational disruption (p.73)."

This perspective was also supported by Gupta, Raj and Wilemon (1986) who identified other integration-facilitating factors which are ultimately controlled by top management: (1) the value that top management place on interfunctional co-operation as perceived by the functional managers, (2) the degree to which senior management are perceived to support new ideas and tolerate NPD failure, (3) support for a team approach to NPD development, and (4) joint rewards for innovation success. The role of top management was viewed as a pro-active one, where their actions are designed to facilitate functional integration rather than playing a reactive role as problem solvers.

3.6.1.3 Organisational Design Issues

Organisational design addresses the way corporate NPD activities can be structured to facilitate integration between the two functions. For example, Gupta, Raj and Wilemon (1986) depicted the new product development process as a set of information gathering activities designed to reduce uncertainty, and they emphasised that:

> "an important role of the organisation during the information process is gathering and processing environmental information. The organisation's structure, then, is a critical variable determining the information processing potential between its sub-units and with the environment (p.10)."

Gupta and Wilemon (1988) identified several organisational structure characteristics drawn from the organisational management literature that affect communication and co-operation between the Marketing and R&D functions. Firstly, there is the degree of organisational centralisation – which is conceptualised in terms of hierarchy of authority and degree of participation in decision-making. The higher the level at which management decision-making takes place within the organisation and the less the participation of subordinates in the decision-making process, the greater the degree of centralisation. Secondly, there is the degree of formalisation – which is the emphasis placed within an organisation on following rules and procedures. Formalisation has been found to act both as a facilitator and a barrier to integration depending on the context. Griffin and Hauser (1996) reviewed the integration literature and identified a number of structural mechanisms that could be used to organise the NPD effort: (1) permanent interfunctional co-ordinating groups which help in conflict resolution and the elimination of language barriers, (2) matrix organisations where group composition is

flexible and fluid, designed to overcome issues with “functional silos” and “over the wall” product development, and (3) cross-functional teams where all functions are represented and information is exchanged more efficiently and conflict resolution occurs without the intervention of senior management. Olsen, Ruekert and Walker (1995) also identified several structural co-ordination mechanisms which are used to co-ordinate interfunctional interactions: (1) bureaucratic controls, highly formalised and centralised approaches, (2) individual liaison roles, where people are assigned from one functional area to communicate and co-ordinate with another functional unit, (3) temporary task forces, (4) integrating managers who are similar to liaison officers but who have been delegated considerable top management authority to support their role, (5) matrix structures, and (6) design teams and design centres.

As exemplified by the foregoing discussion a wide range of studies have shown that the decisions top management make regarding the organisation of human resources do impact upon the level of cross-functional integration achieved. Many of the behaviours of personnel within an organisation are shaped by their interpretation of these organisational “cues” and “expectations” of work behaviours.

3.6.2 The New Product Development Process

The management of the processes by which new products are developed (NPDP) affects the level of functional integration between Marketing and R&D. These processes include: (1) the extent of formal co-ordination of the NPD process, (2) the project control mechanisms employed, (3) the degree of top management support for cross-functional linkages, and (4) the degree of top management NPD commitment. The extent to which the NPD process of an organisation affects interpersonal working

relationships has received some research attention and will be addressed in the following section.

3.6.2.1 Formalised NPD Processes

The way organisational resources (i.e., human, financial and physical resources) are organised for the development of new products has often been considered a major contributing factor to NPD success (Crawford 1987; Cooper and Kleinschmidt 1987; 1990; Olson et al 1995; Griffin and Hauser 1996). Some of the formally structured NPD processes used by organisations have included: quality functional deployment (QFD), (Griffin and Hauser 1992; Griffin 1993), concurrent engineering (CE), and Stage-Gate processes (Cooper 1990), with all aiming to improve integration between functions. Researchers have found varying degrees of success for such formalised processes (Griffin and Page 1993, 1996; Olsen, Ruekert and Walker 1995), with no conclusive evidence as to the superiority of one process over another. Moenaert et al (1994) stated that "during development, the issue at hand is clearly making a trade-off between autonomy and control …… Innovating organisations are in need of formal mechanisms that enhance the communication process, without creating a burden and an overload on procedures (p.39)". The way that individual NPD projects are structured in terms of formalisation and centralisation has been suggested as an important determinant of effective cross-functional relationships (Olson, Ruekert and Walker 1995; Fisher, Maltz and Jaworski 1997; Jassawalla and Shashittal 1998; Song, Xie and Dwyer 2000).

3.6.2.2 Formally Co-ordinated NPD Mechanisms

The role of co-ordinating mechanisms within formalised NPD processes has received considerable attention. Olson, Walker and Ruekert (1995) outlined and empirically

examined the types and effectiveness of the various forms of lateral linkages or structural co-ordination mechanisms that organisations have relied on to facilitate cross-functional communication and co-ordination. They identified several such mechanisms (c.f Galbraith and Nathenson 1978): bureaucratic control/procedures, individual liaisons, temporary task forces, integrating managers, matrix structures, design teams and design centres. The use of such formal approaches to integrate the relevant functions by prescribing rules and procedures for product development activities has been a popular top management approach to overcoming many of the barriers to integration suggested by the literature.

Such barriers to integration include: firstly, cultural differences – where Marketing and R&D personnel are thought to be fundamentally different on a number of key variables e.g., goals and aspirations, needs, and motivation (Saxburg and Slocumb 1968). Dougherty (1992) refers to the existence of "cultural thought worlds" where there are fundamental differences in terms of time perspectives and project priorities. Secondly, there are interpretative barriers – as cultural thought worlds emerge jargons develop within functions which inhibit mutual understanding (Dougherty 1992). Thirdly, there are turf barriers – which are battles over resources and project control (Ashforth and Lee 1990). Fourthly, communication barriers exist – a lack of communication, poor quality of communication (Gupta, Raj and Wilemon 1986). Fifthly, there may be physical barriers, for example where Marketing and Technical personnel are located in different locations (Allen 1970). Finally, there may be differences in rewards and recognition – where personnel feel that there is great disparity between the two functions in the way that senior management rewards them, both financially and in terms of status and recognition for their NPD efforts (Souder 1981, 1988; Griffin 1992).

3.6.2.3 Project Centralisation

Moenaert et al (1994) define project centralisation as the extent to which project-related communication, decision-making and power is concentrated in the hands of a relatively few individuals in a project team (e.g., the project leader) or the top management of the organisation. The literature suggests that centralisation has a negative effect on communication and information sharing activities (Hage and Aitken 1967; Gupta, Raj and Wilemon 1988; Ruekert and Walker 1987; Moenaert et al 1994). Moenaert et al (1994) found that project centralisation had a negative relationship with communication flows between functions and also a negative effect on interfunctional climate. Decentralised project decision-making is thought to have considerable advantages, including increased resource exchange, mutual assistance, accurate communication and greater confidence among functional groups (Tjosvold, Johnson and Johnson 1984). Jassawalla and Sashittal (1998) found that decentralisation lead to high levels of functional integration with evidence of collaborative behaviours, while, highly centralised processes resulted in low levels of integration. Ayers, Dhalstrom and Skinner (1997) found a positive association between centralisation and NPD outcomes when examining NPD success in one hi-tech computer company.

3.6.2.4 Organisational Environment for NPD

The environment for innovation in organisations can often be attributed to senior management actions. Souder and Chakrabarti (1978) found that successful new product teams placed considerable value on joint rewards and responsibility for new product success or failure, and the clear signals received from senior management that co-operation and collaboration between functions was highly valued. In their review of the NPD literature, Brown and Eisenhardt (1995) found senior management *support* is most

critical to successful new product development (c.f Cooper and Kleinschmidt 1987; Gupta and Wilemon 1990) where such support is provided by the way of resources (e.g., both political and financial) to project teams. Jassawalla and Sashittal (1998) view the impact of the organisation on interpersonal collaboration as consisting of top management resource allocation decisions that affect: (1) the extent to which participants overcome perceptual differences between themselves and other functional specialists (e.g., in terms of qualifications, orientations, and interests), and identified with the collaborative intents of the NPD processes, (2) the relative power of functional groups in the NPD and hence their stakeholding, and (3) how participants defined their own behaviours and roles in the NPD process and interacted with others. Their results indicated that in "high collaboration firms", top management played a major role in achieving collaboration between NPD participants especially when the participants perceived that top management gave high priority to NPD by the many "top management deed and proclamation" statements that explicitly identified product innovation as a central focus for the organisation. Song, Xie and Dyer (2000) suggested that top management support for organisational linkages is an important factor in achieving effective cross-functional integration:

> "when senior management provides clear objectives and appropriate organisational structures, it increases the chances that cross-functional integration efforts will succeed. Such support works not only by providing necessary financial and political resources but also signaling that the organisation values co-operation (p.52)."

Song, Xie and Dyer (2000) provided strong empirical evidence showing that senior management support for integration leads to better new product outcomes. They found that this support is evidenced not only by the provision of resources, but also through signals to the organisation and project group members that co-operation is valued.

3.6.2.5 The Nature of the Interfunctional Relationship

The nature of this working relationship, and its role in shaping the work behaviours of personnel in these functional units towards one another, has been the focus of many NPD studies. The general approach taken within the NPD literature regarding the nature of this working relationship between the functions has been to describe it in either, positive terms (e.g., harmonious, quality), or negatively, by describing how it is manifested in an organisation (i.e., disharmony, turf wars, rivalry). Moenaert et al (1994) found that communication flows between Marketing and R&D increased where there was a positive "interfunctional climate", which was defined as the "degree of interest, trust, awareness, and support between the R&D and Marketing function" (p.32). Song, Neeley and Zhao (1996) also found that high quality cross-functional relationships had a strong positive effect on information exchange and perceptions of information quality.

Whereas, in his seminal studies, Souder (1981,1988) determined the extent of interfunctional harmony between Marketing and R&D on the basis of three dimensions: co-operation demonstrated by the parties, the feelings of warmth expressed by each party toward the other, and, the sense of mutual commitment felt by the two parties. Unfortunately, Souder found that "disharmony" between the functions was more the rule than the exception. Such "disharmony" often leads to a number of negative

behaviours by functional groups who become motivated to protect what they see as their territory and would take defensive measures to protect themselves against any political manoeuvring by other functions (Ashforth and Lee 1990; Frankwick, Ward, Hutt, Reinegen 1994; Workman 1998). These powerplays and internal politics which exist in most organisational settings are thought to have a direct effect on effective working relationships (Weber 1947; Deutsch 1949, 1973) yet remain an under researched area in the field of NPD studies (Jones and Stevens 1999).

3.6.3 Interpersonal Factors

When people interact they make judgments about each other based on previous experience and other evidence at hand (Blau 1964). The way managers perceive other Managers has long been of interest to integration researchers as it affects behaviours in the NPD process. As the role of senior management is to integrate functional specialists in complex NPD tasks, the role that interpersonal perceptions play in facilitating or hindering that process is relevant for the study of cross-functional working relationships.

3.6.3.1 Personality Factors

Lucas and Bush (1988) empirically tested the extent to which personality traits would influence the success of, and perceived satisfaction with, the level of integration between R&D and Marketing Managers. By measuring 16 separate personality factors, Marketers were found to be more dominant and assertive, as well as more “happy-go-lucky” and enthusiastic, more venturesome and spontaneous than their R&D counterparts. Their R&D counterparts scored significantly higher on the self-sufficiency dimensions. No other major differences were found, indicating that both

groups studied were fairly equal in intelligence, ego strength, conscientiousness and other factors. These differences were in turn, were thought to affect two factors critical in achieving interfunctional integration, i.e., communication behaviours and the formation of mutual understanding between managers. The strong relationship between satisfaction with the interdependency and a personality trait of the Marketing staff of being "more casual and following own urges" enabled Marketing staff to bypass formal organisational policy and NPD procedures which constrained their relations with R&D, by helping them take the initiative and seek informal relationships thus improving understanding between managers.

3.6.3.2 Psychological Distance

Socio-cultural differences between differing functions have been suggested as barriers to integration. Departmentalisation has lead to "functional silos" whereby functions operate individually and pass their completed work "over the wall" to each other (Griffin and Hauser 1992). Subsequently, separate "thought worlds" begin to emerge where a community of persons engaged in a certain domain of activity develop a shared understanding about that activity (Dougherty 1992). As a result differences between functions occur in terms of the knowledge possessed, the language and jargon used, procedures and methods employed, as well as their goal orientations in terms of time and risk. These approaches then become part of the firmly-entrenched cultures of these functional groups due to the compartmentation that occurs. Empirical evidence provides significant support for such constructs as "cultural thought worlds", "language barriers" and "goal differences" which inhibit mutual understanding between Marketing and R&D staff (Gupta, Raj and Wilemon 1986a; Ruekert and Walker 1987; Souder 1987). To address these barriers to integration, Fisher, Maltz and Jaworski (1997) tested empirically the concept of "psychological distance", which they defined as the

similarities in a functional managers' decision-making style and their orientation towards key aspects of the NPD process (i.e., technological and customer) compared to their counterpart manager. Fisher, Maltz and Jawoski (1997) have shown that psychological distance has a positive relationship with communication behaviour, specifically bi-directionality and communication frequency, and also on perceived relationship effectiveness.

3.6.3.3 Perceived Credibility

Gupta and Wilemon (1988) proposed that the perceived credibility of Marketing Manager had an effect on the perceived credibility of marketing input into NPD. They found that Marketing Managers were perceived as credible if they: (1) were co-operative, open and trustworthy, (2) competent and helpful, (3) friendly and social, (4) fair and easy to work with, (5) know some of the technical aspects of R&D tasks, (6) seen as a rational decision-maker, and (7) respected. Shaw and Shaw (1998) also found evidence that Marketing personnel were not generally viewed as credible by their engineering counterparts. As the NPD is viewed as an information sharing process, source credibility will clearly affect the use of information. As the primary role of the Marketing function is to gather and analyse information regarding the customer and then pass it on to their technical counterparts, the way Marketing personnel are perceived can clearly affect the utility of their information (Moenaert and Souder 1990).

3.6.4 The Motivation to Integrate

There are several possible reasons for a manager to seek a relationship with another manager, e.g., citizenship behaviour, task specification, role expectations, and social interaction, yet the most common reason cited in the NPD literature is that of interdependence due to project uncertainty where the specialist skills of functional

managers are relied upon to assist in tasks that are not familiar (Olson, Ruekert and Walker 1995). The motivation to integrate takes on particular importance in the study of cross-functional working relationships as studies (Dougherty 1992; Fisher, Maltz and Jaworski 1997) have shown that functional specialists often focus on their own departmental issues and become reluctant to engage with others on NPD issues.

3.6.4.1 Interdependence

The interdependence between Marketing and R&D is a key consideration in the NPD literature. The more a function believes they depend on the other function, the greater the interactions and resource flows across the functional boundary and the more influence the information-providing group has over the information-receiving group (Gupta, Raj and Wilemon 1986; Ruekert and Walker 1987; Olsen, Walker and Ruekert 1995). Gupta, Raj and Wilemon (1988) identified 19 NPD activities (Fig 1.1) requiring integration based on resource-dependence theory, where one party needs another party to achieve it goals (Pfeffer and Salancik 1978). Applying this reasoning to the interpersonal level, the extent to which a functional manager believes that he or she needs the specialist skills of another manager to accomplish mutual NPD tasks will also impact on the behaviours exhibited in the working relationship between the two.

3.6.4.2 Project Uncertainty

The nature of NPD involves the development of products which range from product modifications or minor improvements through to “new to the world” radical breakthrough products (Booz, Allen and Hamilton 1982). Such a range of NPD tasks can often draw NPD participants into unfamiliar task situations and Olsen, Ruekert and Walker (1995) found that new and innovative products (usually perceived to be a

greater challenge) to employees requiring more assistance from functional specialists in terms of expertise and resources.

3.6.5 External factors

Gupta, Raj and Wilemon (1986) suggested that the level of R&D/Marketing integration required by the firm depends on the organisations' innovation strategy and the perceived environmental uncertainty within which the firm operates. Higher risk development projects e.g., hi-tech/leading edge projects with greater environmental uncertainty require greater levels of integration. Song and Parry (1992) have empirically tested Gupta, Raj and Wilemons' (1986) model in Japanese hi-tech firms, generally finding support for these hypotheses, i.e., firms with "prospector" innovation strategies (first movers into a new area) were more effectively integrated than firms with "analyser" innovation strategies. Song, Montoya-Weiss and Schmidt (1997) found that four external forces i.e., market competitiveness, the rate of technological change, competitor response time and environmental uncertainty, did not have effect on cross-functional co-operation.

In summary, the taxonomy described here has identified variables that have been found to be antecedents of functional integration, a situation which is characterised by information sharing and co-operation between the Marketing and R&D functions. From this taxonomy will be drawn many of the variables that are thought to be relevant at the *interpersonal* level and will then be used in a new conceptualisation of the interpersonal working relationship between Marketing and R&D Managers. The following section will describe the theoretical background used for this new conceptualisation of the Marketing Manager and R&D Manager's cross-functional working relationship at the interpersonal level.

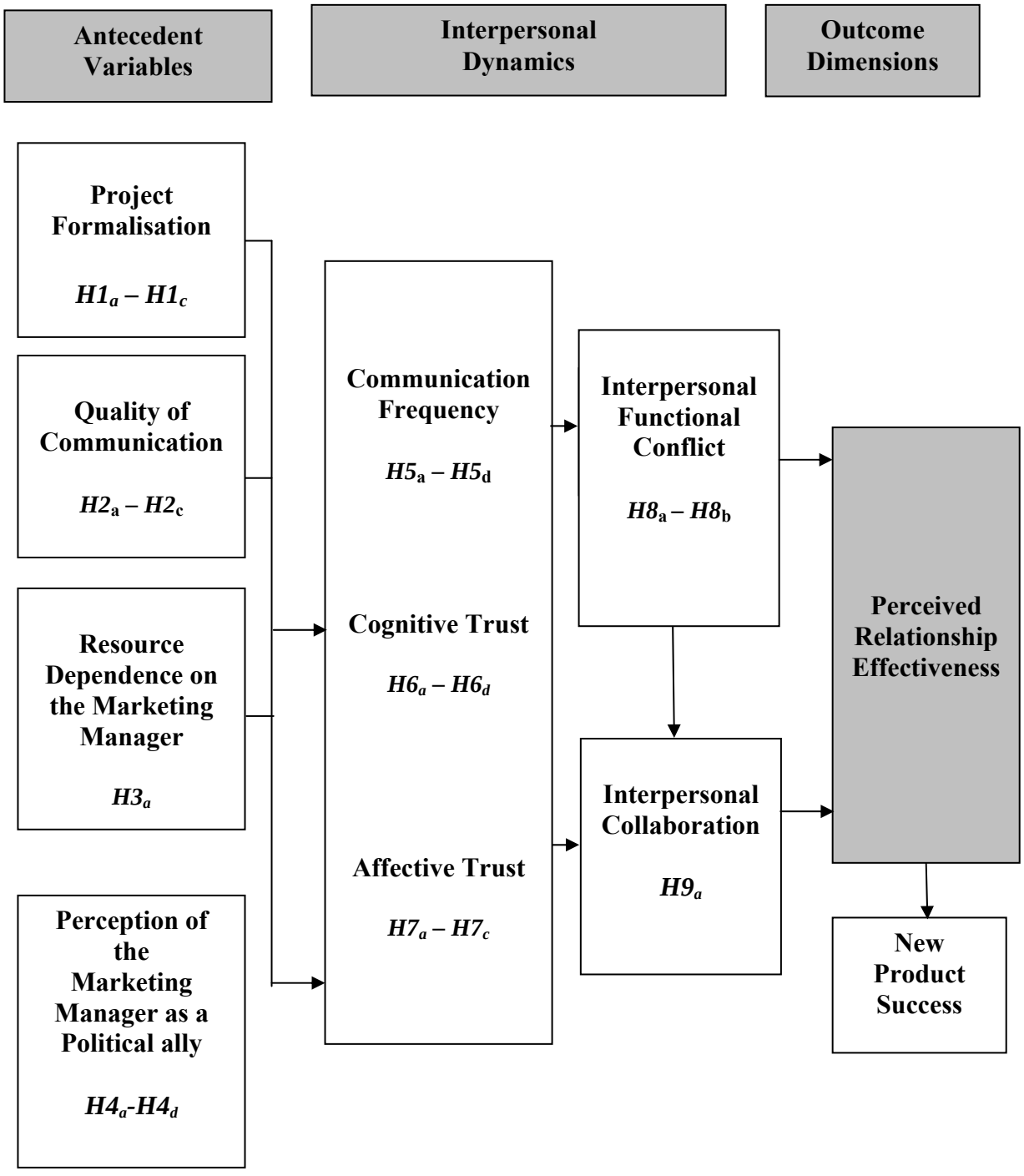
3.7 Proposed Model and Hypotheses

The theoretical model proposed here aims to address the shortcomings of previous conceptualisations of cross-functional working relationships by paying closer attention to the interpersonal dynamics that are central to effective relationships. The theoretical frameworks used here are, the “resource dependence” theory (Pfeffer and Salanzck 1978), and the “social exchange theory” (Blau 1964). These two theoretical approaches are complementary for the analysis of working relationships as they cover the gambit of initial relationship formation through to long term established working relationships. The “resource dependence” theory provides a framework for working relationships between Marketing Manager and R&D Manager which are driven by the need to achieve common goals (Ruekert and Walker 1987). Whereas the social interaction theory, incorporates managers’ behaviour towards a counterpart from their initial contact (which may be organisationally initiated), to the development of the more social aspects of relationships (e.g., advice, social support and friendship) and eventually develop into “collaborative” relationships. These two theoretical frameworks allow the interpretation of the interpersonal dynamics in a highly complex and inherently risky corporate activity, the development of new products.

The new conceptualisation of the Marketing Manager and R&D Manager working relationship presented here (Fig 3.2) incorporates many of the key factors associated with functional integration (e.g., information sharing and co-operation) from the taxonomy presented earlier, however, it is beyond the scope of this study to examine all possible antecedent variables. Specifically, environmental factors will not be examined in this research as previous empirical evidence suggests (Fisher, Maltz and Jaworki 1997; Song, Montoya-Weiss and Schmidt 1997) that external factors, such as competitive intensity and the rate of technological change, are not significant predictors

of functional integration, as previous research had suggested (Gupta and Wilemon 1988; Ruekert and Walker 1987). The model presented here will only include those variables that have been identified as having a causal-effect on the interpersonal dynamics between the Marketing Manager and the R&D Manager.

Figure 3.2: Antecedents and Consequences of an Effective Cross-Functional Working Relationship (CFR) and Corresponding Hypotheses



The following section will discuss and define the explanatory variables as well as the dependent variable which form the basis of this research. The explanatory variables are categorised as antecedent and intervening variables. There are 4 antecedent variables in this study: (1) project formalisation, (2) the perceived quality of communication received by the R&D Manager from the Marketing Manager, (3) the perceived dependence of the R&D Manager on the Marketing Manager, and (4) the perceptions of the Marketing Manager as a political ally. The intervening variables are: (1) communication frequency, (2) perceived cognitive-based trust in the Marketing Manager (3) perceived affect-based trust in the Marketing Manager, (4) interpersonal functional conflict, and (5) interpersonal collaborative behaviours. The dependent variable is perceived relationship effectiveness. The following discussion will begin with the dependent variable to facilitate a better understanding of the purpose of the research.

3.8 The Dependent Variable: Perceived Relationship Effectiveness (PRE)

When two participants interact there are consequences that occur for the individuals involved, the functional units they represent and the organisation as a whole (Ruekert and Walker 1987). The perceived effectiveness of interdepartmental relations is a psychosocial measure developed by Van de Ven (1976) which assesses the perceptions of those personnel who interact with others from differing functional areas. Specifically, it measures whether they perceive their relationship to be worthwhile, equitable, productive and satisfying. Ruekert and Walker (1987) adapted this measure of perceived relationship effectiveness for use at the interpersonal level rather than the interdepartmental level. Several studies have also used this subjective outcome measure (Anderson and Narus 1990; Smith and Barclay 1997). Smith and Barclay (1997) in their

investigation of buyer-seller relationships argued that objective measures may not be the most accurate as they are easily confounded by external factors e.g., long sales cycles. This argument holds true for the NPD process, where numerous variables come into play when determining the success or failure of a new product. It may on occasion be misleading to link relationship effectiveness to such measures; for example, a working relationship may indeed be very effective but other factors such as competitors' actions, poor management of the NPD process, under resourced product launches and so forth may render the project outcome to be a failure e.g., in terms of ROI, profit, sales etc. In a contrasting situation, the working relationship may not be very effective but due to a patented technological breakthrough the firm may gain a competitive advantage in the marketplace which then compensates for the poor internal relationships.

Perceived relationship effectiveness will be the dependent variable for this study and is defined as: how worthwhile, equitable, productive and satisfying the R&D Manager perceives his or her working relationship with the Marketing Manager to be. It is particularly appropriate as it captures the complex nature of interpersonal relationships from the participants' perspective, where interpersonal conflict, trust and collaborative behaviour all play a role in determining the ultimate effectiveness of the working relationship.

3.9 The Antecedent Variables

The antecedent variables examined for this study have been drawn from the literature review and from the qualitative research conducted for this study. These variables are thought to have the greatest explanatory power regarding the effectiveness of individual level working relationships within the NPD. This is a major point of differentiation for

this study, where the main explanatory variables operate at the interpersonal level. Previous studies of functional integration have mainly included organisational level and external variables into their conceptualisations of CFRS (Gupta and Wilemon 1988; Ruekert and Walker 1987; Fisher, Maltz and Jaworski 1997; Song, Xie and Dyer 2000). The following section will present several research hypotheses for empirical testing and will justify their inclusion in the conceptual model for this study.

3.9.1 Communication-based Antecedent Variables

Moenaert and Souder (1990a) argued that the innovation process "is essentially informational, ... the transfer of information is therefore the major vehicle that allows individuals to become integrated (p.98)". The role of communication is to reduce uncertainty in the NPD process through information transfers between functional units regarding customer preferences, competitors and the environment (Souder and Moenaert 1992). The NPD literature clearly identifies information transfer between Marketing and R&D as one of the key antecedents to effective CFRs and provides theoretical justification and empirical evidence for the proposition that an increased volume of information transfer is associated with greater integration between the Marketing and R&D functions, and subsequently with a higher level of NPD success. (Gupta, Raj and Wilemon 1988; Ruekert and Walker 1987; Griffin and Hauser 1996; Moenaert et al 1992). Whether, how often and how well functional managers communicate with each other has implications for the perceived effectiveness of their working relationship. Identified in the NPD literature are five key communication attributes: (1) communication frequency i.e., the *amount* of communication between functions, where the intensity of information flows through all available forms of communication are measured (Van de Ven and Ferry 1980), (2) project formalisation –

the degree to which communication levels are affected by the degree project formalisation as specified by top management (Lawrence and Lorsch 1965), (3) the perceived *quality* of information – how credible, understandable, relevant and useful for task completion is the information provided from one party to another (Gupta and Wilemon 1988), (4) *bi-directionality* of information – where information flows are viewed as two-way processes, where communication is typified by feedback, high frequency, more informal modes, and indirect content (Mohr, Fisher and Nevin 1996), and (5) how marketing information is *used* by the recipient – there is a distinction between *instrumental* and *conceptual* use of information. Instrumental use of information refers to the use of information received from the marketing function to solve a particular problem or make a particular decision. Conceptual use refers changes in the users' overall knowledge and understanding of the situation (Moenaert et al 1994).

Of these communication attributes, perceived quality of communication, project formalisation and communication frequency are included in the conceptual model. Specifically, project formalisation and quality of communication are treated as antecedent variables, whereas communication frequency is treated as a process variable, the justification for this decision will be given in the following sections. The directionality of communication was not used in this study even though "bi-directionality" has been found to be a significant explanatory variable in effective working relationships (Mohr, Fisher and Nevin 1996; Fisher, Maltz and Jaworski 1997). However, Mohr and Nevin (1990) described bi-directionality as part of a "collaborative communication strategy", and as "interpersonal collaborative behaviour" is measured in this study it is argued that there is no need to also measure bi-directionality as Managers

who exhibit collaborative behaviour by definition will be engaged in two-way communication and information exchange. An examination of the "usage" of marketing information by R&D Managers is beyond the scope of this study, however this study does examine some of the antecedents of market information use e.g., information quality, competence, politics and will thereby add to our knowledge in this area.

By examining the nature of interpersonal communication in terms of three dimensions, i.e., project formalisation, the perceived quality of communication, and communication frequency, this approach is expected to provide a deeper understanding of the role of communication in effective interpersonal relationships within the context of NPD projects.

3.9.2 Project Formalisation

The flow of communication between functions has been found to have positive effects on functional integration and new product outcomes (Table 2.3). Many of the formal NPD processes prescribed in the literature (e.g., stage-gate, concurrent engineering, quality functional deployment) place a heavy emphasis on project formalisation as an effective means of facilitating information exchanges between functions. "Project formalisation" refers to the emphasis placed within the project team on following procedures during NPD (Moenaert et al 1994). As part of project formalisation, top management or the functional heads typically prescribe a minimal level of communication between the functional units when they are working together on NPD projects. The respective functions are then forced by the increased use of rules and standard operating procedures to communicate more often (Ruekert and Walker 1987). This increased communication allows assessments of each other's abilities and

competencies to be made. Moenaert et al (1990), in a pilot study examining information use during the NPD, interviewed R&D personnel and found that the formalisation of innovation activities increased both formal and *informal* communication with Marketing. Song, Neeley and Zhao (1996) found that formalised rules and procedures had a small positive effect on information exchange between Marketing and R&D in NPD projects. Accordingly it is hypothesised that:

$H1_a$: Greater project formalisation will lead to higher communication frequency between the R&D Manager and the Marketing Manager.

Other researchers have found that formalised communication actually has a negative effect on new product outcomes (Maltz and Kohli 1996; Fisher, Maltz and Jaworski 1997; Kahn and Mentzer 1998) and at the interpersonal level, highly formalised communication will have a negative effect on performance outcomes. McAllister (1995) suggested that highly formalised communication processes inhibit the development of affect-based trust which is often developed through informal and social interaction between managers. This view was shared by McEvily, Perrone and Zaheer (1995) who suggested that a highly formalised communication process does not provide enough information about the other manager to determine their motives and intentions or whether they are merely acting out organisationally constrained roles. Accordingly, it is hypothesised that:

$H1_b$: Greater project formalisation will lead to a lower level of affect-based trust between the R&D Manager and the Marketing Manager.

The interaction between managers that occurs as a result of project formalisation, necessitates they exchange their expectations of the project in terms of information requirements, goals and timeframes. This exchange process provides an opportunity for the R&D Manager to assess the Marketing Manager (i.e., in terms of professionalism, competence, trustworthiness) and his/her dedication to the task (Souder 1988; Gupta and Wilemon 1988). The formalised nature of the negotiation of communication commitments to each other provides an opportunity for the display of "professional behaviours" that is expected from senior people within an organisation (Good 1980). This particularly important in the NPD process where previous studies have indicated that a major source of conflict is due to R&D feeling that Marketing are unprofessional in their approach as often there is little consultation on project matters with R&D (Workman 1993). Accordingly it is hypothesised that:

$H1_c$: Greater project formalisation will lead to a higher level of cognitive-based trust between the R&D Manager and the Marketing Manager.

3.9.3 Perceived Quality of Information Received by the R&D Manager

As the R&D function typically relies upon the information received from the Marketing function to help them achieve their NPD goals, the perceived *quality* of this information is an important antecedent of effective functional integration and effective individual level working relationships. In their seminal study, Hovland, Janis and Kelley (1953) suggested that source credibility is an important factor influencing the perceived quality of information, the listener must be able to trust the speaker. The source-credibility perspective has been investigated in the NPD by Gupta and Wilemon (1988) who examined the perceptions of information quality received by R&D from Marketing (c.f

Gupta, Raj and Wilemon 1985). They found that "good quality" marketing information was viewed as realistic and valid, objective, consistent and complete, useful, and appealing. Significantly, when the marketing information received was thought to have these characteristics the Marketing Manager in turn was perceived as "significantly more co-operative, trustworthy, competent, friendly, and knowledgeable ……. a highly credible manager was perceived to be providing high quality information (p.28)". This view was supported by Jassawalla and Shashittal (1998) who found that in companies with high levels of functional integration, the Marketing Manager was viewed as professional and competent because his or her marketing information inputs were seen to be of high quality. Such perceptions are believed to increase communication flows, as the exchanges are seen as highly relevant and credible. Accordingly it is hypothesised that:

$H2_a$: The greater the perceived quality of communication from the Marketing Manager the higher the communication frequency.

$H2_b$: The greater the perceived quality of communication from the Marketing Manager the higher the cognitive-based trust.

$H2_c$: The greater the perceived quality of communication from the Marketing Manager the higher the interpersonal collaborative behaviour.

3.9.4 Resource Dependence on the Marketing Manager

Many of the conceptualisations of functional integration between the Marketing and R&D functions have used the "resource dependence" framework (Pfeffer and Salancik 1978, Thompson 1967) to explain interactions between functions (Gupta, Raj and

Wilemon 1986; Ruekert and Walker 1987; Olson, Ruekert and Walker 1995; Griffin and Hauser 1996; Fisher, Maltz and Jaworski 1997). Resource dependence reflects the reliance of one functional area on another for the resources required to accomplish their own functional goals and objectives. This perspective was taken by Ruekert and Walker (1987) who argued that "for marketing and other personnel to do their jobs, there must be an exchange of money, material, information, technical expertise, and other resources. (p.2)". Results of their study showed that the more members of one department perceived themselves to be dependent on another department, the greater the amount of interaction, and influence one department had over the other. Research by Fisher, Maltz and Jaworski (1997) also found a positive correlation between frequency of communication and perceived interdependence when examining communication between Engineers and Marketers during NPD. On the basis of these findings, it is hypothesised that:

$H3_a$: The greater the perceived dependence of the R&D Manager on the Marketing Manager the higher the level of communication frequency.

3.9.5 Perceptions of the Marketing Manager as a Political Ally

"Politics" refers to the efforts of organisational members to mobilise support for or against policies, rules, goals, or other decisions in which the outcome will have some effect on them (Robbins 1987). Politics are an everyday aspect of organisational life, where individuals and subunits, continually engage in politically-oriented behaviour (e.g., bargaining, negotiating). Such a political orientation is characterised by behaviour that: (1) is usually outside the recognised formal hierarchy of authority, (2) is designed to be beneficial to an individual or subunit, and (3) is intentional and designed to

acquire and maintain “power” (Ivancevich and Matteson 1990). Burns and Stalker (1994) argued that “no concern, it is safe to say, is without political or social conflict which generate, or contribute to, manifest inefficiencies of communication within the working organisation (p.188)”. The political behaviour of NPD participants has been implied through the use of concepts such as “turf wars” (Ashforth and Lee 1990) or “interfunctional” rivalry (Lewicki et al 1992; Maltz and Kohli 1996; Moenaert et al 1994; Maltz, Souder and Kumar 2001) yet has not so far been explicitly measured at an interpersonal level.

Maltz, Souder and Kumar (2001) found that interfunctional rivalry severely reduced the “use” of marketing information supplied by marketing personnel to R&D. High levels of interfunctional rivalry were found to inhibit the use of both instrumental (i.e., information to solve a specific problem) and conceptual marketing information (i.e., information for general enlightenment about a topic area). Moenaert et al (1990) found that when managers received information from other functional units, they were suspicious about the objectives of those passing on this information and were hesitant to “use” the information unless they could be satisfied as to the motives of the source.

Smith and Barclay (1997) examined the perceived motives and intentions of exchange partners in business-to-business relationships. They defined perceived motives and intentions as the extent “to which partners perceive the purpose or agenda behind the other’s actions as being benevolent or benign; it is concerned with underlying causes of behaviours (p.6)”. Smith and Barclay (1997) found that the belief that an exchange partner had benevolent motives and intentions predicted relationship investment. It is this assessment of the “motives and intentions” of a counterpart, that is a major aspect

of interpersonal political behaviour. As stated earlier the trust literature clearly identifies "perceived intentions" as critical in determining whether a person can be trusted or not. Trust leads to positive interpersonal dynamics such as communication, co-operation and collaboration, while distrust has negative consequences e.g., conflict, misinformation, blocking behaviours. Interpersonal political conflict, and the associated distrust, can have negative outcomes for individuals in terms of status, reputation, resources, promotion and their position within an organisation is not conducive to effective working relationships. Jones and Stevens (1999) highlighted the fact that the discussion of NPD integration has neglected the vital role that organisational politics play in the NPD process and that, as the central decision makers the R&D Manager and the Marketing Manager are often key political players:

> "Organisations are in a constant state of flux: employees leave, new staff are recruited, strategies are changed or revised, new products or services are introduced and processes are modified. To propose that such changes occur without a political dimension is simply untenable. The various "sectional interests" of groups and individuals becomes particularly apparent during the NPD process. Reputations, and consequently career prospects, can be enhanced or ruined according to the success or failure of a new product or service (p.175)."

The qualitative interviews conducted as preliminary research for this study revealed that organisational politics are an important factor in many firms' NPD processes, and that knowing your "political friends" and "political enemies" has implications for many NPD decisions such as project selection, resource allocation, interpersonal

communication levels and collaborative behaviours. In particular, interviewees felt believing that a functional counterpart would not act malevolently or opportunistically against them, but rather would assist in achieving mutually beneficial outcomes, is critical for effective working relationships. This is the benevolence dimension that some researchers have attributed to trust (Deutsch 1960; Morgan and Hunt 1994). It is this "belief" about the Marketing Manager and his/her "expected behaviours" that is the very basis of affective-based trust. On the other hand, where there is a belief or expectation that the other manager will act in a manner detrimental to one's own interests, there can be little or no trust.

On the basis of theoretical, empirical and qualitative research, the new construct of "Perceptions of the Marketing Manager as a Political Ally" was created. It is viewed as an appropriate antecedent variable for this project level research because it is applicable for both new and existing work relationships. Where a new working relationship is formed for an NPD project, the R&D Manager would still have an initial assessment of the Marketing Manager on a political level by using the "political" relationship that the two functions have as a guide, thus associating the "attributes" of the Marketing functions politics to the individual manager (Kramer 1991; Morgan and Hunt 1994). If the two functional managers had worked together on previous projects, an assessment of the Marketing Manager either as a political friend or political enemy would be made from previous relational exchanges (Morgan and Hunt 1994). If the R&D Manager perceives that the Marketing Manager has benevolent political intentions, or will refrain from opportunistic behaviour, it is far more likely that positive interpersonal dynamics will occur. Accordingly it is hypothesised that:

$H4_a$: The greater the perception of the Marketing Manager as a political ally by the R&D Manager the higher the level of communication frequency.

$H4_b$: The greater the perception of the Marketing Manager as a political ally by the R&D Manager the higher the level of cognitive-based trust.

$H4_c$: The greater the perception of the Marketing Manager as a political ally by the R&D Manager the higher the level of affect-based trust.

$H4_d$: The greater the perception of the Marketing Manager as a political ally by the R&D Manager the higher the level of interpersonal functional conflict.

$H4_e$: The greater the perception of the Marketing Manager as a political ally by the R&D Manager the higher the level of interpersonal collaborative behaviour.

3.10 Intervening Variables – Positive Interpersonal Dynamics

Five variables determine whether or not the interpersonal dynamics between the two managers have "positive" or "negative" outcomes. Interpersonal dynamics are measured in terms of communication frequency, trust (affective and cognitive based), interpersonal functional conflict and interpersonal collaborative behaviour. These variables are drawn from the interpersonal trust and social exchange theory, where the process of developing interpersonal trust and the outcomes of interpersonal trust have an effect on interpersonal relationships.

3.10.1 Communication Frequency

Communication frequency refers to the number of times information is exchanged between functional areas over a period of time (c.f Van de Ven and Ferry 1980). It is measured as the intensity of information flows through all available forms of communication e.g., formal meetings, reports to informal chats, emails, telephone conversations. The literature review (Chapter 2) has identified the benefits of increased communication frequency between the two functions as: improved mutual understanding, more harmonious relations, an appreciation of the information styles and communication preferences of individual managers, better conflict resolution, and the development of trust. Recent research by Becerra and Gupta (2003) found a strong positive correlation between frequent communication and perceived trustworthiness in team work situations. Accordingly it is hypothesised that:

$H5_a$: The greater the communication frequency between the R&D Manager and the Marketing Manager the higher the level of cognitive-based trust.

$H5_b$: The greater the communication frequency between the R&D Manager and the Marketing Manager the higher the level of affect-based trust.

$H5_c$: The greater the communication frequency between the R&D Manager and the Marketing Manager the higher the level of functional conflict.

$H5_d$: The greater the communication frequency between the R&D Manager and the Marketing Manager the higher the level of interpersonal collaborative behaviour.

3.10.2 Interpersonal Trust Perceptions

The way that R&D Managers and Marketing Managers perceive each other on an interpersonal level has long been considered as an explanatory variable for interfunctional communication and co-operation (Souder 1988; Gupta and Wilemon 1988; Souder and Moenaert 1992). The literature in this area has concentrated on several distinct aspects of these perceptions: stereotypes (Saxburg and Slocumb 1968), credibility (Gupta and Wilemon 1988), interpretative barriers (Dougherty 1992), and psychological distance (Kahn and Mentzer 1996). However, missing from the literature is an understanding of the role that interpersonal trust plays in shaping the perceptions of peers and the effect it has in shaping their actual work behaviours towards one another. McAllister (1995) examined interpersonal trust and the working relationship between peer managers and concluded that:

> "for managers and professionals in organisations, developing and maintaining trust relationships is especially important. As boundary spanners, managers work through critical ties to external constituencies on which their departments or organisations depend. Given the complexity and uncertainty inherent in managerial work and the amount of mutual accommodation it involves, effective horizontal working relationships are also critical …… and that under conditions of uncertainty and complexity, requiring mutual adjustment, sustained effective co-ordinated action is only possible where there is mutual confidence or trust (c.f Thompson 1967) (p.25)."

McAllister (1995) examined the role that trust plays in effective relationships with peer managers and provided conceptual and empirical support for the proposition that there are two foundations to interpersonal trust (affective and cognitive trust), and that the two types of trust can act independently as determinants of a peer manager's performance. Affective trust was found to have greater explanatory power than cognitive trust. The informal relationship occurring between managers as a result of affective trust implies that any assessment of a peer's trustworthiness must include a social perspective. The in-depth interviews conducted for this research added weight to this finding, in that Marketing personnel were not only assessed on their perceived professionalism and ability but also on affective criteria such as sincerity and genuine concern for the R&D Manager. The following section will examine cognitive-based trust and affect-based trust separately.

3.10.3 Cognitive-Based Trust

Cognitive-based trust, is grounded in individual beliefs about peer reliability, competence and dependability of another (McAllister 1995). These beliefs occur as a result of reputational effectiveness, functional membership, and direct experience through relational exchange. Several studies have identified the perceived lack of credibility of Marketing staff as a major barrier to integration (Gupta, Raj and Wilemon 1985; Souder 1988; Gupta and Wilemon 1988; Workman 1997) and as such is a major problem when attempting to integrate functions. Moenaert et al (1990) during in-depth interviews with R&D Managers found that marketing information was often screened on the basis of whether or not the source "was competent in their discipline". Gupta and Wilemon (1990) found that R&D Managers in high-technology companies were very critical of their organisations' hiring policies regarding Marketing staff, where 27% of

the R&D Managers thought that the Marketing Managers did not know enough about marketing to be effective. Shaw and Shaw (1998) examined the relationship between Engineers and Marketing personnel and found one of reasons for conflict to be that the Marketers were not professionally trained in marketing and this lead to a lack of credibility.

The in-depth interviews for the research reported in this study, revealed that R&D Managers were very critical of the marketing skills of the people employed in "specialist marketing roles" but who had come from either Engineering or Sales backgrounds. Competence, dependability and peer reliability of functional specialists is seen as essential for effective working relationships where information exchange is a key task related component. Accordingly, it is hypothesised:

$H6_a$: As the R&D Manager's cognitive-based trust in the Marketing Manager increases, interpersonal functional conflict will also increase.

$H6_b$: As the R&D Manager's cognitive-based trust in the Marketing Manager increases, interpersonal collaborative behaviour will also increase.

Cognitive-based trust is also thought to have a direct effect on working relationships, as revealed in Dirks and Ferrin (2001) extensive literature review of the role of trust as an explanatory variable, and it is accordingly hypothesised that:

$H6_c$: As the R&D Manager's cognitive-based trust in the Marketing Manager increases, perceived relationship effectiveness increases.

Rempel, Holmes, and Zanna (1985) found strong empirical support for the proposition that relationships can develop from an initial cognitive base, where one perceives the other party to be competent in their specialist field, and then relationships become closer as social interaction leads to the development of affect-based trust. McAllister (1995) found that cognitive trust had a direct causal effect on affective trust in peer manager relations. It is thought that affective trust forms from an initial perception of the other person as being competent, reliable and dependable. Accordingly it is hypothesised:

$H6_d$: As the R&D Manager's cognitive-based trust in the Marketing Manager increases, affect-based trust will also increase.

3.10.4 Affect-Based Trust

Affect-based trust is grounded in reciprocated expressions of interpersonal care and concern (Pennings and Woiceshyn 1987; Rempel et al 1985). McAllister (1995) found that managers expressing high affect-based trust looked for more opportunities to meet their peers' work-related needs and to engage in more productive intervention in task-related situations. Affect-based trust was found to have greater explanatory power than cognitive-based trust in explaining working behaviours. The informal relationship occurring between managers as a result of affect-based trust implies that any assessment of a peer's trustworthiness must include a social perspective. McAllister (1995) further argues that once an evaluation of another manager is made, and that manager is viewed as high in affect-based trust, such trust often continues even in the absence of its original cognitive basis (c.f Zajonc 1980). Working relationships in which affect-based trust exists are found to be more robust in nature than those based on a cognitive base,

allowing for any conflict to be resolved satisfactorily for both parties (Johnson-George and Swap, 1982). Accordingly it is hypothesised that:

$H7_a$: As the R&D Manager's affect-based trust in the Marketing Manager increases, interpersonal functional conflict will also increase.

$H7_b$: As the R&D Manager's affect-based trust in the Marketing Manager increases, interpersonal collaborative behaviour will also increase.

Affect-based trust is also thought to have a main effect on working relationships (Dirks and Ferrin 2001). Accordingly it is hypothesised that:

$H7_c$: As the R&D Manager's affect-based trust in the Marketing Manager increases, perceived relationship effectiveness increases.

3.10.5 Interpersonal Functional Conflict

March and Simon (1958) defined conflict as the "breakdown of the standard mechanisms for decision-making (p.891)". When two parties interact there are inevitably going to be "differences of opinion" or "conflict". The NPD process does cause considerable "conflict" between Marketing and R&D personnel because of conflicting goals, objectives and priorities (Gupta and Wilemon 1985; Souder 1988; Dougherty 1992; Workman 1997; Song, Xie and Dyer 2000). Much of the NPD integration literature has taken the traditional view of conflict held in the organisational literature, wherein conflict is seen as negative and should be minimised or managed. However, Menon et al (1996) examined the role that conflict plays in organisations and

proposed that it should be measured on two dimensions, firstly, as dysfunctional i.e., "as unhealthy behaviours within an organisation such as the distortion and withholding information to hurt other decision makers, hostility and distrust during interactions … and creating obstacles to impede the decision-making process (p.303)", and, secondly, as functional conflict i.e., which refers to "the healthy and vigorous challenge of ideas, beliefs and assumptions (p.303)". When examining the effects of conflict on marketing strategy formulation, they found that dysfunctional and functional conflict are two separate constructs and should be treated differently. Also they found strong empirical support for functional conflict improving interdepartmental relations, communication quality, and "esprit de corps". There is sufficient theoretical and empirical evidence to conclude that functional conflict is an important variable that needs to be included in a conceptualisation of interpersonal working relationships. Functional conflict leads to consultative interaction, with useful give-and-take among organisational members, where opinions and feelings are expressed freely, and where there is a willingness to consider new ideas and changes (Menon et al 1996). Accordingly it is hypothesised that:

$H8_a$: Greater functional conflict between the R&D Manager and the Marketing Manager will lead to higher levels of interpersonal collaborative behaviour.

$H8_b$: Greater functional conflict between the R&D Manager and the Marketing Manager will lead to higher levels of perceived relationship effectiveness.

3.10.6 Interpersonal Collaborative Behaviour

Collaborative behaviour is the expression of all the positive aspects of interpersonal working relationships i.e., effective communication, trusting behaviour, volitional co-

operation, mutual problem solving, and esprit de corps. As such, the concept of interpersonal collaboration is grounded in social exchange theory (Blau 1964). Interpersonal collaborative behaviour is distinct from co-operation, where people may co-operate with each other because they feel that they have to i.e., where participants do not want to engage in such behaviours but feel constrained by organisational pressures (e.g., task specification, politics). Interpersonal collaboration is a form of "volitional co-operation", where participants want to co-operate with and freely interact with others. When collaborative behaviour occurs amongst managers, there is a tendency to view the relationship as productive and the other manager in a favourable way (Kahn 1998; Kahn and Mentzer 1998; Jassawalla and Shashittal 1998). Accordingly it is hypothesised that:

$H9_a$: As the R&D Manager's interpersonal collaborative behaviour increases, the higher the level of perceived relationship effectiveness.

3.11 Conclusion

The purpose of this chapter was to develop a new conceptualisation of functional integration between the Marketing and R&D functions at the individual manager level. The Marketing and R&D Manager dyad is the key focus of this study, rather than the traditional departmental level of analysis. This chapter began by developing a taxonomy of factors posited by the literature to act as antecedent variables when examining functional integration between the Marketing and R&D functions. The theoretical framework for this research was developed by highlighting the emergence of "trust" and "collaborative behaviours" as key concepts in understanding interpersonal cross-functional working relationships (CFR). A new conceptualisation of the Marketing/R&D CFR was proposed, which distinguishes this model from previous

conceptualisations by including affect-based trust and cognitive-based trust as key determinants of interpersonal dynamics in the CFR. Four antecedent variables are included in the model, project formalisation, perceived resource dependence on the Marketing Manager, perceptions of the Marketing Manager as a political ally. The dependent variable is perceived relationship effectiveness. The model is specified and proposes that as the interpersonal collaboration between the Marketing Manager and the R&D Manager during NPD projects increases, so will perceived relationship effectiveness increase. Also the more functional conflict increases (rather than dysfunctional conflict) the more the interpersonal collaborative behaviour will increase between managers. Functional conflict in turn, increases when both affect and cognitive-based trust levels are high between the managers. Factors which contribute to the development of high levels of affect-based trust are the perceptions of the Marketing Manager as a political ally and the greater the frequency of communication between the two managers. Cognitive-based trust develops when the R&D Manager perceives the Marketing Manager's communication to be of high quality, and, that the Marketing Manager is also a political ally. Project formalisation helps develop cognitive-based trust and also increases the communication frequency between the managers. From this proposed conceptual model several hypotheses are presented for testing. The following chapter will deal with the methodology involved with this research.

CHAPTER 4: METHODS AND ACHIEVED SAMPLE

4.1 Preamble

This research involves an empirical investigation of the antecedents and consequences of the Marketing Manager and R&D Manager cross-functional working relationship (CFR), as such this chapter will: (1) discuss and provide justification for the choice of a two-phased research design (preliminary qualitative research and the mail method survey), (2) describe the questionnaire design, editing and pre-testing process, (3) discuss the sampling issues for this study, (4) examine any possible non-response bias, and (5) provide an analysis of early-late respondents. Also presented will be some descriptive statistics concerning the achieved sample and respondent profile.

4.2 Research Design

The decision on which research design was most appropriate for the main part of this study was made after careful consideration of the research objectives and constraints. Several research design options were considered i.e., qualitative versus quantitative research, a key informant versus an examination of the R&D and Marketing Manager working relationship from both manager's perspective by using a matched pairs of responses.

4.2.1 Qualitative and Quantitative Research: A Two-Phased Design

Determining which research method, qualitative or quantitative, to use for this study was vigorously discussed and debated. Lukas et al (2004) explain the difference between qualitative and quantitative methods, where qualitative research offers the advantages of exploring new ideas, thoughts, feelings, preliminary insights on, and

understanding of ideas and objects, thus providing a greater richness of information. Whereas, the goal of quantitative research is the validation of facts, estimates, relationships and predictions with the distinct advantage of generalisability to a defined population. As theory-testing was the main purpose of this study, a quantitative study was considered to be most appropriate method. The literature review (Chapter 2) clearly highlighted that there exists a considerable body of exploratory and empirical research into the topic area, and by using relevant variables identified in these previous empirical studies and similar context, it would be possible to address the research objectives of this study.

Nonetheless, to avoid any problems associated with using theories and constructs which have been predominantly developed and tested in other cultural/contextual settings, a two-phased design was used (Creswell 2002). Preliminary research comprised of qualitative research (in-depth interviews) which provided several benefits for this study: (1) the relevance of the topic area in an Australian context was confirmed, (2) it identified and confirmed the salience of key issues raised by the literature review in the context of Australian NPD projects, and (3) discussions with the respondents ensured the appropriate language was used for the survey questionnaire. However, the study focuses and reports on the main part of the study, the mail-out survey used to collect data and empirically test the proposed model.

4.2.2 The Survey Respondents: A Key Informant Approach

A key informant approach was chosen as the most appropriate method of obtaining the data. Even though there have been some criticisms of self-reporting surveys due to the respondent's tendency to often overstate their own importance or involvement in

organisational matters (Nunnally and Bernstein 1994) or to the tendency to view themselves as the more reasonable party in conflict situations (Thomas and Pondy 1977), the advantages of using such an approach outweighed these limitations.

Additionally, the sensitive nature of many of the questions used in this survey precluded the use of dyadic research which would have involved both partners in the relationship completing the questionnaire. It was thought inappropriate to have respondents comment on sensitive issues such as interpersonal trust, defensive behaviour, monitoring behaviour, open communication, and relationship effectiveness in the full knowledge that their counterpart would be completing the same task. Any potential for conflict or awkwardness arising in their working relationship after completing the questionnaire was deemed unacceptable, as this research was meant not to be intrusive in nature. This decision was supported by the numerous respondents when first approached to participate in the study, who upon hearing the topic area, then sought assurances that their responses would be kept strictly anonymous and confidential and not released to the other manager. From a research perspective, it was thought that a more accurate picture of the working relationship would result from respondents filling in the questionnaire in an anonymous and confidential manner without having any bias introduced by them wondering what the other manager may be saying and thus tempering their comments to be perceived as a fairer manager.

4.2.3 Preliminary Qualitative Research

Although a great deal of literature exists regarding the Marketing/R&D interface none of it has been examined in an Australian context. Therefore it was decided that in-depth interviews (45 – 90 minutes) were the most appropriate way to determine if the

experiences of Australian managers were similar to their overseas counterparts or were affected by cultural factors. To achieve this objective, Australian managers in manufacturing companies with experience in developing new products from both Marketing and R&D perspectives were the desired interviewees. Several of these managers were identified through enquiries with fellow academics working within the Commerce Faculty, of the University of Wollongong. An introduction was arranged and as result, 6 interviews were conducted with managers who could be classified as having had Marketing roles and 7 interviews with R&D Manager roles. Of particular note was that 12 of the 13 interviewees had undergraduate technical qualifications (e.g., undergraduate engineering, science degrees) and those with Marketing qualifications had acquired them later in their careers. Also of note was that five of these managers had work experience in both roles, as R&D Managers and as Marketing Managers, thus giving them unique insights from both perspectives of the working relationship.

Using a semi – structured interview protocol with topic areas drawn from the literature review, the interviews concentrated on the following topic areas: (1) past and current NPD experiences, (2) a historical account of the interactions between the relevant functions within their current organisation, (3) the NPD process used by their company, (4) the perceived effectiveness of their working relationship with the other functions in terms of communication, co-operation and project outcomes, (5) the state of the relationship with the other function in terms of harmony, (6) the level of top management support for NPD, (7) the nature of internal politics and how it impacts on the working relationship between Marketing and R&D, and (8) the role of interpersonal relationships and trust with respect to working relations.

Most of the personal interviews took between 45 – 90 minutes each, with considerable dialogue ensuing. It was quickly apparent that being introduced to the interviewee by someone they knew fairly well had distinct advantages as a rapport was established very quickly and some extremely sensitive issues were discussed e.g., organisational politics, top management competence, counterpart perceptions. The collected interview data was transcribed and content analysed to determine any patterns amongst respondents. As a result of the qualitative interviews a better understanding of the Australian NPD environment was gained and this understanding was incorporated into the questionnaire design process.

The R&D respondents had fairly consistent views, firstly, there was a perception that Marketing Managers tended to "use" R&D and then discard them, that the Marketing Managers had no real no intention of developing a long term working relationship. Secondly, that the Marketing Manager was not often perceived as a "true" Marketing professional, often being an ex-Engineer or Sales representative. Thirdly, it was when they had been involved in a stable, longer term "trusting" work relationship with a Marketing Manager, that they had achieved their best new product outcomes. In these situations, "playing politics" and "covering their arse" was not a priority, rather completing the project successfully was the main objective. Finally, constant restructuring and management change had left the R&D Managers very cynical and "distrustful" when it came to NPD policy. The Marketing Managers were very consistent in their perceptions as to what leads to successful new product development, notably that they had to earn the "trust" of the R&D Manager. They had to establish credibility and gain respect (cognitive trust). When R&D did not trust them, they were left in a position where R&D could easily stall the NPD process with few political

repercussions and often ending in missed market opportunities and poorly developed new products. What was common to both parties was the desire to develop new products, as all of them enjoyed the activity. Importantly for the study of NPD, both types of manager claimed that the actual NPD process as defined by top management was not as important as the ability to work together effectively with common purpose. They had seen far more effective product development from people working together, often informally, to achieve NPD success than sticking strictly to a heavily formalised and management defined process.

Upon having completed the qualitative component of the study, the process of developing a survey instrument began. A review of previous quantitative empirical studies generated a large battery of scales which measured many of the constructs of interest in the proposed theoretical model (the source of these scales are presented in Chapter 5, Table 5.1). The following criteria were then used to screen scales that measured the same construct: (1) validity criterion where they at least had face validity in measuring the construct of interest, (2) internal consistency (reliability criterion) where they had a Cronbach alpha value of over 0.7 (Nunnally 1978), and (3) robustness criterion, where these scales had been used in previously SEM applications and had been subjected to confirmatory factor analysis (CFA) thus ensuring that they were psychometrically robust enough for structural equation modeling purposes.

4.3 The Survey

4.3.1 Questionnaire Development

Zikmund (1994) recommends that the two key criteria of relevance and accuracy be foremost in the researcher's mind when designing a questionnaire and suggests that

several decisions should be made to guide the initial drafting of the questionnaire: (1) What should be asked? The literature review and preliminary research for this study enabled the research questions to be clearly defined in terms of testable hypotheses, (2) How should it be phrased? As the main purpose of this study was to obtain attitudinal data, the majority of questions used a linear numeric rating scale, allowing a response from 1 – 7 (where 1 = Completely Disagree, 7 = Completely Agree), indicating respondent opinion on a range of relevant topics. Linear numeric scales were chosen over the traditional Likert scale format as the former have been found to have greater measurement properties for attitudinal research and minimise mid-range answers (Alreck and Settle 1995), (3) In what sequence should the questions be arranged? Due to the confidential nature of NPD projects and the sensitivity of many of the questions regarding working relationships, easing the respondent into the questionnaire was seen as a key design issue. By beginning with fairly easy questions it was hoped that the respondent's interest and involvement would be maintained to ensure completion of a very long questionnaire (initially 15 pages). The early questions were designed to report the communication behaviours between managers and then lead into the more sensitive relationship questions, and (4) What questionnaire layout will best serve the research objectives? As this questionnaire was very long, a key concern was to try and reduce its length to 12 pages. In discussions with fellow academics experienced in mail-out surveys of senior management in organisations, it was felt that the length of the questionnaire (15 pages) would be a major hindrance to completion and response rate. Particular attention was then paid to the first three pages of the questionnaire to ensure that it remained uncluttered and did not intimidate the respondents, allowing them to begin the task relatively easily.

At this point, the first draft of the questionnaire was developed and a panel of five academics with experience in quantitative studies and new product development were approached for assistance in evaluating the following: (1) the draft questionnaire, (2) the conceptual model, and (3) the proposed hypotheses. Of particular importance was whether or not the panel considered the measurement instrument would adequately measure the key constructs in the theoretical model. Of the academics approached, three were able to assist and provided considerable feedback. Firstly, the panel suggested minor modifications of several construct items to improve face validity. Secondly, a questionnaire of 15 pages was considered far too long for time-poor senior managers to complete. Thirdly, the use of linear numeric scales instead of Likert scales attracted their interest. The panel questioned the reasoning behind the use of such scales and further felt that most respondents would be used to filling out Likert scales and would be confused by the unfamiliar layout. They suggested that an example question of how to complete a linear numeric scale must be included in the questionnaire to minimise any potential confusion.

4.3.2 Pre-testing the Questionnaire

To pre-test the questionnaire, 10 managers drawn from the population of interest were contacted by telephone and asked if they were willing to participate in the pre-testing. Pre-testing was conducted in their offices using the “debrief” approach as suggested by Aaker and Day (1986), which simulates mail-out conditions as much as possible with minimal interaction between the researcher and the respondent. Using this approach the researcher administered the questionnaire and accompanying instructions to the respondent and then observed the “body language” of the respondent, the time it took to complete individual questions, any hesitations on particular items, and overall

questionnaire completion time. Once the questionnaire was completed the researcher then debriefed the respondent on several points: (1) overall impressions of the survey, (2) the ease of completion and reaction to the use of the linear numeric scales, (3) any problem areas of the questionnaire that had been encountered, (4) overall comprehensibility, (5) the language used, (6) the logical flow of the questionnaire, (7) any issues of sensitivity about the questions, and finally (8) the extent to which the questionnaire was enjoyable or interesting to complete.

In all, there were 6 draft versions of the questionnaire until a version which met the research objectives of the study and also was acceptable to the respondents was developed. The main criticisms of the initial draft versions were that: (1) the first two pages were intimidating, and (2) the language used in some of the items was confusing and required clarification. Of particular interest was the feedback that the linear numeric scales were very easy to use, and that the questionnaire was surprisingly quick to complete despite its 13 page length.

4.4 Sampling Strategy

There are several issues related to data collection that must be addressed when conducting quantitative research, including: (1) defining the target population, (2) determining whether or not to use a census or a sample, (3) selecting or developing a sampling frame, and (4) obtaining the sample (Zikmund 1994). These issues will be addressed individual below.

4.4.1 Defining the Target Population

For this study the population of interest was defined to be technically-trained functional managers in Australian manufacturing firms i.e., R&D Managers, Engineering Managers and Manufacturing Managers, who have a major input into NPD projects and have interacted significantly with the Marketing Manager during the project development process. Previous studies have identified and reported CFRs between Marketing and R&D, Engineering, and Manufacturing departments due to their heavy involvement in the NPD process (Kahn 1996; Song, Montoya-Weiss and Schmidt 1997, Ruekert and Walker 1987; Song, Xie and Dyer 2000). The population of interest was drawn from a wide cross-section of Australian manufacturing industries from all states and territories, and included industries such as e.g., chemicals, automotive, electrical equipment and components, agricultural equipment, food etc.

4.4.2 Determining whether to use a Census or Sample

In order to determine whether or not a census was possible for this study, enquiries were made to find publicly available databases which could identify all companies involved in NPD projects. Enquiries with Government sources (Federal Government Department of Industry) revealed that statistics were collected on the Manufacturing activities of Australian firms in terms of contribution to Gross Domestic Product, employment by industry type and turnover (Manufacturing Survey 1998, 8225.0 Australian Bureau of Statistics). However, there was no way of determining which of these companies were involved in NPD activities. It was suggested that enquiries be made with the Australian Taxation Office (ATO) department as it held a database which registered the recipients of Federal R&D Taxation subsidies for companies involved in Research and Development. Upon contacting the ATO it was made clear that this information was

highly confidential and could not be accessed by the public, not even for academic purposes.

At this stage several commercial mailing-list providers were contacted to determine if they could identify NPD active companies. The enquiries revealed that none of these commercial providers could sort their databases by NPD activities. At his point it was obvious that a census was not possible, and the decision was made to seek a mailing-list that could provide a sample frame that would be representative of the population of interest.

4.4.3 Selecting a Sampling Frame

Only one commercial provider (INCNET Pty Ltd) could provide a mailing list which met the following two search criteria: (1) a list of companies that had the job titles of R&D Manager, Engineering Manager and Manufacturing Manager, (2) that these companies also had employed a Marketing Manager or a key Marketing decision-maker. INCNET Pty Ltd provided an initial list of 813 companies which met these criteria. The mailing list concentrated on companies in all sectors of the economy with annual turnover of above AUD $10 million and a minimum of 50 employee numbers. The 813 names on the mailing list were screened to eliminate names from firms or government agencies unlikely to be involved in NPD activities.

The remaining 744 managers were then contacted over a 3 week period by telephone to determine: (1) if they had participated in any NPD projects over the last 3 years, (2) whether they had significant involvement with the Marketing Manager during this project, and (3) whether they would agree to participate in the research. In total, 343

managers were eligible for the study and of these 337 managers agreed to participate (98.3%), the list of whom comprised the sampling frame for the study. Using this approach ensured that the respondents were representative of the target population.

4.4.4 Obtaining the Sample

All potential respondents in the sampling frame were contacted by telephone. The purpose of the study was explained and the co-operation of the manager sought. Many managers actually commented that they preferred to be approached in this manner as usually they would not participate in studies that were mailed to them unannounced. As an inducement for co-operation in the study, the offer of an executive summary of the results was made. Once managers had agreed to participate, a questionnaire and accompanying covering letter was mailed out to them within 48 hours to keep the request at top of mind. As this was a progressive mail-out of the questionnaire, follow-up phone calls were made three and six weeks after the initial phone call to each participating manager. This resulted in 184 usable responses for a net response rate of 54.6 %.

4.4.5 Survey Data Analysis

Prior to any data entry, the questionnaire was coded and a data file created using SPSS version 11.0. As completed questionnaires were received they were numbered and dated. They were then checked to ensure that the respondents were: (1) reporting on their relationship with a Marketing Manager (q.1), (2) whether they themselves were the correct respondent (q.28), and (3) for missing data. Six questionnaires were rejected on these criteria, three reported on a relationship with another technically trained manager, and three due to excessive missing data. The data from the remaining questionnaires was then entered into the SPSS data file by the researcher in batches of 20 to eliminate

fatigue and potential inputting errors. When the data entry had been completed, a research assistant was employed to assist the researcher in cross-checking all of the responses against the data entered to eliminate inputting error. At this stage basic data analysis was conducted to examine the nature of the data and ensure that it met the basic criteria for use in SEM analysis, with an emphasis on assessing the multivariate normality of the data (a full account of the data analysis and statistical testing of the hypotheses is given in Chapter 5).

4.5 The Achieved Survey Sample

4.5.1 Industry Coverage

The achieved sample covered 184 firms, 175 of which (95.1%) were goods producers, and the remaining 9 (4.9%) were software producers. Consumer marketers accounted for 83 (45.1%), business-to-business marketers (78) 42.4.%, and (13) 7.1% sold into both markets. Companies varied in size, in terms of full-time employees from 5 (software developers) to 40,000 employees (electrical goods), with a median number of employees being 160 employees. As a wide cross-section of Australian manufacturers responded (Table 4.1), the achieved survey sample does provide a reasonably representative sample of Australian firms which are NPD active and thus allows a degree of generalisability of the research results to the wider population.

4.5.2 Respondent Profile

There were varying job titles for the respondent managers, with them being grouped into the 3 categories shown in Table 4.2. The majority of respondents were from the R&D manager group with job titles such as General Manager R&D, Director of R&D and R&D Manager. The Engineering Manager group also included titles such as

Engineering Director and Chief Engineer. The Manufacturing Manager group also include titles such as Manufacturing Director, General Manager Manufacturing and Production Manager. The job titles of the respondents indicating they were senior people in their respective organisations and likely to be involved in NPD activities. Many of the respondents had also been in their respective positions for a considerable period of time, with mean = 5.75 years, median = 4.4 years).

Table 4.1: Industry Profile of the Sample

ANZSIC Classification Division C – 28 Manufacturing	Industry Type	Frequency	Percentage
25	Chemicals/Adhesives	5	2.7
281	Automotive components	14	7.6
2832	Medical/Pharmaceutical	12	6.5
291	Building Materials	22	12.0
284 - 285	Electrical Equipment and Components	8	4.3
21	Food	20	10.9
233	Packaging	7	3.8
2842	Telecommunications	4	2.2
27	Metal Fabrication	3	1.6
28	Machinery Manufacturer	18	9.8
224	Clothing Manufacturer	4	2.2
293	Other Manufacturing • Software Developer	57 10	31.0 5.4
Total		**184**	**100.0**

Table 4.2: Achieved Sample Manager Titles

Respondent Title	Frequency	Percentage
R&D Manager	76	41.3
Engineering Manager	37	20.1
Manufacturing Manager	58	31.5
Other Technically Trained Managers	13	7.1
Total	184	100.0

To ensure that the respondent managers in different categories did not have any significant differences in their pattern of responses, a multivariate analysis of variance (MANOVA) was performed across all of the key variables posited in the conceptual model. To test for Type I Error, the Bonferroni correction, which is a multiple-comparison correction used when several dependent or independent statistical tests are being performed, was applied at the conservative level of $\alpha = 0.5$ (Tabachnick and Fiddell 1996). The results indicated that there were no statistically significant differences found between the groups. The results of this analysis support the decision to pool the respondent types into one data set for subsequent SEM analysis.

4.5.3 Non-Response Error

When dealing with mail-out surveys, and the low response rates usually associated with them, it is recommended that the researcher determine whether or not the persons in the sample responded differently from those who did not, before generalising the results to the population. A first step that has been is recommended is to sample non-respondents to determine whether they differ in nature from the early respondents (Armstrong and Overton 1977). Accordingly, at the end of the 8 week survey time-frame, a random

sample of 20 non-responding managers was chosen and contacted by telephone to determine why they had not responded to the survey and if there was a discernable pattern in there reasons for not doing so which would differentiate them from the respondents. Of the 20 managers contacted, 8 had already completed the questionnaire and had returned it, eliminating them as non-respondents. The remaining 12 managers were then asked a series of questions which may have affected their decision to respond such as: (1) their interest in the subject matter, (2) the applicability of the questionnaire to their employment, (3) the sensitivity of the divulging their organisations' NPD practices, (4) its sensitivity in terms of their working relationship, (5) the format of the questionnaire. In all cases, the main factor preventing completion and return was that they were under heavy time constraints and the questionnaire was sizeable in nature and would take a considerable amount of time for completion. In light of the screening approach used when contacting respondents, the 54% response rate, and that non-response was not due to content of the questionnaire, non-response bias is not considered a major problem affecting the generalisability of the research results the target population.

4.5.4 Early versus Late Respondents

Another option available to researchers is to examine the pattern of response in terms of early versus late responses on a number of key variables as it is thought that late respondents are closer to non-respondents in characteristics (Armstrong and Overton (1977). An analysis of early versus late response was conducted by splitting the sample into the first 50 responses and the last 50 responses received and comparing the means using analysis of variance (ANOVA) on several descriptor variables: respondents time in position ($F = 0.225$, $p = 0.637$), the number of full-time company employees ($F =$

0.338, p = 0.563), the core number of people involved in the NPD project (F = 2.741, p = 0.596), project-time scale (F = 0.159, p = 0.692). The findings of these analyses indicated that there were no statistically significant differences in the responses of early versus late respondents. This supports the previous analysis and the conclusion that non-response bias was not considered a serious concern in this study. Thus, the sample can reasonably be treated as representative of the population of interest.

4.6 Conclusion

In conclusion, this chapter discussed the research method used in this study and provided the justification for its use. The primary purpose of this research was theory testing, and therefore required the achieved sample to be both representative of and generalisable to the population of interest. To achieve this goal, a two-phased research approach was used, where the first-stage involved the conduct of in-depth interviews to ensure that the theory to be tested was relevant for the respondents. A detailed explanation of the sampling strategy is provided focusing specifically on the measures undertaken to ensure that the sampling frame would identify the appropriate respondents for this research.

The second-stage of this research involved a quantitative research design using a mail-out survey with a key informant as the unit of response. A cross-sectional retrospective approach was employed with the respondent identifying a completed NPD project where they had significant interaction with a Marketing Manager as the basis for completing the questionnaire. Once the measurement instrument was pre-tested to ensure that it was relevant, comprehensible and easy to complete for the respondents, all identified potential respondents were contacted to ensure that they were firstly, eligible

for the study, and secondly, willing to participate. Of the 337 questionnaires mailed out over the 8 week research period, 184 useable responses were obtained from respondents whose job titles indicated that they were from the population of interest (a net response rate of 54.6%) and had been involved in NPD activities with a Marketing Manager. Overall, the research methodology undertaken has resulted in an achieved sample which is representative of the population of interest and large enough to allow the use of structural equation modeling (SEM) as the main analytical technique (Chapter 5).

CHAPTER 5: MODEL SPECIFICATION AND REFINEMENT

5.1 Preamble

Statistical models provide an efficient and convenient way of describing the structure underlying a set of observed variables, where these models can be expressed either diagrammatically or mathematically, via a set of equations indicating the relationships between variables. Typically, a researcher postulates a statistical model based either on relevant theory, on empirical research, or a combination of both. Once the model is specified, the researcher then tests its plausibility based on sample data. The main aim of this model-testing procedure is to determine the goodness-of-fit between the hypothesised model and the sample data (Byrne 2001). The purpose of this chapter is to provide justification for the use of SEM as the major analytical technique for this study, and to discuss the development of a SEM (Structural Equation Model) which was used to test the hypotheses proposed in Chapter 3. Specifically addressed in this chapter will be the statistical issues associated with the use of SEM, the data screening and purification process, then finally, model specification and testing.

5.2 Structural Equation Modeling (SEM): A Definition and the Justification for its use in Theory Testing

Hair et al (1998) define SEM as a multivariate technique that combines aspects of multiple regression (examining dependence relationships) and factor analysis (representing unmeasured concepts – factors – with multiple variables) to estimate a series of interrelated dependence relationships simultaneously. They identify the main statistical advantage that SEM has over other multivariate techniques to be its ability to provide greater explanatory ability and statistical efficiency while overcoming the common limitation faced by other multivariate techniques (e.g., multiple regression,

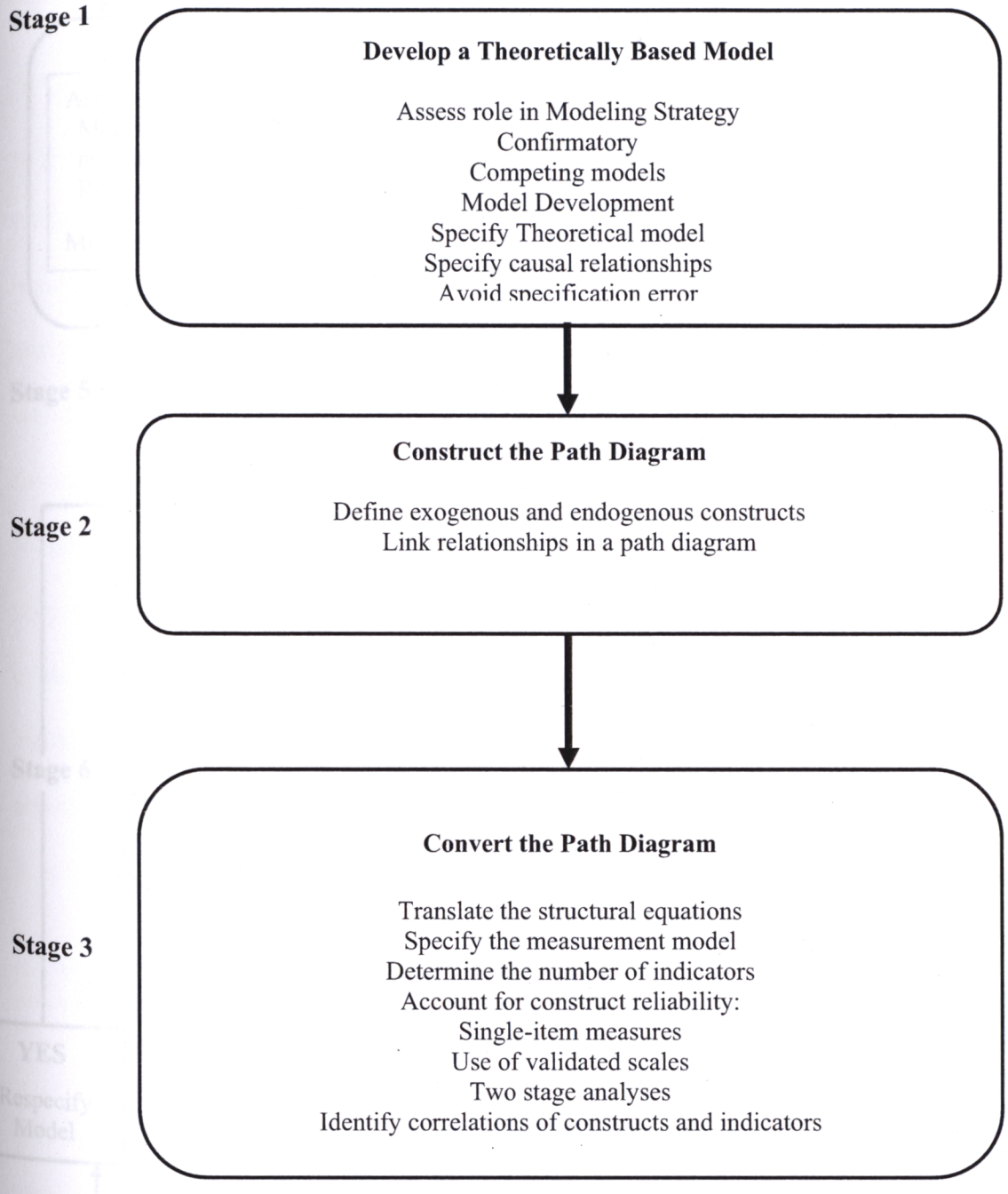
MANOVA, multiple discriminant analysis) of only being able to address a single relationship at a time. Byrne (2001) describes SEM modeling as a statistical methodology that takes a confirmatory (i.e., hypothesis-testing) approach to the analysis of a structural theory bearing on some phenomenon, and which has two important aspects to the procedure: (1) that the causal processes under study are represented by a series of structural (i.e., regression) equations, and (2) that these structural relations can be modelled diagrammatically to enable a clear conceptualisation of the theory under study.

These features of SEM allow a researcher to model complex relationships derived from theory and as such has resulted in its widespread use "in every conceivable field of study including education, marketing, psychology, sociology, management, testing and measurement, health, demography, organisational behaviour, biology and even genetics (Hair et al 1998 p.578)". The ability of SEM to provide the researcher with a comprehensive method for the quantification and testing of theory is also noted by Marcoulides and Schumaker (1996) who find that biologists, educational researchers, market researchers, psychologists, social scientists, and other behavioural researchers rely heavily on the technique.

The acceptance of SEM as an appropriate statistical technique for theory validation in Marketing is evident in Table 2.1 with numerous authors using SEM to test casual relationships. To better illustrate the SEM process used in this study, the Hair et al (1998) procedure for developing and testing a SEM model will be used as a guide (Fig 5.1). The remainder of this chapter will explain the approach taken in this study for developing and testing the SEM model.

Figure 5.1: A 7-Stage Process for Structural Equation Modeling

Hair et al (1998) p.593 – 595



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5.3 Stage 1 of SEM: Developing a Theoretically-Based Model

SEM is a method of statistical analysis that is used to determine whether or not the data obtained in a study confirms the hypothesised relationships and provides statistical support for the theoretical model specified by the researcher at the start of the analysis (Kline 1998). SEM must be based on previous theoretical development, past empirical evidence or prior experience to develop a set of research objectives to distinguish which independent variables predict each dependent variable. This is an important distinction between SEM analysis and other multivariate approaches which perform exploratory analysis (Hair et al 1998). The conceptual model to be tested by this research (Fig 3.1) was developed by reviewing the literature (Chapter 2) and by using insights gained from the in-depth interviews conducted as preliminary research for this study. The procedure followed in this study has met a key requirement for SEM, specifically, that the proposed conceptual model was a developed *a priori* and that SEM has been used in a confirmatory role. Any statistical analysis that is used in the SEM process should only conducted after theory development, thus avoiding one of the most commonly cited abuses of SEM, that of fitting theory to suit the data collected (Kline 1998; Byrne 2001). It is for this reason that the Hair et al (1998) process places data related issues in later stages, and emphasizes the importance of theoretical issues in the early stages of SEM process.

5.4 Constructing a Path Diagram

Hair et al (1998) state that after developing a theoretical model, the next stage is to portray the relationships in a path diagram. Schematics of models are termed *path diagrams* because they provide a visual portrayal of relations that are assumed to hold among the variables under study. Essentially a path diagram depicting an SEM model is

the graphical equivalent of its mathematical representation whereby a set of equations relates dependent variables to their explanatory variables (Byrne 2001).

5.4.1 Converting the Path Diagram

After portraying the model in a path diagram, the next step is to specify the model in more formal terms which involves: (1) specifying the structural equations linking constructs, called the *structural model* (2) specifying the *measurement model*, showing which variables measure the constructs, and (3) specifying a set of matrices which indicate any hypothesised correlations among constructs or variables.

5.4.2 Translating the Structural Equation

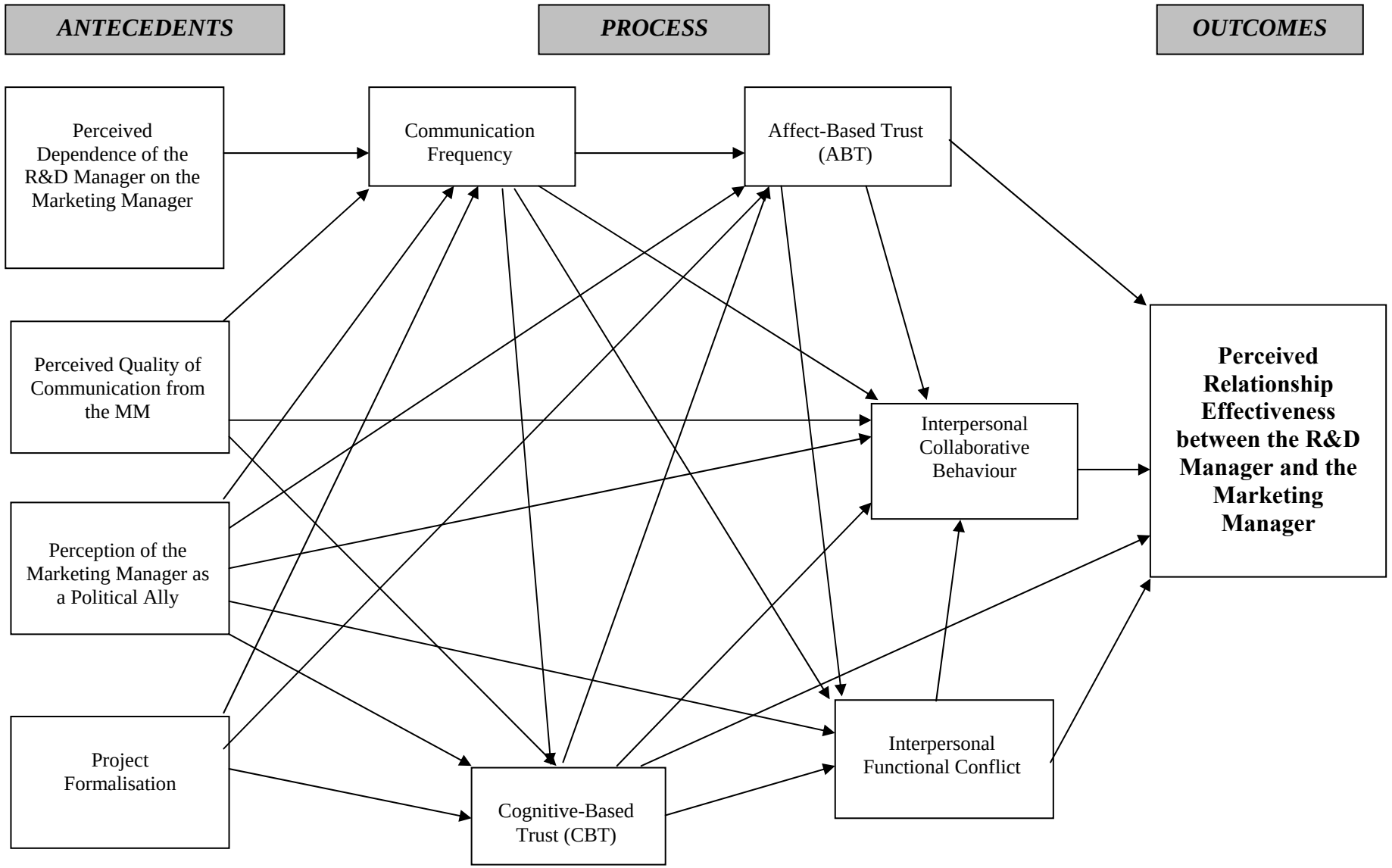
The *structural model* is the set of one or more dependence relationships linking the hypothesised model's constructs represented by a path diagram. A key component of the structural model are the *latent variables* (also known as "latent constructs") which are operationalised constructs. A latent variable cannot be measured directly but can be represented or measured by one or more variables *(indicators).* These latent variables are viewed as higher–order constructs that have multiple underlying dimensions. The latent constructs are shown in a causal path model containing arrows pointing from *exogenous variables* (the independent variables) to *endogenous variables* which are the dependent variables of the study. The output of an SEM equation will provide estimates of the strength of this causal relationship in the form of a "path coefficient", which can be viewed as the coefficient of determination (i.e., R^2) for each of the specific regression equations which describe the relationship between the variables (Hair et al 1998). The proposed structural model for this study is represented by Figure 5.2 which represents the hypotheses developed for testing (see Chapter 3).

5.4.3 Specifying the Measurement Model

Once the structural model has been specified, the *measurement model* provides the measures for the constructs in the structural model. The measurement model is viewed as a sub-model in SEM in that it specifies the indicators for each construct in the structural model and assesses the reliability of each construct for estimating the causal relationships. The measurement model is specified for both the exogenous (independent) and endogenous (dependent) constructs (Hair et al 1998). This stage marks the transition from exploratory factor analysis to a confirmatory role, where the researcher specifies which variables define each construct rather than exploring the data to determine if relationships exist.

The following section will explain several key issues regarding the development of the measurement model: (1) the selection of the operational measures for this study, (2) the creation of a new scale to measure the perceptions of the Marketing Manager as a political ally, (3) the establishment of construct validity using exploratory factor analysis (EFA) and then confirmatory factor analysis (CFA), (4) an assessment of the construct reliability of the reflective measurement items, and (5) an assessment of the discriminant validity of the measures.

Figure 5.2: The Proposed Conceptual Model



In the majority of cases either existing scales from the literature were used or scales were adapted to suit the context of this study. The questionnaire included three types of measure: formative multi-item measures, reflective multi-item measures, and single item measures. Table 5.1 lists the variables included in the structural model and the source of the measurement scale from the literature.

Table 5.1: Measurement Scales used in this Study

Variables	Cronbach Alpha in this study	Formative/ Reflective Scale	No. of Items in Scale	Source of Scale
Perceived Relationship Effectiveness	.94	Reflective	5	Ruekert and Walker 1987
Quality of Communication	.93	Reflective	5	Moenaert and Souder 1992
MM as a Political Ally	.762* (* 2 item)	Reflective	4	New scale – Interviews
Project Formalisation	.84	Reflective	3	Ruekert and Walker 1987
Cognitive Trust	.88	Reflective	5	McAllister 1995
Affective Trust	.92	Reflective	3	McAllister 1995
Functional Conflict	.81	Reflective	6	Jaworski and Kohli 1993
Collaborative Behaviour	.90	Reflective	3	Kahn 1996; Kahn and Mentzer 1998
Perceived dependence on the Marketing Manager	N/A	Formative	3	Ruekert and Walker 1987
Communication Frequency	N/A	Formative	11	Fisher, Maltz and Jaworski 1997

* 4 items were used in the questionnaire, 2 items were later dropped from the data analysis.

5.4.4 New Scale Development

There was only one new scale developed for the proposed model, "Political Ally", which was defined as the degree to which the R&D Manager perceives the Marketing Manager as his/her political ally (i.e., friend, supporter) within the organisation. An extensive literature review highlighted that the concept of interpersonal politics had not been developed into a measurement scale. Discussions with several Management academics revealed that they were unaware of any measurement scales in existence that met the definition of "political ally".

Therefore, the scale development for this research was based on Churchill's (1979) procedure which recommends that the first step in developing a measure is to specify the domain of the construct by providing a definition of the construct of interest. Having done this, the next step taken was to generate a list of items which were thought to address the domain as specified. An exhaustive review and consultative process resulted in an initial list of 11 items which were thought to measure the construct. This list was then discussed with a panel of Management academics in a formal item-editing session designed to avoid the use of unclear or ambiguous items to improve the precision of the items, and to ensure face validity. The initial screening process resulted in only 8 items remaining. At this point several of the participants raised concerns about the very sensitive nature of the questions being asked. Furthermore, they expressed the concern that they would not answer many of these questions themselves if they were the respondents in a mail-out survey. After further review, 4 items were dropped leaving 4 items in the measurement scale. As SEM is a multivariate technique which requires 3 items per construct as the preferred minimum, where two indicator measures can

increase the possibility of infeasible solutions (Ding, Velicer and Harlow 1995), all 4 items measuring the new construct of “political ally” were used in the questionnaire.

5.4.5 Accounting for Construct Reliability

Once the measurement model has been specified (Hair et al 1998) the researcher must then determine the reliability of the indicators. All of the existing reflective measures chosen from the literature (Table 5.1) had reported Cronbach alpha scores higher than the generally accepted .70 level (Nunnally 1978). In this study, all measures were found to have initial Cronbach alpha scores above the recommended .70 level. The final reliability scores for the scales where achieved after measure refinement using CFA analysis and are reported in (Table 5.1).

5.4.6 Use of Validated Scales

Occasionally researchers can use scales that have been extensively tested in previous research if the purpose of the study is to replicate the effects found in prior studies. The reliability of the scale or measure can therefore be fixed at previously established levels to maintain control over the meaning of the constructs (Hair et al 1998). This study did not use scales that were sufficiently tested by prior research to warrant fixing the reliabilities of construct measures.

5.5 Assumptions of SEM

Prior to any model testing, the researcher has to ensure that the data collected meets two key assumptions of SEM analysis; (1) independent observations, and (2) the linearity of relationships. SEM is very sensitive to the distributional characteristics of the data, particularly the departure from multivariate normality or a strong skewness in the data

(Hair et al p.601). In this research, these two assumptions have been met by the data collected. Firstly, all observations were independent of each other. Secondly, an examination of scatter plots revealed no violations of linearity, skewness or kurtosis (Kline 1998) underlying the validity of the data. Further, all variables were assessed for multivariate normality or any strong kurtosis in the data, with all variables displaying normal distribution within the accepted range values for kurtosis (-2.58 to 2.58).

5.5.1 Data Entry

Kline (1998) identifies the accuracy of data entry as a key issue in SEM. Initially the data was input by the researcher in small batches of 20 questionnaires at a time to minimise fatigue. To maintain the accuracy of the data entry, all of the data was re-checked by the researcher calling out the responses and a research assistant checking the accuracy of the original inputting on every eligible questionnaire, any necessary corrections were then made. Further, all variables had their descriptive statistics calculated (e.g., means, standard deviations, ranges) to determine whether there were any out of range or incorrectly coded values.

5.5.2 Removal of Outliers

Kline (1998) states that outliers are cases with scores very different from the rest, outliers can be either univariate or multivariate in nature. Univariate outliers have extreme scores on a single variable with a generally accepted rule of thumb being that a score is extreme when it exceeds three standard deviations away from the mean. Kline (1998) suggests three options are available to the researcher after identifying outliers: (1) do nothing, (2) drop the case from the analysis, or (3) change the score to the next most extreme score. All univariate variables were examined for outliers by using

boxplots and examining out of range values, and two of the examined variables had outliers. The univariate outliers were examined individually and deemed to be valid responses as the respondent fulfilled the key criteria for inclusion in the study and therefore their data was kept for subsequent analysis.

Multivariate outliers are identified by having extreme values on two or more variables or its configuration of scores is unusual. AMOS 4 uses the statistic called the Mahalanobis distance score to identify outliers which indicates the multivariate distance between the scores of an individual case and the sample means. There was only one multivariate outlier in the model and upon examination it also was retained as it met all of the criteria for inclusion in the study.

5.5.3 Missing Data

Missing data i.e., incomplete survey data, is common in many areas of social research. The two key issues according to Kline (1998) are firstly, how much missing data is too much? Kline draws on research by Cohen and Cohen (1983) who suggest that 5% or even 10% of missing data on a particular variable is not large. Kline makes the observation that many empirical studies in the behavioural sciences do not report this percentage in their results. In this study the amount of missing data only accounted for 1.1% - 1.7% of all responses on the variables used for modeling purposes. Any completed questionnaire that had significant levels of missing data i.e., approximately over 25% of total data collected, were removed from the study and viewed as non-useable (3 in total). The second issue that Kline (1998) feels is important in dealing with missing data is whether or not the pattern of missing observations is random or systematic. In other word, are the missing variables attributable to a random pattern of

pure chance or is there a systematic pattern of missing data. In this research there was no identifiable pattern found amongst the missing data. The missing data was recorded on each question in the survey and frequency tables and histograms were used to identify any discernable pattern of missing data. Having determined the nature of the missing data, the next step in the process is determining how to deal with the missing observations. Schafer and Graham (2002) in a review of ways that missing data has been treated in the social science literature, state that:

> "when a unit provides partial information, it is tempting to replace the missing items with plausible values and proceed with the desired analysis rather than discard the unit entirely. Imputation, the practice of filling missing values, has several desirable features. It is potentially more efficient than case deletion, because no units are sacrificed: retaining the full sample helps prevent loss of power from a diminished sample size. Moreover if the observed data contain useful information for predicting the missing values, an imputation process can make use of this information and maintain high precision (p.158)."

Several ways are suggested for dealing with missing observations: listwise or pairwise deletion or the replacement (imputation) of missing observations with estimated scores. This research used *means substitution* as the imputation method, which involves substituting the overall sample average on that variable. This decision was made on the basis that: (1) there were very low levels of missing observations in the sample and this would not significantly affect the analysis as would be the case when there are large levels of missing data as there can be distortions in estimated variances and correlations

(Schafer and Graham 2002), and (2) the two most commonly used computer generated data deletion options, casewise or listwise deletion, would have reduced the sample size to an unacceptable level for SEM research where n = 200 is considered as ideal (Boonsma 1997).

5.5.4 Assessing Sample Size

There are no specific criterion that dictate the acceptable sample size for structural equation modeling. Kline (1998) suggests some guidelines or rules of thumb where sample sizes below 100 are considered small, between 100 and 200 subjects as medium size and samples that exceed 200 cases could be considered as large (c.f. Breckler 1990). Anderson and Gerbing (1988) view 100 to 150 subjects as the minimum for conducting SEM modeling. Hair et al (1998) highlight the importance that sample size plays in the estimation and interpretation of SEM results. They identify four key factors that determine sample size requirements: (1) model misspecification, (2) model size, (3) departures from normality, and (4) estimation procedure (discussed in detail later in this chapter). These key sampling issues are addressed below.

5.5.5 Model Misspecification

This refers to the extent that the model suffers from specification error where significant variables have been omitted due to not having a sufficiently large sample to test the data. As it is impossible to include every potential construct or indicator, specification error should be negligible if the researcher has included those relevant to the theory. The purpose of the taxonomy developed in Chapter 3 was to ensure that the variables most relevant to the study of working relationships were included in the model and that those peripheral to the problem area were excluded from the proposed conceptual model.

5.5.6 Model Size

Typically a ratio of at least five respondents for each estimated variable is required, with a ratio of ten respondents per variable considered most appropriate (Bentler and Chou 1987; Schumaker and Lomax 1996). As there are ten variables in the final model with 184 respondents, this resulted in a ratio of 18 to 1, more than adequately meeting the model size requirements.

5.5.7 Departures from Normality

If there are departures from multivariate normality in the data, the ratio of respondents to variables needs to increase with a generally accepted ratio of 15 respondents per variable. As there are no violations of multivariate normality in the survey data this was of no concern.

5.6 A Two-Stage Approach to Model Testing

Once the data related issues and SEM assumptions have been addressed, Anderson and Gerbing (1988) strongly recommend a two-stage approach to SEM. Where the measurement model is first estimated and re-specified if necessary, much like factor analysis, and then the measurement model is fixed in the second stage when the structural model is estimated. The rationale is that the accurate representation of the reliability of the indicators is best established in two steps to avoid the interaction of the measurement and structural models and avoid interpretational confounding which can possibly result from within-construct versus between-construct effects in estimation. This view is also supported by Joreskog and Sorbom (1993) where:

> "The testing of the structural model i.e., the testing of the initial specified theory, may be meaningless unless it is first established that the measurement model holds. If the chosen indicators for a construct do not measure that construct, the specified theory should be modified before it can be tested. Therefore, the measurement model should be tested before the structural relationships are tested (p.113)."

In SEM modeling construct validity is assessed by simultaneously testing the structural and measurement models together (Bentler 1978). However, it is necessary to test beforehand the internal consistency and uni-dimensionality of the items used to measure the constructs in the study. To do so, firstly, exploratory factor analysis (EFA) and, secondly, confirmatory factor analysis (CFA) were used in this study. Crowley and Fan (1997) explain the different roles that EFA and CFA play in the SEM process, where exploratory factor analysis is predominantly a data-driven technique for discovering what underlying structure the data may possess and is applied where the researcher wants to explore the data to see what kinds of characteristics, interesting features and relations may exist. In doing so no hypothesised model is imposed on the data and all variables "load" on all factors. CFA, on the other hand, starts with a theoretically plausible model that is assumed to describe, explain, and account for the empirical data. The construction of the model is based either on *a priori* information about the nature of the data structure or on substantive theories in the field (c.f. Joreskog and Sorbom 1989). As such, variables are limited to only "load" on one or a few of the factors.

Overall, EFA is viewed as being useful for generating hypotheses and it is then highly desirable to subject these hypotheses to the test of statistically more rigorous CFA. EFA

was used in this study to ensure that the selected scales did in fact only measure one construct, and also to determine whether or not the new scale "political ally" did perform as required. The following section will summarise the findings from the EFA which was used to assess the structure of the new scale: Political Ally, and test the uni-dimensionality of the other scales used in the study.

5.6.1 The Exploratory Factor Analysis Results

Exploratory factor analysis EFA was conducted on the 8 reflective multi-item measures (i.e., a total of 37 items). Oblimin rotation was selected as the rotation technique as the majority of variables were expected to be highly correlated (Hair et al 1998). The results revealed several interesting findings and resulted in changes being made to the initially-specified measurement model, as discussed below (see Appendix 3):

(1) An eight factor solution was achieved (eigen-value of 1.0) explaining 75.0% of the variance.

(2) The 6 items used to measure "formalisation of communication" split into two factors, where closer examination revealed that items 1, 2 and 3 measured a construct which was renamed "project formalisation" and was subsequently retained for the remainder of this study. The other 3 items were dropped from the measurement model.

(3) The new scale of "political ally" split into two factors at an eigen value of .788, and as it is a new scale it required further investigation. An examination of the 4 items used confirmed that on the basis of face validity, items 1 and 3 measured

the construct “political ally” as defined by this study. On the other hand items 2 and 4 seem appeared to be measuring another construct, the extent to which the R&D Manager perceives that “playing politics” occurs with the Marketing Manager. The 2-item measure of “political ally” was used for the remainder of the study where normally such a two item measure would be dropped from the analysis. However, due to the importance of this construct to the study, and the fact that it is a new scale and exploratory in nature, it has been included as the two remaining items were high in face validity.

(4) The EFA analysis failed to distinguish between the constructs of “collaborative behaviour” and “perceived relationship effectiveness”, with these constructs being grouped together as Component 1, explaining 48.1% of the total variance. As past research (e.g., Kahn 1996; Kahn and Mentzer 1998; Jassawalla and Shashittal 1998) suggests that these two constructs are very highly correlated but distinct in nature this was not a surprising result. It was decided to subject the two variables to the more rigorous test of CFA and discriminant validity to determine if they are indeed different variables.

After having made the required modifications to the measurement model, the next step in the analysis was the use of CFA, which is part of the scale validation process (Gerbing and Anderson 1988), where CFA is seen to “afford a stricter interpretation of uni-dimensionality than can be provided by more traditional methods such as coefficient alpha, item-total correlations, and exploratory factor analysis and thus generally will provide *different* conclusions about the acceptability of a scale (p.186)”. The following

section describes the confirmatory factor analysis conducted to test the measurement model.

5.6.2 The Confirmatory Factor Analysis Results

Only 33 items were kept for the confirmatory factor analysis using AMOS Version 4 (Arbuckle and Wothke 1999). The CFA was completed in two stages to ensure that there was an acceptable ratio of observations to items and did not exceed the widely accepted ratio of 10 responses per item measured (Bentler and Chou 1987; Kline 1998). Furthermore, constructs that were thought to be most highly correlated with one another were grouped together to ensure that all items loaded cleanly on their respective constructs, thereby assisting in the establishment of discriminant validity. The goal of CFA is to identify the specified model, which is achieved when the specified model meets the required fit statistics for SEM. The most widely reported measures of overall model fit are:

(1) The Likelihood-Ratio Chi-Square (χ^2) statistic is an absolute fit measure where a large value of chi-square relative to the degrees of freedom signifies that the observed and estimated covariance matrices differ considerably. Statistical significance levels indicate the probability that these differences are due solely to sampling variations. Thus low chi-square values, which result in significance levels greater than .05 or .10, indicate that the actual and predicted input matrices are not statistically significant – here the researcher is actually looking for *non-significant* differences because the test is between actual and predicted matrices. This is in contrast to the normal chi-square approach where significant differences are sought by the researcher (Hair et al 1998).

(2) The Goodness-of-Fit index (GFI) is a descriptive overall goodness of fit index, where scores range from 0 (poor fit) to 1.0 (perfect fit), and represents the overall degree of fit represented by the squared residuals from prediction compared to the actual data (Hair et al 1998). Scores of over 0.9 are viewed as acceptable (Bagozzi and Yi 1988).

(3) The Comparative-Fit-Index (CFI) is an incremental fit index where a comparison is made between the estimated model and a null or independence model. As with the GFI, scores range from 0 (poor fit) to 1.0 (perfect fit) with scores of over 0.9 viewed as acceptable (Bentler 1990).

(4) The Root Mean Square Error of Approximation (RMSEA) is a measure that attempts to correct for the tendency of the chi-square statistic to reject any specified model derived from too large a sample as all posited relationships become significant. The RMSEA value is representative of the goodness-of-fit that could be expected if the model were estimated in the population, not just the sample drawn for the estimation. Acceptable values range between 0.05 and 0.08 (Browne and Cudeck 1993; Rigdon 1996).

In the first stage CFA model a 4 factor - 15 item model was analysed which included the constructs of affect-based trust (3 items), cognitive trust (5 items), quality of communication (5 items) and political ally (2 items). The model produced an acceptable fit with a chi-square of 143.219 (df = 84, p = .000), GFI= 0.908, CFI = 0.972, RMSEA = 0.062 (even though p = .000, due to the constrained model and large sample size).

In the second stage CFA a 4 factor – 17 item model was analysed which included the constructs of interpersonal collaborative behaviour (3 item), perceived relationship effectiveness (5 item), functional conflict (6 items) and project formalisation (3 item). The model failed to produce an adequate GFI score, with the other fit statistics being acceptable with a chi-square of 242.604 (d.f = 113, p = .000), GFI= 0.864, CFI = 0.943, RMSEA = 0.079). Examining the standardised regression weights of the items where scores above 0.70 are viewed as acceptable indicated that an item (f2r) should be dropped from the functional conflict scale as it had a value of only 0.333, it also had a squared multiple correlation (SMC) score of only 0.111, where the squared multiple correlation is the proportion of variation that is explained by the predictors of the variable in question, the closer the value to 1.0 the greater the variance explained. Also examining the standardised residual covariance matrix showed that the item violated the benchmark where any items that have scores above 2.58 indicate cross-loading (Joreskog and Sorbom 1988) and should be deleted from the analysis. The model was re-run without the offending item, again the model failed to produce an adequate GFI score with the other fit statistics being acceptable with a chi-square of 207.836 (df = 98, p = .000), GFI= 0.877, CFI = 0.951, RMSEA = 0.078). A further item (f3) was dropped from the functional conflict scale as its SMC was 0.440 and its standardised regression weight was 0.664.

The model was re-run without the offending item (f3), but again the model failed to produce an adequate GFI score with the other fit statistics being acceptable with a chi-square of 182.655 (df = 84, p = .000), GFI= 0.881, CFI = 0.954, RMSEA = 0.080). A further item (f1), was then dropped from the functional conflict scale as it had standardised residual covariance scores approached or exceeded 2.58 and its SMC was

0.491. The model was re-run without the second offending item (f1), the model producing acceptable fit statistics with a chi-square of 109.658 (df = 71, p = .002), GFI= 0.922, CFI = 0.981, RMSEA = 0.055. This completed the confirmatory factor analysis for the measurement model. Reliability analysis revealed that all of the Cronbach alpha scores for the purified measures exceeded 0.81 (see Table 5.1) suggesting that there is a high level of internal consistency for the indicators.

At this point of the SEM process, the structural and measurement models had been specified, the next step was to specify any correlations that are thought to exist *a priori* between exogenous constructs or between endogenous constructs.

5.6.3 Identifying Correlations of Constructs and Indicators

In many instances exogenous constructs may be correlated with each other, and in this study several of the exogenous variables are indeed correlated with each other. Specifically, there was a correlation between the variables of: (1) “quality of communication” and “political ally”, a finding consonant with Moorman, Deshpande and Zaltman (1993) where the quality of information received was associated with positive perceptions of the source, (2) “political ally” and “dependence on the Marketing Manager”, this was expected because the qualitative research interviews suggested that their “friends” were often heavily relied upon for resources and the organisational literature abounds examples of the dependence of strategic alliance partners upon each other for specific task completion, (3) “project formalisation” and “quality of communication”, where information expectations between Marketing and R&D are formalised there are greater perceptions of information quality (Moenaert et al 1994), and (4) “dependence on the Marketing Manager” and “quality of

communication", an association between these variables has been suggested by previous researchers examining the use of market research information, where the greater the belief that the other manager has specialist skills that can be relied on, there is a greater belief that they produce quality outputs (Moorman, Deshpande and Zaltman 1992). Correlations of the variables used in the proposed conceptual model are presented in Table 5.2.

Table 5.2: Descriptive Statistics for the Key Constructs

Variables	**Scale Mean**	**S.D**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Communication Frequency[a]	2.51	.66									
Quality of Communication	4.65	1.37	.35**								
Cognitive Trust	5.19	1.23	.24**	.69**							
Affective Trust	4.83	1.54	.29**	.57**	.70**						
Relationship Effectiveness	5.15	1.32	.32**	.70**	.78**	.75**					
Project Formalisation	4.02	1.55	.30**	.29**	.31**	.35**	.40**				
Dependence on Marketing Manager[a]	3.28	1.25	.31**	.38**	.25**	.20**	.27**	.10**			
Functional Conflict	5.25	1.15	.12	.39**	.54**	.46**	.56**	.27**	.12		
Collaborative Behaviour	5.18	1.39	.35**	.70**	.66**	.68**	.84**	.31**	.28**	.54**	
Political Ally	3.97	1.61	.27**	.49**	.58**	.65**	.59**	.21**	.25**	.41**	.59**

** Pearson product moment correlation coefficients significant at the 0.05 level (two-tailed test)

[a] denotes a formative indicator

5.6.4 Assessment of Discriminant Validity

When highly correlated measures are used it is important to also establish discriminant validity, where discriminant validity refers to the distinctiveness of the factors measured by different sets of indicators (Kline 1998). Discriminant validity was assessed using Fornell and Larcker's (1981) approach where discriminant validity is established if the squared multiple correlation of two variables is less than the average variance extracted (AVE) statistic available from the AMOS 4 data output. In all cases, the AVE extracted was greater than the squared multiple correlation. This finding was particularly important for the variables of interpersonal collaborative behaviour and perceived relationship effectiveness as the EFA had failed to distinguish between the two. In light of the results of the CFA and the discriminant validity, interpersonal collaborative behaviour is a separate construct to perceived relationship effectiveness.

Onc these steps have been undertaken, the next step is to select the type of input matrix (covariances or correlations) to be used for model estimation, and (3) to estimate the structural and measurement models.

5.7 Estimating the Proposed Model

At this stage the researcher estimates the specified model, and addresses the issues of inputting the data in the appropriate form and selecting the estimation procedure.

5.7.1 Inputting Data

The focus of SEM is on the pattern of relationships across respondents and for this reason SEM was initially formulated for use with the variance-covariance matrix and not individual data observations as the input data (as it would be if a correlation matrix

was used). As such SEM is often called covariance structure analysis. Hair et al (1998 p.603) suggest that the nature of the research should be the determining factor as to which matrix types to use. If the objective of the research is to understand the pattern of causal relationships which link various constructs, correlation matrices are appropriate. In the case where the research is a test of theory, then covariances are appropriate because they allow valid comparison between different populations or samples due to the fact that they have a common range that makes possible direct comparisons of the coefficients in the model.

5.7.2 Model Estimation

Schumaker and Lomax (1996 p.102) describe estimation as the procedure of obtaining parameter estimates for those specified in the model (measurement and structural) that produce the matrix Σ (population), such that the parameter values are as close as possible to those in *S*, the sample covariance matrix of the observed or indicator variables. Kline (1998) identifies several estimation approaches available to the researcher: maximum likelihood (ML), generalised least squares (GLS), unweighted least squares (ULS), the two-stage least squares (TLS) method, and the asymptotically distribution free (ADF) method. If the assumption of multivariate normality is met, the ML estimation is viewed as the most appropriate for small to medium size samples (Ding, Velicer and Harlow 1995), but is not recommended for larger samples as the method becomes too "sensitive" and almost any difference between variables is detected making goodness-of-fit measures indicate a poor fit. When the data is non-normal in distribution the techniques of GLS and ADF are used, this requires far larger samples (*Ns* of 200 – 500).

5.7.3 Estimation Technique

AMOS 4 uses the variance-covariance matrix for model testing and Maximum Likelihood (ML) estimation as the default method for model fitting. ML estimation differs from regression analysis as it simultaneously calculates all model parameters. The name “maximum likelihood” describes the statistical principle that underlies their derivation: if the estimates derived from the sample data are assumed to be population values, they are the ones that maximise the likelihood that they are drawn from this population (Kline 1998, p.123).

Hair et al (1998) identify several of the key estimation processes available to the researcher:

(1) Direct estimation: in this process the parameter then the confidence interval (and standard error) of each parameter is based on sampling error. Both the parameter estimate and its confidence interval come from the model estimated on a single sample. This is the most commonly used approach to SEM modeling and was chosen as the estimation approach for this study as it does not have restrictions in terms of sample size as do some of the other techniques identified below.

(2) Bootstrapping: which is a re-sampling technique where cases are randomly selected from the original data set (which is treated as being representative of the population) and multiple models are generated. This method works most effectively in large sample situations (n > 500) which are definitely representative of the population from which they are drawn (Arbuckle and Wothke 1999).

(3) Simulation: allows the researcher to change the characteristics of the sample to meet the researcher's objectives e.g., the degree of correlation between variables may be varied across samples in some systematic manner. As this study involves theory testing, simulation was not viewed as appropriate.

(4) Jack-knifing: is an approach which aims to determine if there are influential data points in the sample. Similar to bootstrapping it involves drawing repeated sub-samples from the original sample. Kline (1998, p.310) defines it as a re-sampling procedure where one case is excluded from each replication of an original sample. For example, the first case is omitted in the first generated sub-sample, the second case is excluded from the second generated sub-sample, and so on. The maximum number of generated samples using a jack-knife procedure thus equals the total number of cases. Jack-knifing is therefore more useful in situations where there are smaller samples (Schumacker and Lomax 1996).

5.7.4 Assessing the Model Identification

As part of this stage of SEM, Hair et al (1998) identify the degrees of freedom in a model and the subsequent diagnosis and remedy of identification problems as key issues. The following discussion will address these issues in the wider context of model identification. Byrne (2001) states that model identification is a complex topic that is difficult to explain in non-technical terms, and continues with:

> "in broad terms, the issue of identification focuses on whether or not there is a unique set of parameters consistent with the data. This question bears directly on the transposition of the variance-covariance matrix of observed

> variables (the data) into the structural parameters of the model under study. If a unique solution for the values of the structural model can be found, the model is considered to be identified …. If, on the other hand, a model cannot be identified, it indicates that the parameters are subject to arbitrariness thereby implying that different parameter values define the same model; such being the case, attainment of consistent estimates for all the parameters is not possible, and thus the model can not be evaluated empirically (p.35)."

Hair et al (1998, p.608) state that there is no single rule that will establish the identification of a model, they suggest that the researcher has two basic rules or heuristics available, the rank and order conditions. The order condition states that the model's degrees of freedom must be greater to or equal to zero, where the degrees of freedom in a model are the difference between the number of correlations or covariances and the actual number of coefficients in the proposed model. This corresponds to what are termed just-identified or over-identified models. A just-identified model has exactly zero degrees of freedom providing a perfect model fit yet the solution is uninteresting in that it has no generalisability. An over-identified model has more information in the data matrix than parameters resulting in positive degrees of freedom, and as such is the goal for all SEM modeling.

The model in this study did meet the order condition with df = 15 (see Table 5.2). However, Hair et al (1998) argue that the order condition is necessary but not sufficient for identification, the model must also meet the rank condition to be identified. The rank condition which requires the researcher to algebraically determine if each parameter is

uniquely identified (estimated). As this is a very complicated process two heuristics are suggested: (1) the three measure rule, where any construct with three measures or more will always be identified – all constructs in the model except "political ally" meet this requirement, and (2) the recursive model rule which states recursive models will always be identified. Kline (1998) describes recursive models as having two distinct features, firstly, all causal effects are unidirectional (no feedback loops), secondly, their disturbances are uncorrelated in that no variable is both a cause and an effect of another variable, only then can a model be viewed as causal in nature. The SEM model that is presented here in Figure 5.1 meets both the rank and order conditions for identification, as well as the criteria incorporated in the AMOS program. Overall, there were no issues requiring diagnosis or modification in the model identification stage of this study.

5.7.5 Evaluating Model Estimates and Goodness of Fit

Having satisfied all of the requirements of the previous stages, the next step is to estimate the model. At this point the constructs in the path model were represented with summated scores using equally-weighted scales developed from the results of the confirmatory factor analysis. Li and Calantone (1998 p.88) provide the rationale for doing so by highlighting that the inherent complexity and difficulty of running a full structural model can be significantly reduced by turning the structural model into a path model with a measurement model as *a priori*. The use of summated scales represents a trade-off in technical rigour versus a gain in practicality, with outcomes of an acceptable variable-to-sample size and a less complex model. Li and Calantone (1998) further support their action by citing several references which have used this approach in the Marketing literature (Calantone, Schmidt and Song, 1996; Cavusgil and Zou, 1994;

Price, Arnould, and Tierney 1995). The model was estimated using the structural equation modeling package AMOS 4: Arbuckle and Wothke 1999.

5.7.6 Offending Estimates

Hair et al (1998) indicate the first step in evaluating the results of a model is an initial inspection of "offending estimates" which are the estimated coefficients in either the structural or measurement models that exceed acceptable limits e.g., negative error variances or non-significant error variances for any construct, standardised coefficients exceeding or very close to 1.0, and, very large standard errors associated with any estimates. If any of these offending estimates exist they must be dealt with by dropping the item from the model before evaluating any specific results of the model. An examination of the data output revealed no offending estimates in this analysis.

5.8 Overall Model Fit Measures

Hair et al (1998) state that "assessing the overall goodness-of-fit for structural equation models is not as straightforward as other multivariate dependence techniques ……. SEM has no single statistical test that best describes the "strength" of the model's predictions. Instead, researchers have developed a number of goodness-of-fit measures that when used in combination, assess the results from three perspectives: overall fit, comparative fit to a base model, and model parsimony (p.653)". Hoyle (1995) also acknowledges that there is little consensus concerning the best index of overall fit for evaluating structural equation models and recommends that researchers do not report a long list of fit indexes that are generated by the software merely for the sake of completeness. Rather fit indexes should be chosen on the basis of their appropriateness to issues such as sample size and estimation technique used (e.g., maximum likelihood,

least–squares). The researcher is thus faced with deciding which measures to use as there is no agreement amongst SEM users on a complete set acceptable for this type of analysis. However, there is a general consensus as to the minimum requirement in terms of fit measures for model estimation (Kline 1998; Byrne 2001).

The first step is to determine the overall model fit with one or more of the accepted Goodness-of-Fit measures available, where the correspondence of the actual or observed input (covariance matrix) with that predicted by the model is measured. One of the difficulties when assessing SEM output is the lack of consensus amongst SEM researchers as to what constitutes the ideal "set" of fit indexes that would fully assess the structural model being tested. As Byrne (2001) states "the choice is not a simple one, largely because particular indexes have been shown to operate somewhat differently given the sample size, estimation procedure, model complexity, and/or violations of assumptions of multivariate normality and variable independence (p.87)". The indexes used for this study have been suggested by several authors as meeting the minimum requirement for SEM model evaluation (Hair et al 1998; Hoyle 1995; Kline 1998; Schumaker and Lomax 1996). The following section will provide a brief description of the fit measures chosen and the justification for their use, and then present the model fit statistics for the study.

When assessing model fit, Goodness-of–Fit measures are typically of three types: (1) absolute fit measures, (2) incremental indexes of fit, and (3) parsimonious fit indexes.

Absolute fit measures – assess how well an *a priori* model reproduces the sample data by providing a measure of the overall model fit (both measurement and structural). As

explained previously, the Likelihood-Ratio Chi-Square (χ^2) statistic is an absolute fit measure where a large value of chi-square relative to the degrees of freedom signifies that the observed and estimated covariance matrices differ considerably. The chi-square for the model was χ^2 = 19.297 (d.f =15, p = 0.201), with the overall chi-square non-significant as required by SEM. To reduce the sensitivity of the χ^2 to sample size, some researchers divide its value by the degrees of freedom, the resulting statistic (χ^2/df) has no clear-cut guideline about what value is minimally acceptable, but a common suggestion is that it should be a ratio less than 3 (Hoyle 1995). This view is also supported by Carmines and McIver (1981) who suggest that a value between 1 and 3 is acceptable. The χ^2/df ratio for this study was 1.3 indicating a good model fit.

To avoid the problems associated with using chi-square and chi-square/degrees of freedom ratio, several fit indices were developed originally for use with the LISREL program but which are now available with others (e.g., AMOS). The most commonly reported is the Joreskog-Sorbom *Goodness-of- Fit Index* (GFI), where values of the index theoretically range from 0 (poor fit) to 1 (perfect fit). The GFI is analogous to a squared multiple correlation coefficient in that it indicates the proportion of the observed covariances explained by the model-implied covariances (Hoyle 1995). Scores of over 0.9 are viewed as acceptable (Bagozzi and Yi 1988). For this model the GFI = 0.980 indicating a very good absolute model fit.

As stated previously, the Root Mean Square Error of Approximation (RMSEA) is another absolute fit measure, with Byrne (2001) describing it as one of the most informative criteria in covariance structure modeling as it takes into account the error of

approximation in the population and asks the question "how well would the model, with unknown but optimally chosen parameter values, fit the population covariance matrix if it were available?". This is the key ability of the RMSEA value where it is representative of the goodness-of-fit that could be expected if the model was estimated in the population, not just the sample drawn for the estimation. Values below 0.05 are viewed as excellent, and acceptable values ranging between 0.05 and 0.08 (Browne and Cudeck 1993, Rigdon 1996). The RMSEA value for this study is 0.040, indicating a very good model fit.

Incremental fit measures – these compare the proposed model to a baseline or null model. These were developed to overcome the limitations of the above mentioned model fit measures. Of these incremental indexes, the Normed Fit Index (NFI) measure, developed by Bentler and Bonnet (1990), has been widely used and is highly regarded (Byrne 2001). Kline (1998) describes the NFI index "where the value of the NFI indicates the proportion of the improvement of the overall fit of the researcher's model relative to a null model. The typical null model is an independence model, that is one in which the observed variables are assumed to be uncorrelated. If the NFI equals .80, for example, then the relative overall fit of the researchers model is 80% better than that of the null model estimated with the sample data (p.129)." The accepted minimum value for the NFI index was 0.90, however, Hu and Bentler (1999) have a revised cut-off of 0.95 which is representative of a well-fitting model. The NFI value for this study is 0.981, indicating very good model fit

Bentler (1990) developed a revised version of his NFI index, the Comparative Fit Index (CFI) where the new measure is interpreted the same way as the NFI but is less affected

by large sample size. As with the GFI, scores range from 0 (poor fit) to 1.0 (perfect fit) with scores of over 0.9 viewed as acceptable. Bentler (1990) suggests that the CFI should become the incremental fit index of choice for structural equation modeling. The CFI value for this study is 0.996, indicating a well-fitting model.

Another commonly reported incremental fit measure is the Bentler-Bonnet (1990) non-normed fit index (also known as the Tucker – Lewis Index, TLI). It combines a measure of parsimony to account for model complexity, into a comparative index between the proposed and null models, resulting in values between 0 to 1, with a recommended TLI value of 0.90 or greater. The TLI value for this study is 0.987.

Also recommended for model evaluation is the incremental fit index (IFI) developed by Bollen (1989) to address issues of parsimony and sample size known to be associated with the NFI. As such it is computationally the same as the NFI except that the degrees of freedom are taken into account (Byrne 2001). Consistent with the other indexes it yields values between 0 and 1, with a value greater than .95 indicative of a good fit (Byrne 2001). The IFI value for this study is 0.987.

Another incremental fit index which has been used in the past is the adjusted goodness of fit index, AGFI, this is an extension of the GFI, where it is adjusted by the ratio of degrees of freedom for the proposed model to the degrees of freedom for the null model. Consistent with the other indexes it yields values between 0 and 1, with a value greater than .95 indicative of a good fit (Byrne 2001). However, Kline (1998) states that the AGFI has been viewed as problematic by numerous researchers, and is less used

than before when reporting SEM results. As it is still required by some reviewers of SEM research, the AGFI for this study is 0.926, approaching the accepted level.

Parsimonious fit measures – are the third type of goodness of fit measures suggested for evaluating SEM models. These measures relate the goodness of fit of the model to the number of coefficients required to achieve this level of fit. Their basic objective is to avoid "overfitting" the model. However, there is no statistical test that is available for these measures, so their use is limited to model comparisons (Hair et al 1998). These measures are not seen as necessary for individual SEM models that are testing theory, but they are used when making comparisons between SEM models (Hoyle 1995, Schumaker and Lomax 1996, Kline 1998).

In summary, the 10 construct model, with 4 exogenous variables and 6 endogenous variables, resulted in acceptable model fit with a chi-square of 19.297 (d.f = 15, p = .201), GFI= 0.980, CFI = 0.996, RMSEA = 0.040) (see Table 5.3). Furthermore, the Squared Multiple Correlation is viewed as a useful statistic for assessing the proportion of variance explained by the predictors of the dependent variable. Similar to the R^2 statistic in multiple regression analysis, the closer the value of the SMC to 1 indicates a greater percentage of the model variance explained by the predictor variables. In this study, 80.5% of the variance in the outcome variable (i.e., perceived relationship effectiveness) is explained by the predictor variables. From these findings, it may be concluded that the conceptual model presented in this study does have significant explanatory power when examining the working relationship between Marketing Managers and R&D Managers.

Table 5.3: Model Fit Results

Fit Statistics	Accepted levels	Model (15 d.f)
Chi Square	Non Significant	19.297
P	p > .1	0.201
CMIN/df	Between 1 and 3	1.286
GFI	Greater than 0.90	0.980
AGFI	Greater than 0.90	0.926
CFI	Greater than 0.95	0.996
NFI	Greater than 0.95	0.981
RMSEA	Less than 0.08	0.040
IFI	Greater than 0.95	0.996
Squared Multiple Correlation	The closer to 1 the better variance explained	0.805
Significant Paths Non Significant Paths	18 6	N/A

5.8.1 The Fit of the Measurement Model

Hair et al (1998) suggest that once the overall model fit has been established, the measurement model should be tested with each measurement construct assessed for uni-dimensionality and reliability. These requirements have already been met earlier in the SEM process where confirmatory factor analysis was used to establish uni-dimensionality and reliability of the construct items. The issues of composite reliability and variance extracted were also addressed during the confirmatory factor analysis. The structural model fit is assessed by an examination of the significance of estimated coefficients.

5.8.2 Model Modification

In SEM there are issues relating to the extent to which the proposed hypotheses and models specified prior to data analysis can be modified, Kline (1998) explains that in SEM analysis "the data may be inconsistent with the model, which means that the researcher must either abandon the model or modify the hypotheses on which it is based. The former option is rather drastic, where in practice researchers more often opt for the second choice, which means the analysis has a more exploratory tenor as revised models are tested with the same data (p.9)". Kline (1998) also makes the point that the distinction between the terms "exploratory" and "confirmatory" in SEM analysis should not be interpreted as absolute but rather refers to Joreskog's (1993) more formal distinction of SEM applications being either (1) *strictly confirmatory* – where a researcher has a single model that is accepted or rejected based on its correspondence to the data, (2) *alternative models* - where alternative models are available *a priori*, and (3) *model – generating* (which is the most common) where an initial model does not fit the data and is modified by the researcher. It is then tested again with the data with the goal to "discover" a model that has two properties i.e., it makes theoretical sense, and its statistical correspondence to the data is reasonable. SEM, even though it is regarded as a confirmatory technique does have the flexibility to accommodate some modifications to initial hypotheses and expected relationships. In this study, there was no model modification as the specified model remained unchanged, rather some items from the measurement model where dropped to improve reliability (e.g., functional conflict, project formalisation and political ally).

5.9 Chapter Summary

The purpose of this chapter was to establish that SEM was an appropriate statistical technique for theory testing. Subsequently, a SEM model was developed and tested by following the general guidelines set out by Hair et al (1998). The results resulted in acceptable model fit with a chi-square of 19.297 (d.f = 15, p = .201), GFI= .980, CFI = .996, RMSEA = .040) and indicated that the model specified *a priori* does match the sample data to the extent that the model is deemed to be identified on statistical grounds. The next part of the analysis examines the specific path coefficients between constructs and allows the researcher to determine whether the hypotheses developed have been supported or rejected by the analysis. Chapter 6 will present Table 6.1: Structural Paths and a discussion of the specific findings will follow.

CHAPTER 6: RESULTS AND DISCUSSION

6.1 Preamble

Presented in this chapter are the results of the causal path analysis model developed to conceptualise the antecedents and consequences of interpersonal working relationships between Marketing Managers and R&D Managers during a new product development project. In this study, 26 hypotheses were developed for testing, and of these 18 were supported and 6 not supported by the results of the SEM analysis. The following chapter will discuss: (1) the causal path analysis and the test of each hypothesis, (2) the indirect, direct and total effects of all variables within the SEM model on the dependent variable i.e., perceived relationship effectiveness, (3) the theoretical implications of this research, (4) the managerial implications, (5) the limitations of the study, and (6) suggested future research directions.

6.2 Causal Path Analysis

Causal path analysis allows the researcher to specify a series of expected dependence relationships amongst a set of independent and dependent variables (Hair et al 1998; Kline 1998). Structural equation modeling provides a method of testing whether or not these relationships are statistically significant. Unfortunately, when interpreting their data some researchers have implied strong causal relationships from the results, thus drawing strong criticism from other researchers who point out that it is only possible to draw strong cause-effect inferences from experimental studies (Schumaker and Lomax 1996). Hoyle (1995) makes it clear that the conditions for establishing causality are no different when data are analysed using SEM analysis than with correlation, multiple regression analysis, or analysis of variance. That is, independent variables must be

isolated, association between variables must be demonstrated and directionality established. SEM researchers are advised to present their results as weak causal inferences (Hoyle 1995; Kline 1998; Schumaker and Lomax 1996). The following section will provide the results of the SEM analysis for all of the hypotheses developed for this study.

6.3 Results of the Hypothesis Testing

The strength of the hypothesised relationships in the structural model will be tested by examining the weight of the path coefficients between variables hypothesised to have a directional relationship. Table 6.1 provides the results of the SEM analysis for all of the hypotheses and the expected direction of the hypotheses and the actual outcomes of the study. The following section will discuss each hypothesis individually.

6.3.1 The Antecedent Variables ($H1_a$ – $H4_e$)

The discussion begins with the 4 antecedent variables, (1) project formalisation, (2) perceived quality of communication received from the Marketing Manager, (3) perceived dependence on the Marketing Manager, and (4) perceptions of the Marketing Manager as a political ally.

Table 6.1 Structural Model Findings

Linkages in the Model		Expected Direction	Actual Direction	Standard. Beta	C.R (t-values)	Hypoth. Supported
ProjForm → Commfreq	H_{1a}	+	+	.226	3.282***	Yes
ProjForm → ABT	H_{1b}	-	+	.137	2.522**	No
ProjForm → CBT	H_{1c}	+	+	.132	2.422**	Yes
Qualcom → Commfreq	H_{2a}	+	+	.227	2.806***	Yes
Qualcom → CBT	H_{2b}	+	+	.545	8.850***	Yes
Qualcom → Collabbeh	H_{2c}	+	+	.357	5.787**	Yes
DependMM → Commfreq	H_{3a}	+	+	.215	3.001***	Yes
Polally → Commfreq	H_{4a}	+	-	-.053	-0.716	No
Polally → CBT	H_{4b}	+	+	.245	4.260***	Yes
Polally → ABT	H_{4c}	+	+	.207	3.556***	Yes
Polally → Funcconf	H_{4d}	+	+	.243	3.454***	Yes
Polally → Collabbeh	H_{4e}	+	+	.149	2.795***	Yes
Commfreq → CBT	H_{5a}	+	-	-.017	-0.311	No
Commfreq → ABT	H_{5b}	+	+	.102	1.916**	Yes
Commfreq → Funcconf	H_{5c}	+	-	-.018	-0.290	No
Commfreq → Collabbeh	H_{5d}	+	+	.097	2.063**	Yes
CBT → Funcconf	H_{6a}	+	+	.356	4.177***	Yes
CBT → Collabbeh	H_{6b}	+	+	.043	0.083	No
CBT → PRE	H_{6c}	+	+	.296	5.925***	Yes
CBT → ABT	H_{6d}	+	+	.531	8.738***	Yes
ABT → Funcconf	H_{7a}	+	+	.095	1.107	No
ABT → Collabbeh	H_{7b}	+	+	.274	4.393***	Yes
ABT → PRE	H_{7c}	+	+	.176	4.939***	Yes
Funcconf → Collabbeh	H_{8a}	+	+	.167	3.124***	Yes
Funcconf → PRE	H_{8b}	+	+	.056	1.400*	Yes
Collabbeh → PRE	H_{9a}	+	+	.497	10.299***	Yes

Significance at d.f = 18, * = p > .10 (1.330) ** = p > . 05 (1.734) *** p > .01 (2.552)

Hypothesis $H1_a$: Greater project formalisation will lead to higher communication frequency between the R&D Manager and the Marketing Manager

The relationship between formalised innovation activities and increased communication flows has been the main tenet of NPD thinking for many decades (see Table 2.3) with a great a deal of past empirical evidence indicating that increased formalisation between Marketing and R&D functions does increase communication flows. This study has focused on the interpersonal level of communication expectations created by formalised procedures at the project level, where the extent to which the Marketing Manager and the R&D Manager understand their communication commitments and expectations is thought to increase communication flows through both informal and formal channels (Ruekert and Walker 1987). By formalising the project process, individual managers can engage in help-seeking behaviour from their counterpart manager in an organisationally legitimate manner i.e., task specification through formalised communication expectations, rather than relying on social ties to facilitate information exchange. This formal project communication can and often does lead to social exchanges occurring (Blau 1964). Therefore it was hypothesised that an increase in the level of project formalisation would lead to increased communication frequency between the managers. The results of the analysis support this hypothesis, as there is a statistically significant, *positive* path-coefficient (.226) indicating a strong association between project formalisation and communication frequency between the two managers.

Hypothesis $H1_b$: Greater project formalisation will lead to a lower level of affect-based trust between the R&D Manager and the Marketing Manager

The results of the analysis did not only reject this hypothesis, rather the opposite is indicated i.e., that there is a statistically significant, *positive* path-coefficient (.137)

between project formalisation and affect-based trust, in other words greater project formalisation increases the level of affect-based trust. A possible explanation is provided by Lewis and Weigert (1985a) who suggested that when parties interact in a "cordial way", they establish a feeling and appearance that everything is normal and in proper order and that situational normality belief results in increasing trusting intentions. By formalising project communications there seems to be an opportunity for the R&D Manager to assess face-to-face the intentions of the Marketing Manager. Specifically, it allows the evaluation of the degree of mutual understanding between the two managers and the appreciation of each other's concerns. This view is supported by Good (1988) who suggested that in work situations being around another person generally will increase already formed favourable beliefs about that person, as interpersonal cues are generally harder to misconstrue face to face.

Hypothesis $H1_c$: Greater project formalisation will lead to a higher level of cognitive-based trust between the R&D Manager and the Marketing Manager

The results of the analysis support this hypothesis, as there is a statistically significant, *positive* path-coefficient (.132) indicating a strong association between formalised communication and cognitive-based trust between the two managers, where as project formalisation increases so does the level of cognition-based trust. The interpersonal communication exchange that occurs when project guidelines are being formalised between counterpart managers provides an opportunity for role behaviours to be met, where the counterpart manager is expected to behave in a competent, professional and dependable manner as they hold a senior position in the organisation. Formalising the nature of project communication and their relative communication commitments to each other provides managers an opportunity to assess such qualities in each other. The

increased level of accountability that occurs from following formalised processes facilitates the display of professional behaviours and confirms role expectations allowing cognitive-based trust to increase.

Hypothesis 2_a: The greater the perceived quality of communication from the Marketing Manager the higher the communication frequency

The results of the analysis support this hypothesis, as there is a statistically significant, *positive* path-coefficient (.227) indicating a strong association between the perceived quality of the information and communication frequency, where the quality of communication from the Marketing Manager is perceived to be high, there will be an increase in the frequency of communication between the managers. As the R&D function typically relies upon the information received from the Marketing function to help it achieve its NPD goals the perceived quality of this information i.e., how credible, understandable, relevant and useful for task completion, is a major antecedent of effective functional integration and effective individual-level working relationships. Where communication is perceived to be of high quality, there are increased communication flows as the exchanges are viewed as highly relevant and credible (Gupta and Wilemon 1988; Jassawalla and Shashittal 1998). R&D Managers will communicate more frequently with Marketing Managers who are perceived as performing their job competently i.e., providing information inputs of value to the NPD project. When communication quality is low, R&D Managers will often use many of the avoidance behaviours suggested by Bromiley and Cummings (1995), and also identified in the preliminary qualitative research for this study, such as not returning phone calls, postponing meetings and delaying responses to requests, when dealing with their counterpart manager to prevent conflict situations arising. Quality communication

increases communication frequency by eliminating much of the perceived risk associated with the reliance on another person's specialist judgement which then impacts directly upon their own task completion. Managers will increase their communication frequency with counterparts when they perceive that value is being added to their task completion. This finding supports the widely held view that quality of information is important in successful interfunctional integration (Moenaert and Souder 1992; Maltz and Kohli 1996; Shaw and Shaw 1998).

Hypothesis 2_b: The greater the perceived quality of communication from the Marketing Manager the higher the cognitive-based trust

The results of the analysis support this hypothesis, as there is a highly statistically significant, *positive* path-coefficient (.545) indicating a very strong association between the perceived quality of the information and cognitive-based trust, high quality communication from the Marketing Manager leads to an increase in the R&D Manager's cognitive-based trust. This finding was expected as the trust formation literature clearly identifies the manner in which components of interpersonal trust are built between two people in co-operative work relationships, with particular emphasis on the importance of competent role performance for cognitive trust development (Rotter 1967; Dwyer and Oh 1987). In the context of the R&D/Marketing working relationships, where the R&D Manager is often heavily reliant on the information inputs from the Marketing Manager, the quality of the communication is the basis for an assessment of the individual manager. That is, the attributes of the information are highly correlated with the perceptions of the individual manager's competence and ability (Gupta and Wilemon 1988; Moenaert and Souder 1994; Jassawalla and Kahn 1998). Marketing Managers are clearly assessed by R&D Managers on the basis of their

communication inputs for the NPD project. Where their communication inputs are perceived as being of high quality, there is an increased level of cognitive-based trust between the R&D Manager and the Marketing Manager.

Hypothesis 2_c: The greater the perceived quality of communication from the Marketing Manager the higher the interpersonal collaborative behaviour

The results of the analysis support this hypothesis, as there is a statistically significant, *positive* path-coefficient (.357) indicating a strong association between the perceived quality of communication and interpersonal collaborative behaviour, where high quality communication from the Marketing Manager leads to an increase in the R&D Manager's interpersonal collaborative behaviour. This results generally in an improvement in interpersonal dynamics, including greater mutual understanding and more harmonious relations (Jassawalla and Shashittal 1998), greater appreciation of the information styles and communication preference of individual managers (Moenaert and Souder 1992), better conflict resolution (Ruekert and Walker 1987), and the development of interpersonal trust (McAllister 1995). This finding supports the theoretical and empirical evidence that effective communication between the two functional managers is beneficial in overcoming many of the barriers to co-operation that exist such as: (1) stereotypes (Saxburg and Slocumb 1968), (2) credibility (Gupta and Wilemon 1988), (3) interpretative barriers (Dougherty 1992), (4) psychological distance (Fisher, Maltz and Jaworski 1997). Therefore, the quality of communication that the R&D Manager receives from the Marketing Manager does have a direct effect on their interpersonal collaborative behaviour as it allows them to use such inputs with greater confidence in their decision making processes.

Hypothesis 3_a: The greater the perceived dependence of the R&D Manager on the Marketing Manager the higher the level of communication frequency

The results of the analysis support this hypothesis, as there is a statistically significant, *positive* path-coefficient (.215) indicating a strong association between the perceived dependence of the R&D Manager on the Marketing Manager and an increase in communication frequency. Resource dependence theory suggests that the more one function believes it depends on the other function, the greater the interactions and resource flows across the functional boundaries (Thompson 1967; Pfeffer and Salancik 1978). This theoretical view has received widespread empirical support in the NPD literature (Gupta, Raj and Wilemon 1986; Ruekert and Walker 1987; Olsen, Walker and Ruekert 1995). At the interpersonal level, the theory of relationship commitment (Morgan and Hunt 1994) suggests that managers will pursue a relationship if they feel that it is beneficial and worthwhile, and this applies particularly to dependence situations. This research confirms that when a manager is dependent on another manager for resources there is likely to be greater the communication frequency between the two managers, supporting the findings of Ruekert and Walker (1987).

Hypothesis 4_a: The greater the perception of the Marketing Manager as a political ally by the R&D Manager the higher the level of communication frequency

Robbins (1987) states that politics are an everyday aspect of organisational life, where individuals and subunits continually engage in politically oriented behaviour. Typically, in NPD research the political nature of the process has been implied through constructs such as “turf wars” (Ashforth and Lee 1990) or “interfunctional” rivalry (Lewicki et al 1992; Maltz and Kohli 1996; Moenaert et al 1994; Maltz, Souder and Kumar 2001) where these political aspects of cross-functional relations have been found to have

negative effects on information sharing and co-operation. As stated earlier, the trust literature clearly identifies the perceived intentions of the other party as critical in determining whether they can be trusted or not (Deutsch 1960; Morgan and Hunt 1994). If the Marketing Manager is perceived to be a political ally, which was defined as the degree to which the R&D Manager perceives the Marketing Manager as his/her political ally (i.e., friend, supporter) within the organisation, it was expected that communication flows will be frequent between the two managers. The results of the analysis reject this hypothesis, as there is a non-significant, *weak negative* path-coefficient (-.053) between the perception of the Marketing Manager as a political ally and communication frequency. It seems that the greater the perception of the Marketing Manager as a political ally, the less there is a perceived need to communicate frequently. A possible explanation of this behaviour may lie in the individual manager's motivation to communicate in the relationship. In situations of low trust work relationships there is normally an increase in monitoring behaviour (McAllister 1995), such as more frequent communication to ensure compliance with agreements and more formalised communication to document requests (Ashforth and Lee 1990). In the circumstance where the Marketing Manager is not expected to be a political threat to the R&D Manager, communication may be limited to task completion only and not used for monitoring purposes.

Hypothesis 4_b: The greater the perception of the Marketing Manager as a political ally by the R&D Manager the higher the level of cognitive-based trust

The results of the analysis support this hypothesis, as there is a highly statistically significant, *positive* path-coefficient (.245) indicating a strong association between the perception of the Marketing Manager as a political ally and cognitive trust, where the

Marketing Manager is perceived to be a political ally, there is an increase in the level of the R&D Manager's cognitive trust in the Marketing Manager. As cognition based trust, is grounded in individual beliefs about peer reliability, competence and the dependability of another (McAllister 1995), the perception of the Marketing Manager as a political ally who can be depended upon to provide "support" seems applicable during NPD projects. Pettigrew (1973) argues that in organisational settings, internal politics are often stable in nature with decision makers using the same allies to achieve their goals over a period of time, which implies that they are able to make accurate assessments of their allies trustworthiness. Support for this viewpoint is also provided by Moenaert et al (1992) who found that in situations where the sender of marketing information e.g., the Marketing Manager, was "trusted" by the recipient there was a higher "use" of the information received from that source in decision making because there was little risk in using information with a hidden agenda behind the information transfer.

Hypothesis 4_c: The greater the perception of the Marketing Manager as a political ally by the R&D Manager the higher the level of affect-based trust

The results of the analysis support this hypothesis, as there is a highly statistically significant, *positive* path-coefficient (.207) indicating a strong association between the perception of the Marketing Manager as a political ally and affect-based trust, where the greater the belief that the Marketing Manager is an ally the greater the level of affect-based trust. The trust literature provides evidence that relationships develop on the basis of whether or not the other party is perceived to be "trustworthy" or not (Mayer, Davis and Schoorman 1995). This assessment of trustworthiness is based on perceptions of benevolence or benevolent intentions (Deutsch 1960; Rousseau et al 1988).

Benevolence is viewed as the extent to which another party is believed to want to "do good" and not act malevolently towards the trustee and (Mayer, Davis and Schoorman 1995). This benevolence dimension that some researchers have attributed to interpersonal trust, and the "beliefs" about others and their "expected behaviours", are the basis of affective-based trust. The results of this study indicate that in situations where the Marketing Manager is perceived as a political ally within the organisation there is an increase in the perceived level of affect-based trust.

Hypothesis 4_d: The greater the perception of the Marketing Manager as a political ally by the R&D Manager the higher the level of interpersonal functional conflict

The results of the analysis support this hypothesis, as there is a highly statistically significant, *positive* path-coefficient (.243) indicating a strong association between the perception of the Marketing Manager as a political ally and interpersonal functional conflict i.e. where the Marketing Manager is perceived to be a political ally there is an increase in the level of functional conflict. The social exchange theory and trust literature both provide support for the view that functional conflict i.e., conflict which entails the "the healthy and vigorous challenge of ideas, beliefs and assumptions" (Menon et al, 1996), is more likely to be an outcome of working relationships where there is the belief that the other party is "on your side" and that their intentions are benevolent. In these situations there is no need to display the defensive and monitoring behaviours that are apparent in relationships where the other party is perceived as a threat (McAllister 1995; Bromiley and Cummings 1995). Rather, the two parties can put their efforts into satisfying their mutual self interests or achieving organisational goals (Vigoda 2003). As the interpersonal political behaviour of NPD participants has not been empirically tested in any NPD study to date, the closest parallel that can be drawn

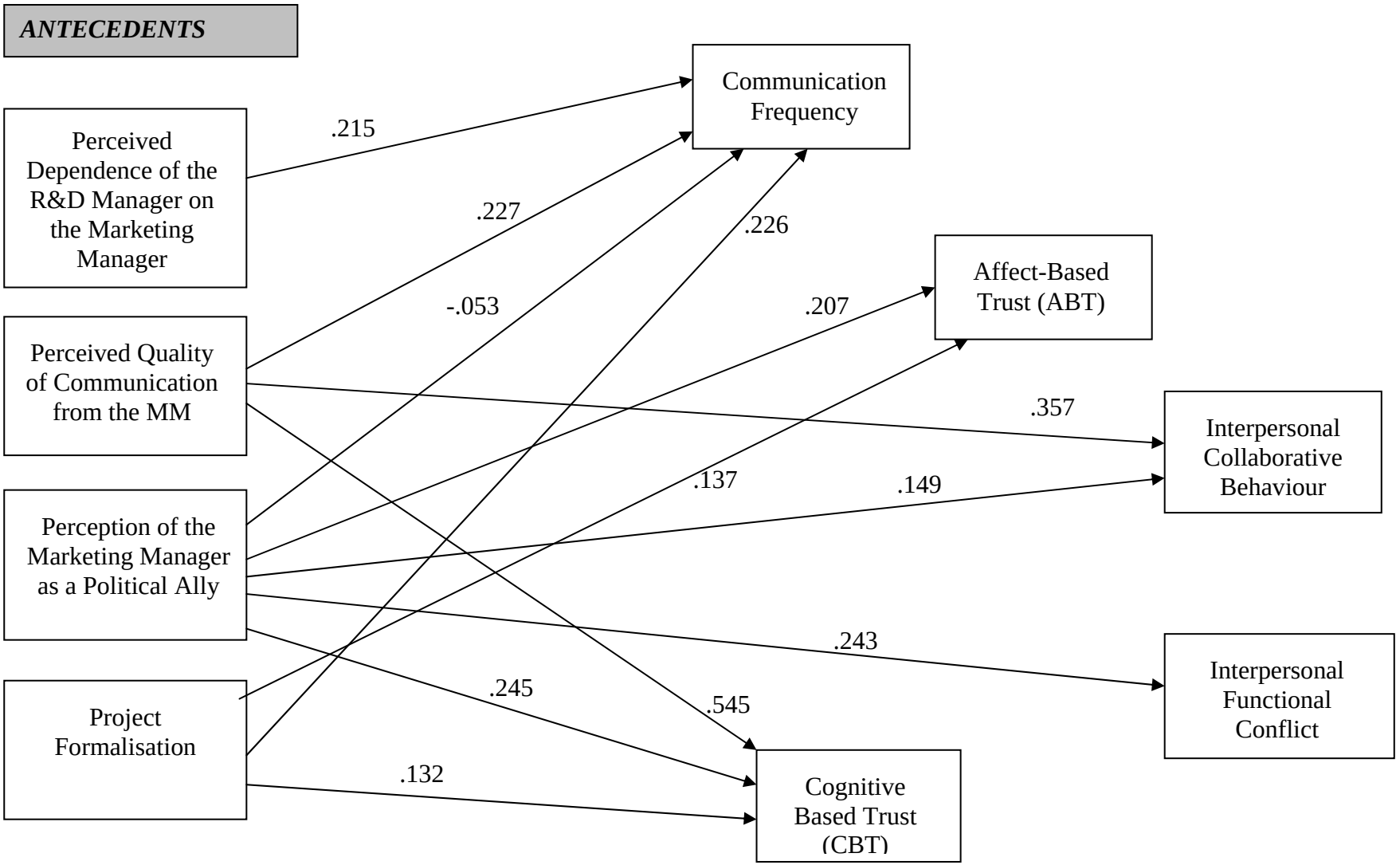
is the "interfunctional" rivalry where both R&D and Marketing are thought to "compete" against each other in an organisational context for resource and status. This interfunctional competition is viewed as part of organisational politics (Vigoda 2003) and in situations where the "interfunctional rivalry" between R&D and Marketing is perceived to be low and the Marketing function is seen to be a "non-threat" to R&D there are likely to be far more organisationally beneficial behaviours displayed such as cross-functional information sharing, co-operation, and functional conflict (Lewicki et al 1992; Maltz and Kohli 1996; Moenaert et al 1994; Maltz, Souder and Kumar 2001).

Hypothesis 4_e: The greater the perception of the Marketing Manager as a political ally by the R&D Manager the higher the level of interpersonal collaborative behaviour

The results of the analysis support this hypothesis, as there is a highly statistically significant, *positive* path-coefficient (.149) indicating a strong association between the perception of the Marketing Manager as a political ally and collaborative behaviour, where as the Marketing Manager is perceived to be a political ally the level of interpersonal collaborative behaviour increases. The organisational behaviour literature suggests that this assessment of the other party as a political ally or enemy can occur implicitly or explicitly, and it has a direct impact on the types of interpersonal political behaviours that can be displayed (Robbins 1987). Seminal work by Kipnis, Schmidt, and Wilkinson (1980) suggest that the exhibition of interpersonal political behaviour occurs through the use of eight types "influence" tactics on co-workers. The majority of these influence tactics are used in a negative and threatening manner in circumstances where the other party is thought to be negatively affecting the interests of the instigator e.g., through assertiveness, sanctions, blocking actions, and upward-appeals for action

against the party. In circumstances where the other party is thought to be facilitating a desired result, more positively-oriented influence tactics such as ingratiation, rational discussion, and mutual exchange tend to be used. Vigoda (2003) suggests expanding these original eight influence tactics to add two more positively oriented influence tactics. These tactics are: (1) the use of "personal appeals" i.e., an appeal to the other's feelings of loyalty or friendship, and (2) "consultation" i.e., asking for participation in decision making or planning when the other's support or assistance is required, or showing willingness to modify a proposal to deal with the other's concerns and suggestions. It is the explicit or implicit assessment of the Marketing Manager as a political ally which often determines the type of influence tactic used, with evidence indicating that non – allies are often dealt with by using many of the negative type influence tactics (Fairholm 1993). In the context of NPD, the perception of a counterpart manager does have implication for the type of interpersonal interaction that is likely to occur, with a far greater likelihood of collaborative interpersonal behaviours being exhibited when the manager is viewed as political ally.

Figure 6.1: Hypotheses $H1_a$ – $H4_e$



6.3.2 The Intervening Variables ($H5_a$ - $H9_a$)

The intervening variables, which were thought to have the most effect on the interpersonal dynamics between the two managers, were: (1) communication frequency, (2) perceived cognitive-based trust in the Marketing Manager, (3) perceived affect-based trust in the Marketing Manager, (4) interpersonal functional conflict, and (5) interpersonal collaborative behaviours.

Hypothesis 5_a: The greater the communication frequency between the R&D Manager and the Marketing Manager the higher the level of cognitive-based trust

The results of the analysis reject this hypothesis and indicate a possible opposite direction of the effect to that posited. There is a no statistically significant relationship between communication frequency and cognitive-based trust and only a small *negative* path-coefficient (-.017) indicating a weak association between communication frequency and cognitive-based trust, where communication frequency increases there is a small decrease in the level of cognitive-based trust. The interactionist approaches to functional integration (Ruekert and Walker 1987; Griffin and Hauser 1992; Moenaert et al 1994) have held the view that communication frequency would lead to greater information sharing during task completion. The empirical evidence in this study suggest that in terms of developing cognitive trust, too much communication between the managers, may actually reduce the perception of the other managers' credibility and competence. A competent and credible Marketing Manager may be viewed as someone who does not need to ask too many questions but rather has a good knowledge of the issues at hand. Support for this proposition is also provided by Gupta and Wilemon (1988a) who found that competent and credible Marketing Managers were perceived as having a good understanding of technical issues.

Hypothesis 5_b: The greater the communication frequency between the R&D Manager and the Marketing Manager the higher the level of affect-based trust

The results of the analysis support this hypothesis, as there is a statistically significant, *positive* path-coefficient (.102) indicating an association between communication frequency and affect-based trust, where as communication frequency increases there is an increase in affect-based trust. The trust literature supports the view that developing affect-based trust is a gradual, step-by-step process (Blau 1964; McNight, Cummings and Chervany 1998). Fisher (1978) regards interpersonal communication as consisting of the communicator's attitudes, cognitions and perceptions which are then transmitted to a receiver who then processes the communication through internal *conceptual* filters e.g., a person's "black box", to decode the message. Accordingly, as initial communication between the managers occurs, though this communication is often limited, it provides enough "social data" to determine whether or not the Marketing Manager has malevolent or opportunistic motives towards the manager (Blau 1964; Good 1988). In established relationships communication frequency helps to maintain social bonds (McAllister 1995).

Hypothesis 5_c: The greater the communication frequency between the R&D Manager and the Marketing Manager the higher the level of functional conflict

The results of the analysis reject and possibly contradicts the direction of this hypothesis, as there is no statistically significant relationship and a small *negative* path-coefficient (-.018) indicating a very weak association between communication frequency and functional conflict, where as communication frequency increases the level of functional conflict decreases. This finding appears to contradict the widely held viewpoint that increased communication frequency will increase co-operation between the Marketing and R&D functions and reduce conflict as there is greater appreciation of

each other's needs and a greater understanding of the disparate "jargons and languages" that functional units typically have developed (Ruekert and Walker 1987; Griffin and Hauser 1992; Dougherty 1992). One possible explanation of this study's findings may be that as many organisations are still guided by the belief that "more communication is better", this reliance on increasing the "volume" of communication from Marketing to R&D, may be resulting in R&D Managers feeling overwhelmed and often frustrated by what they perceive as large amounts of non-productive communication, thus leading to dysfunctional rather than functional conflict. This is consistent with Maltz and Kohli (1996), who found that increased communication frequency can actual lead to increased dysfunctional conflict between Marketing and other functions as communication becomes excessive and unnecessary when examining the dissemination of marketing intelligence across functional boundaries.

Hypothesis 5_d: The greater the communication frequency between the R&D Manager and the Marketing Manager the higher the level of interpersonal collaborative behaviour

The results of the analysis support this hypothesis, as there is a statistically significant, *positive* path-coefficient (.097) indicating an association between communication frequency and interpersonal collaboration, where as communication frequency increases there is an increase in interpersonal collaborative behaviour. Communication is a necessary pre-requisite for the development and maintenance of relationships, and frequent communication allows the transfer of the social data necessary for this relationship development to occur (Blau 1964). Support for this finding in the context of NPD is provided by Jassawalla and Shashittal (1998), who found that collaborative relationships between Marketing Managers and R&D Managers were characterised by

high levels of communication. McAllister (1995) also suggests that frequent communication is an aspect of affect-rich working relationships, where managers often monitor the needs of their counterparts to be better able to assist them in the performance of their tasks. The finding of this study that communication frequency increases interpersonal collaborative behaviour supports the view amongst functional integration researchers that communication is the necessary precursor to successful information transfer and co-operation between functions (Ruekert and Walker 1987; Griffin and Hauser 1996; Song, Xie and Dyer 2000).

Hypothesis 6_a: As the R&D Manager's cognitive-based trust in the Marketing Manager increases, interpersonal functional conflict will also increase

The results of the analysis support this hypothesis, as there is a highly statistically significant, *positive* path-coefficient (.356) indicating a very strong association between the cognitive-based trust and interpersonal functional conflict, where the R&D Manager has high levels of cognitive-based trust in the Marketing Manager there will be an increase in the level of functional conflict between the managers. The NPD process is characterised by the exchange and challenge of ideas by functional specialists who should "bring to the table" skills and expertise that the other members of the project team do not possess to the same extent (Burns and Stalker 1961; Lawrence and Lorsch 1965). The acceptance of other managers as competent and credible in their discipline goes to the very heart of successful functional integration where any project-related discussions or exchanges are directly affected by the extent to which the functional manager in question is perceived as "knowing what they are talking about" (Gupta and Wilemon 1988; Moenaert and Souder 1990b; Shaw and Shaw 1998; Workman 1998). The findings of this study support the view that the healthy and vigorous challenge of

ideas, beliefs and assumptions characterising interpersonal functional conflict can only occur when the other party with whom the exchange is occurring, is perceived as competent and dependable in their discipline, which results in high levels of cognitive-based trust in the R&D Manager.

Hypothesis 6_b: As the R&D Manager's cognitive-based trust in the Marketing Manager increases, interpersonal collaborative behaviour will also increase

The results of the analysis reject this hypothesis, as there is no statistically significant relationship and only a small *positive* path-coefficient (.043) indicating a very weak association between the cognitive-based trust and interpersonal collaborative behaviour, where the R&D Manager has high levels of cognitive-based trust in the Marketing Manager there will be a small positive increase in interpersonal collaborative behaviour between them. The findings suggest that the perception of the Marketing Manager as a competent and dependable marketing professional is not sufficient enough on its own to allow the development of interpersonal collaborative behaviour. The mutual and volitional exchanges that characterise interpersonal collaborative behaviours between managers (Jassawalla and Kahn 1998) are ones that extend beyond cognition based task oriented interactions and seem to occur in circumstances where affect-based trust exists. It appears that R&D Managers seem to make the clear distinction between task-related aspects of their working relationship and the more complex affect-based and social aspects of their relationships which influence their behaviours.

Hypothesis 6_c: As the R&D Manager's cognitive-based trust in the Marketing Manager increases, perceived relationship effectiveness increases

The results of the analysis support this hypothesis, as there is a highly statistically significant, *positive* path-coefficient (.296) indicating a very strong association between cognitive-based trust and perceived relationship effectiveness, where the R&D Manager has high levels of cognitive-based trust in the Marketing Manager there will be an increase in the perceived level of relationship effectiveness. This finding corroborates McAllister (1995) who found a strong positive correlation between a peer manager's effective role performance and cognitive trust. In an NPD context, there is also support for the view that when the Marketing Manager is perceived to be to be competent in his/her discipline there is more effective cross-functional integration i.e., information sharing and co-operation (Gupta and Wilemon 1988; Shaw and Shaw 1998). Cognitive-based trust is therefore an important antecedent variable for effective working relations between functional specialist who rely upon each others' judgement and expertise to complete their own tasks.

Hypothesis 6_d: As the R&D Manager's cognitive-based trust in the Marketing Manager increases, affect-based trust will also increase

The results of the analysis support this hypothesis, as there is a highly statistically significant, *positive* path-coefficient (.531) indicating a very strong association between the cognitive-based trust and affect-based trust, where the R&D Manager has high levels of cognitive-based trust in the Marketing Manager there will also be an increase in the perceived level of affect-based trust. This finding adds support to those of Rempel, Holmes, and Zanna (1985) and McAllister (1995) who have found that affect-based trust in close relationships develops from an existing cognitive base. In the

context of NPD, and the specialised roles of these managers, the finding of this study is consistent with the theory that the R&D Manager's cognitive-based judgement of the Marketing Manager will drive initial communication and then the opportunity for an affect-based assessment of the Marketing Manager will occur.

Hypothesis $7_{a:}$ As the R&D Manager's affect-based trust in the Marketing Manager increases, interpersonal functional conflict will also increase

The results of the analysis do not support this hypothesis, there is a non-statistically significant, *positive* path-coefficient (.095) indicating a weak association between affect-based trust and interpersonal functional conflict, where the R&D Manager has high levels of affect-based trust in the Marketing Manager there will also be an increase in the level of interpersonal functional conflict. The direction of the relationship was expected, however the lack of strength was unexpected. Menon, Bharadway and Howell (1996) in their seminal study of conflict in intraorganisational relationships, found that their construct of "team spirit", which has affective-based aspects such as people being perceived to be warm and trusting of one another and with associated feelings of good fellowship, had a strong positive effect on interdepartmental functional conflict. However, a possible explanation for the result in this study may lie with Souder's (1988) "Too good friends syndrome" where the Marketing and R&D Managers were too friendly and maintained too high a regard for each other, thus inhibiting each party from challenging the assumptions and judgements of the other party. The findings of this study indicate that affect-based trust on its own is not a driver of functional conflict in the context of NPD projects.

Hypothesis $7_{b:}$ As the R&D Manager's affect-based trust in the Marketing Manager increases, interpersonal collaborative behaviour will also increase

The results of the analysis support this hypothesis, as there is a highly statistically significant, *positive* path-coefficient (.274) indicating a very strong association between affect-based trust and interpersonal collaborative behaviour, where the R&D Manager has high levels of affect-based trust in the Marketing Manager there will also be an increase in the level of interpersonal collaborative behaviour. This finding corroborates McAllister (1995) who found that managers who are high in affect-based trust are more inclined to meet a peer's work-related needs and to engage in productive intervention preventing their peer from making mistakes. Jassawalla and Shashittal (1998), using content analysis, found that low levels of collaboration in NPD processes occurred when managers had suspicions about the motives and intentions of the other party, which is a key aspect of affect-based trust. The findings of this research provide support for the belief that unless affect-based trust, characterised by "care and concern", is present in a working relationship, that working relationship is unlikely to develop interpersonal collaborative behaviours.

Hypothesis $7_{c:}$ As the R&D Manager's affect-based trust in the Marketing Manager increases, perceived relationship effectiveness increases.

The results of the analysis support this hypothesis, as there is a highly statistically significant, *positive* path-coefficient (.176) indicating a strong association between affect-based trust and perceived relationship effectiveness, where the R&D Manager has high levels of affect-based trust in the Marketing Manager there will also be an increase in the level of perceived relationship effectiveness. As affect–based trust has received little research attention at the interpersonal level, it is difficult to draw direct comparisons from other research. McAllister (1995) found that affect-based trust had no

direct effect on “peer performance effectiveness”, which is a subjective measure of how well a manager performs his/her job, but had an indirect effect on “manager affiliative citizenship behaviour”, which measured the extent to which “care and concern” was shown through the behaviours of the peer manager that are not required as part of their role performance e.g., additional assistance and guidance. As this study is the first to empirically examine affect-based trust in the context of NPD projects, affect-based trust, which is the subjective feeling of being secure against exploitation in a relationship and of having the comfort that comes from assurance of having one’s interests served by another party, is found to be a key determinant of effective working relationships. This finding supports the long-held view that trust is indeed multi-dimensional and is important in understanding effective working relationships (Deutsch 1962; Zand 1972; Mittal 1996; Morgan and Hunt 1994; Dirks and Ferrin 2001).

Hypothesis 8_a: Greater functional conflict between the R&D Manager and the Marketing Manager, will lead to higher levels of interpersonal collaborative behaviour

The results of the analysis support this hypothesis, as there is a highly statistically significant, *positive* path-coefficient (.167) indicating a strong association between functional conflict and greater interpersonal collaborative behaviour, where as the level of functional conflict between the R&D Manager and the Marketing Manager increase, the level of interpersonal collaborative behaviour also increases. As most of the NPD literature has focused on the dysfunctional nature of conflict in cross-functional relationships there are few studies from which direct comparisons can be made. An exception is Dyer and Song (1998) who examined the relationship between strategy, constructive conflict and NPD success. They found that there was positive correlation between “constructive conflict” and integrative conflict handling behaviours which were

defined in a similar manner to interpersonal collaborative behaviour in this study. The results presented in this study provide empirical support for Thomas's (1976) view of productive organisational conflict, where interpersonal collaboration depends upon the candid exchange of accurate information about one's underlying concerns, possible alternatives and one's satisfaction with those alternatives. Thomas's perspective strongly parallels the definition of functional conflict used in this study i.e., the healthy and vigorous challenge of ideas, beliefs and assumptions whereby conflict that is positive in nature is a pre-requisite of interpersonal collaboration. The findings of this study indicate that functional conflict is a key antecedent of interpersonal collaborative behaviour in the context of NPD projects.

Hypothesis 8_b: Greater functional conflict between the R&D Manager and the Marketing Manager, will lead to higher levels of perceived relationship effectiveness

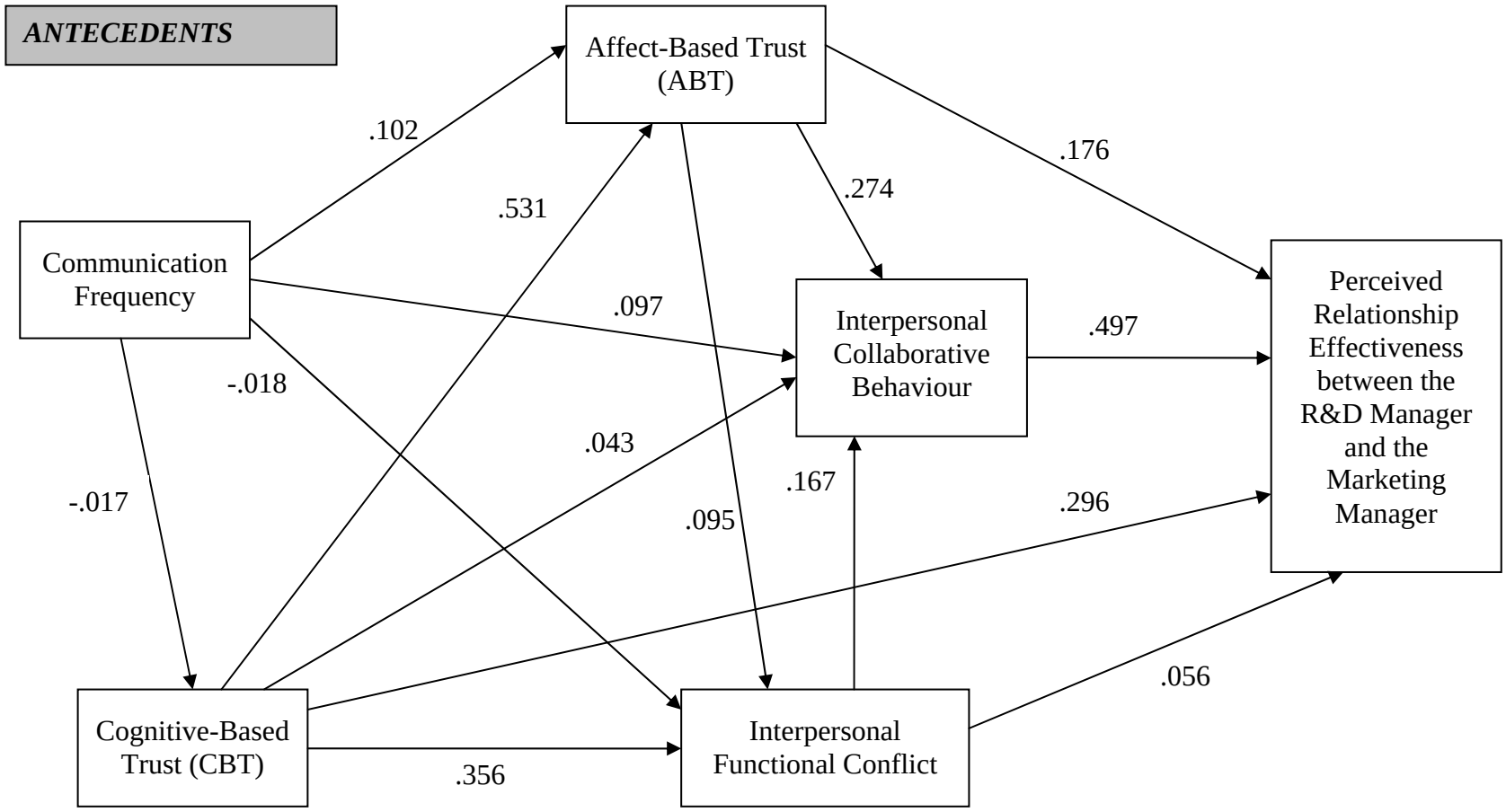
The results of the analysis support this hypothesis, as there is a statistically significant, *positive* path-coefficient (.056) indicating an association between functional conflict and greater perceived relationship effectiveness, where as the level of functional conflict between the R&D Manager and the Marketing Manager increase, the higher the level of perceived relationship effectiveness. As the effect of functional conflict on perceived relationship effectiveness has not been measured prior to this study, no direct comparisons can be drawn, however, some indirect evidence is available. Song, Xie and Dyer (2000) examined the role that positive forms of conflict behaviour between Marketing Managers and R&D Managers played in the NPD process. Their results found that "collaborating behaviour" towards conflict resolution, leads to increased levels of functional integration and also increased functional harmony between Marketing and R&D Managers. Song, Xie and Dyer (2000) defined "collaborating

behaviour" as occurring where "the Marketing Manager seeks the common interests of all functions to achieve an integrative solution (p.52)." and it was operationalised in a similar terms to "functional conflict". Their evidence also adds support to the finding in this study that functional conflict has a positive effect on working relationships in the NPD.

Hypothesis 9_a: As the R&D Manager's interpersonal collaborative behaviour increases, the higher the level of perceived relationship effectiveness

The results of the analysis support this hypothesis, as there is a highly statistically significant, *positive* path-coefficient (.497) indicating a very strong association between interpersonal collaborative behaviour and perceived relationship effectiveness, where as the level of interpersonal collaborative behaviour between the R&D Manager and the Marketing Manager increase, the level of perceived relationship effectiveness also increases. This finding provides strong empirical support for the main assertion of this thesis, that interpersonal collaborative behaviour is the primary driver of perceived relationship effectiveness between functional managers. Much of the theoretical development for this thesis was based on the views and findings of Kahn and Mentzer (1998), and Jassawalla and Shashittal (1998) that cross-functional collaboration is a key component of successful functional integration during NPD activities. The finding of this study is consistent with these views, where Kahn and Mentzer (1998) found that perceived collaboration between departments was positively correlated to high levels of satisfaction with those relationships, and, Jassawalla and Shashittal (1998) found high levels of satisfaction in cross-functional relationships which were collaborative in nature. Interpersonal collaborative behaviour can therefore be viewed as a key antecedent of perceived relationship effectiveness during NPD projects.

Figure 6.2: Hypotheses $H5_a$ – $H9_a$



6.4 Direct, Indirect and Total Effects in the Model

The analysis of a complex causal path model also allows the examination of *direct*, *indirect* and *total* effects of exogenous and endogenous variables on one another. *Direct* effects are seen as causal effects that "flow" from the observed variable on the left of the path diagram to the one on the right of the arrow head, and *indirect* effects occur when one or more mediating variables "transmit" some of the causal effects of prior variables onto subsequent variables. Indirect effects are estimated statistically by the products of the direct effects. The *total* effects are the sum of all the indirect and direct effects of one variable on another (Kline 1998). The indirect, direct and total effects were calculated using the statistical program AMOS 4 and are reported in Table 6.2. The closer these values are to 1.0 the stronger the effect.

Table 6.2 Determinants of Perceived Relationship Effectiveness

Construct	Direct Effect (1)	Indirect Effect (2)	Total Effect (1) + (2)
Project Formalisation	--	.131	.131
Quality of Communication	--	.488	.488
Dependence on the Marketing Manager	--	.015	.015
Marketing Manager as a Political Ally	--	.304	.304
Communication Frequency	--	.069	.069
Cognition-based Trust	.296	.244	.540
Affect-based Trust	.176	.150	.326
Functional Conflict	.056	.083	.139
Interpersonal Collaborative Behaviour	.497	--	.497

6.4.1 Indirect Effects

The analysis revealed that 4 exogenous variables have an indirect effect on PRE: Project formalisation, Quality of communication, Dependence on the Marketing Manager, Marketing Manager as a political ally. The endogenous variable of Communication frequency was also found to have a small indirect effect on PRE. Of these indirect effects, Quality of communication (.488) had the strongest effect on other variables in the model, followed by, Marketing Manager as a political ally (.304), Project formalisation (.131), and Dependence on the Marketing Manager (.015). The endogenous variable of Communication frequency was also found to have a small indirect effect (.069) on Perceived Relationship Effectiveness

6.4.2 Direct Effects

Only 4 of the 9 explanatory variables had a direct effect on Perceived relationship effectiveness (PRE). These variables are Affect-based trust (ABT), Cognitive-based trust (CBT), Functional conflict and Interpersonal collaborative behaviour, where CBT had the strongest direct effect (.540), followed by Interpersonal collaborative behaviour (.497), ABT (.326) and, Functional conflict (.083).

These findings support the inclusion of interpersonal trust in the proposed conceptual model as both forms of trust have strong direct and indirect effects on work behaviours during NPD projects. The previous conceptualisations of the CFR between Marketing and R&D Managers had not adequately addressed the complex nature of such working relationships and this gap in our knowledge has to some degree been addressed by this research. Furthermore, the inclusion of the variable “Marketing Manager as a political ally” as an antecedent of interpersonal trust, is shown to also have a strong indirect

effect on the dependent variable, Perceived relationship effectiveness, justifying its inclusion in the model.

6.5 Discussion of the Results

The model and hypotheses tested here provide support for the proposition that individual level variables have a significant explanatory role on the level of perceived relationship effectiveness (PRE) between Marketing Managers and R&D Managers during NPD projects. The major contribution of this research is that it adds to knowledge on the antecedents and outcomes of effective working relationships by introducing interpersonal trust as a two-dimensional mediating variable in the context of the NPD process. Thus addressing a major gap in the NPD literature where interpersonal trust had not been adequately conceptualised or appropriately operationalised in empirical NPD studies, and therefore, limiting our understanding of the role interpersonal trust plays in the complex dynamics of cross-functional working relationships. Interpersonal trust was found to affect two important relationship behaviours, functional conflict and interpersonal collaborative behaviour, which have received little empirical research in the NPD process. This study also introduced and examined the role of interpersonal level politics as a key explanatory variable in NPD working relationships, adding to our very limited knowledge in this area. Overall, the exogenous and endogenous variables, presented in the conceptual model and subsequently tested in this study, explain 80.5% of the variance in the dependent variable, the perceived relationship effectiveness (PRE) between the Marketing Manager and the R&D Manager. The following section will discuss the theoretical implications of the research in detail.

6.6 Theoretical Implications

The social aspect (non-work related interaction) of cross-functional relationships has been suggested as an important determinant of mutual understanding and friendship (Dougherty 1987, Souder 1988) but there has been little empirical evidence on the extent to which this affective dimension of working relationships influences a manager's overall perceptions of the effectiveness of their working relationships. This study explicitly incorporated the affective aspect of interpersonal relationships into an understanding of CFRs, as suggested by Blau (1964), Johnson-George and Swap (1982), Rempel, Holmes, and Zanna (1985), and McAllister (1995), and finds that in Marketing/R&D CFRs both affect-based trust and cognitive based-trust are important determinants, indirectly and directly, of perceived relationship effectiveness.

In this study, affect-based trust was found to have a large direct effect on perceived relationship effectiveness (see Table 6.3) providing support for the belief that working relationships do have an important social aspect to them, that the "care and concern" of another manager are important aspects of managerial working relationships (Blau 1964; Gabarro 1990). This provides further empirical support for McAllister (1995) who found that managers clearly distinguish between the instrumental nature of their work relationships and the affective aspects. Also, cognitive-based trust was found to have a large direct effect on perceived relationship effectiveness and this supports the findings of other NPD studies that a manager must be perceived to be competent in his/her discipline for effective cross-functional integration (i.e., in terms of information sharing, co-operation and collaboration) to occur (Gupta and Wilemon 1988; Shaw and Shaw, 1998). The findings provide empirical evidence that working relationships between

functional specialists are assessed not only on the basis of perceived expertise and task performance but also on the social aspects of their relationships.

Another key theoretical implication of the study arises from the finding that only the affective dimension of interpersonal trust had the hypothesised relationship with interpersonal collaborative behaviour. Affect-based trust has a strong direct effect on interpersonal collaborative behaviour indicating that this type of trust is necessary to elevate working relationships from ones based on task-specified interaction to a higher level where "volitional" co-operation occurs. This finding provides empirical support for qualitative findings of Jassawalla and Shashittal (1998) who found that managers who regarded their relationship with the Marketing Manager as collaborative in nature had close social distances and mutual understanding. On the other hand, cognitive-based trust was not found to have a significant effect on interpersonal collaborative behaviour. This latter finding provides empirical support for Thomas (1977) who asserted that trust and the knowledge that another party will not behave exploitatively is a prerequisite for collaboration to occur. The knowledge that the Marketing Manager is competent in his/her discipline and task performance is not sufficient for R&D Managers to display collaborative behaviours, even though the working relationship itself may be perceived to be effective.

This study also examined the role that functional conflict has on interpersonal collaborative behaviour and perceived relationship effectiveness, where functional conflict refers to "the healthy and vigorous challenge of ideas, beliefs and assumptions" (Menon et al 1996). This study found that functional conflict was strongly affected by cognitive-based trust providing support for past studies (Gupta and Wilemon 1988;

Moenaert 1994) which have suggested that counterpart managers must be perceived to be competent and credible for effective work-related exchanges to occur. In contrast, affect-based trust was found not to have a significant effect on functional conflict. A possible explanation for ABT having little impact on functional conflict is provided by Souder (1981) where relations between Marketing and R&D personnel were so good that each other's specialist opinions were rarely challenged. Functional conflict occurs in task related situations where there is high cognitive-based trust, yet may be tempered by too much affect-based trust in the relationship. Functional conflict in turn was found to have a positive effect on collaboration and perceived relationship effectiveness, supporting the viewpoint that "healthy exchanges" are beneficial for working relationships (Menon et al, 1996).

Another finding of this study provides further support for the viewpoint of Johnson-George and Swap (1982), Rempel, Holmes, and Zanna (1985) and McAllister (1995) that cognitive-cased trust also has a direct effect on affect-based trust and that effective working relationships are built on a foundation of credibility, reliability and professionalism. As the Marketing Manager and the R&D Manager are usually not part of the same functional unit (where the opportunity for social interaction would be much higher), many of their initial interactions will be task-based and problem-oriented in formalised settings (i.e., such as project meetings) and any initial assessment of the other manager would be made on the basis of their perceived ability to contribute their expertise to the task at hand. Future affective interactions are then likely to develop based on this initial cognitive platform.

A major contribution to the NPD literature is made through the development and testing of a measure of interpersonal politics called "the perceptions of the Marketing Manager as a political ally" (POL ALLY). Addressing this gap in the NPD literature, which has largely ignored this important aspect of organisational life, this new construct was found to have a strong direct effect on several mediating variables and a strong indirect effect on perceived relationship effectiveness. Specifically, the perceptions of the Marketing Manager as a political ally has a negative effect on communication frequency, suggesting that if the manager is not viewed as a threat there is less need to engage in defensive-type communication with a counterpart (McAllister 1995, Williams 2001). Further, the perceptions of the Marketing Manager as a political ally has a strong direct effect on both aspects of interpersonal trust, ABT and CBT. The finding that ABT is an outcome of POL ALLY adds empirical support to the viewpoint taken by trust researchers that the perceived "benevolence" of the other party is a major factor in trust development and allows co-operation between individuals to occur (Johnson-George and Swap 1982; Gambetta 1988). Similarly, cognitive-type trust is based on the view that the other party is capable of delivering expected outcomes (Deutsch 1960; Gabarro 1978) and in this study, where the Marketing Manager is seen as a political ally capable of delivery mutually beneficial outcomes, there is an increase in CBT.

The perception of the Marketing Manager as a political ally also had implications for the interpersonal dynamics between managers. Functional conflict was positively affected by POL ALLY, suggesting that productive exchanges were more likely to occur when the Marketing Manager was viewed as being "on side". Interpersonal collaborative behaviour was also positively affected by POL ALLY indicating that the managers are willing to collaborate freely to achieve mutually beneficial outcomes. These findings

suggest that interpersonal politics are worthy of future research as they do affect many of the key relationship variables in CFRs (Jones and Stevens 1999).

The role of communication in interfunctional relationships has been a major area of researcher attention. In this study communication between the two managers was examined in terms of quality and frequency. Quality of communication was found to have a very strong effect on cognitive-based trust, corroborating the findings of previous studies that managers are assessed on the value of their information inputs in the NPD process (Gupta and Wilemon 1988; Jassawalla and Kahn 1998). Accordingly, high quality of communication also had a positive direct effect on interpersonal collaborative behaviour suggesting that in such dependence relationships with task-specific communication, quality communication inputs are appreciated and reciprocated in the form of interpersonal collaborative behaviour (Gouldner 1960). Also supported was the viewpoint that communication quality leads to greater communication frequency, and confirms the findings of numerous studies that poor quality marketing information is ignored and not used (Deshpande and Zaltman 1982; Gupta and Wilemon 1988; Maltz and Kohli 1996).

The second communication variable, communication frequency, was hypothesised to have a positive effect on both forms of interpersonal trust. Communication frequency did have a positive association with ABT, supporting the social exchange perspective that communication frequency allows relationships to develop and assessments of the managers' intentionality to be made. However, communication frequency had a small non-significant negative effect on CBT suggesting that "over communicating" on task related issues is bothersome and overloads the R&D Manager and may actually reduce

perceptions of competence (Maltz and Kohli 1996). Similarly, communication frequency had a small non-significant negative effect on functional conflict indicating that excessive communication on task related issues is not viewed as "productive". In contrast, the hypothesised relationship between communication frequency and interpersonal collaborative behaviour is supported indicating that frequent communication exchanges allow managers the opportunity to reach the mutual understanding necessary for collaborative behaviours to emerge (Keller 1986).

This study examined the effect of project formalisation on several variables. Firstly, project formalisation was found to have a strong positive effect on communication frequency, corroborating Moenaert et al (1994) who also found that greater project formalisation increased communication from Marketing to R&D. Similarly, Ayers, Dhalstrom and Skinner (1997) found that role formalisation in NPD activities had a positive effect on information sharing and involvement between functions. Project formalisation was hypothesised to have a negative effect on affect-based trust, but was found to have a positive effect on both affect and cognitive-based trust. Levels of affect-based trust may increase as the R&D Manager feels that his/her concerns are being taken into account when the specific details of project organisation and timelines are being negotiated. Some support for this viewpoint is provided by Shaw and Shaw (1998) who found that engineers felt that one of the major causes of conflict with Marketing personnel was that they did not appreciate their task-related constraints and showed little concern for their needs. Similarly, cognitive-based trust may increase when the two managers discuss their specific project requirements and information expectations and have the opportunity to make assessments about each other's task knowledge and competence. The implications of these findings are that interpersonal

relationships with functional managers require a degree of organisational support through structural means (e.g., formal team meetings, NPD committees etc) to facilitate positive outcomes.

The degree to which the R&D Manager feels that he depends on the Marketing Manager for key project resources was examined in terms its effect on communication frequency. Dependence on the Marketing Manager had a direct positive effect on communication frequency indicating that task-related communication occurred when the R&D Manager felt that he/she required specialist input. The use of internal marketing may assist in a greater appreciation of the benefits that the marketing perspective may bring to NPD projects (Shaw and Shaw 1998).

In summary, the major theoretical implications of this research lie in a greater appreciation of the role that interpersonal trust, as a two dimensional construct, plays in facilitating beneficial organisational behaviours between functional managers such as information sharing, volitional co-operation (collaboration), and functional conflict. By also highlighting the antecedents of interpersonal trust, and in particular, the interpersonal politics that occur in organisational settings, this study provides a framework which allows researchers to better understand the factors affecting the interpersonal dynamics involved in effective working relationships.

6.7 Managerial Implications

Traditionally, effective CFRs were thought to exist when there was “information sharing and co-operation” between functional managers, with many methods having been suggested for successfully integrating the R&D and Marketing function (c.f Griffin and

Hauser 1996). However, none of the proposed methods have specifically targeted improving interpersonal trust. Rather, it was implied that these approaches would improve relations through more and better communication without clearly understanding the interpersonal dynamics involved. The major implication of this study for management is that the development of trusting cross-functional working relationships should be the preferred integration strategy for companies that are engaged in NPD as the benefits of CFRs that are rich in both affect and cognitive-based trust are greater than the relationships based on a cognitive aspect only.

Specifically, this study does provide evidence that the cognitive aspects of working relationships do lead to perceived relationship effectiveness but do not facilitate collaborative behaviours. However, there is also empirical support for the need to develop affect-based trust to achieve "volitional co-operation" in the form of collaborative behaviour. When trusting work relationships are rich in ABT there is an opportunity for what Mohr, Fisher and Nevin (1996) call "collaborative communication" to occur i.e., with open and two way communication, which they suggest may be a governance mechanism on its own instead of integration and control, with the benefits of being flexible, inexpensive and can be implemented at short notice. These benefits would be of great advantage in NPD situations where there are brief windows of market opportunity and quick new product introductions are required. This study corroborates the findings of Kahn (1996), Kahn and Mentzer (1998), Jassawalla and Shashittal (1998) that interpersonal collaboration is by far the most beneficial behaviour that can be exhibited by functional managers in achieving positive relationship outcomes.

Another implication of this study is the need for companies to develop an overall communication strategy for NPD projects. A management priority should be to ensure the quality of communication between functional managers as this has a strong direct effect on communication frequency, cognitive-based trust and interpersonal collaborative behaviour, as well as a very strong indirect effect on both affect-based trust (through cognitive-based trust) and perceived relationship effectiveness. Top management should concentrate on processes that ensure any communication concerns expressed by the R&D Managers are addressed by the Marketing Manager. These concerns include such issues as the attributes of marketing information received from Marketing, including its accuracy, comprehensibility, timeliness and usefulness (Gupta and Wilemon 1988; Moenaert et al 1992), and the need for a greater transparency of information generation, e.g., joint customer visits, and interaction during report writing, to facilitate acceptance and subsequent use of the information by the R&D Manager (Moenaert et al 1992; Maltz, Souder and Kumar 2001). The implication here is that many working relationships are established on a cognitive-base with affect-based trust developing as more social data is obtained, the quality of communication between managers takes on increasing importance in relationship development.

Further, the findings of this study indicate that the commonly used management approach of project formalisation which is designed to ensure minimum levels of communication do occur between functions and that project expectations are understood by both parties, is a successful means of improving working relationships. The findings of this study show that both affect-based trust and cognitive-based trust develop in an environment where the "risk" associated with working with another functional manager as a peer can be managed by formalising project expectations. However, the findings

here also support the view of Kahn (1996) that mechanisms which increase communication frequency should not become too formalised and overload managers with too much communication on task-related issues, as this can become counter productive.

The other major managerial implication of this study is that the interpersonal politics between the two managers are as important, if not more so, than the levels of interfunctional rivalry that affect departmental relations (Fisher, Maltz and Jaworski 1997; Maltz, Souder and Kumar 2001) in terms of productive working relationships. Top management should use approaches which limit the opportunity for the two managers to become political rivals as this study shows that the perception of the Marketing Manager as a political ally has a very positive effect on interpersonal dynamics. The management literature has identified many negative and inefficient behaviours associated with managers "covering their backs" such as monitoring and extensive time consuming recording of all interactions (McAllister 1995; Williams 2001). By reducing the opportunity for negative interpersonal politics to emerge, using such approaches as mutual goal setting, joint rewards and recognition, transparent resource allocation, clear support and encouragement for a team approach to NPD activities, top management may be able to guide functional CFRs in a more positive direction where the interdependence between Marketing and R&D is perceived as a positive sum game rather than a "turf war" which reduces the opportunity for developing successful new products. As this study provides the first empirical evidence in an NPD context to support the viewpoint that interpersonal politics are a major antecedent of interpersonal trust, functional conflict, interpersonal collaborative behaviour and indirectly perceived relationship effectiveness, top management should

focus its attention on creating an NPD environment where divisive sectional and personal interests do not become entrenched in the organisation's culture.

6.8 Limitations of the Study

A number of limitations are acknowledged in this research. Firstly, as this study required a single key respondent to report on several of their own behaviours, such as functional conflict, interpersonal collaborative behaviour and communication frequency, their responses could be affected by self-reporting bias, which occurs in situations where the respondent answers questions in a manner that they believe will have them viewed more favourably by the researcher (Churchill 1987). Secondly, the findings here are only from one member of the dyad, the R&D Manager, so future research is required to establish whether the same patterns between the constructs are found when examined from the Marketing Manager's perspective (Song, Xie and Dyer 2000). If possible a fully–matched dyadic approach would provide useful findings in terms of whether or not the Managers see their relationship in the same way. Thirdly, the study was cross-sectional in nature, taking a single snapshot in time and is therefore a "static" study and may not have captured the iterative and dynamic processes of trust and relationship formation. In future, longitudinal data could be used to examine the development or maintenance of trust, thus better establishing internal validity. Fourthly, even though the study was conducted in Australia and a broad cross-section of industry across the country was surveyed, the nature and limited coverage of the sample cautions against drawing sweeping generalisations to the greater population of technically trained managers. In particular, there may be differences across particular manufacturing industries e.g., such as rubber products versus automobile component manufactures. Fifthly, as the study was conducted in an Australian context and focuses exclusively on

one cultural setting, cultural factors may affect the interpersonal dynamics between managers (c.f. Song, Xie and Dyer 2000). Finally, further development and refinement of the measure of interpersonal politics, Political Ally, is required as the original 4 items measuring the construct split into 2 factors when exploratory factor analysis was applied (Chapter 5). The concept of Political Ally may be formed by other related variables that require further conceptual development.

6.9 Directions for Future Research

The topic of trust is much discussed with a plethora of academic research examining trust in varying contexts, with great debate as to its role in organisations i.e., is trust an antecedent or outcome variable, a moderator, mediator or main effect, how is trust generated, how is it maintained and so forth (Dirks and Ferrin 2001). As the topic of trust is still an under-researched area in the field of NPD studies, there are several interesting and potentially fruitful areas arising from this study.

As a starting point, knowledge of the antecedents of affect-based trust requires further investigation. Examining other individual level variables, such as personality, cultural background, and work-experience, could provide insights regarding this type of trust. Also an examination of the possible mechanisms that management could use to improve the affective-based social aspects of CFRs would be worth researching e.g., co-ordinated social events, bonding sessions etc, to determine if they produce positive relationship outcomes.

Also another extension of this research would be determining whether or not interpersonal collaborative behaviour has a direct effect on NPD success. Empirical

evidence suggests that effective integration leads to the development of successful new products, but does interpersonal collaboration? Souder (1988) suggests that when working-relations between Marketing and R&D become the "too good friends" syndrome, too many inferior products are produced as the functional managers rarely challenge each other's viewpoints taking each others opinions as "gospel" truths. Would collaborative working relationships produce more successful new products? Would the nature of the relationship affect the type of product being produced i.e., would they be radically different products or only minor product modifications? Similarly, future research could also consider the role of both types of interpersonal conflict, dysfunctional and functional conflict on interpersonal collaboration and perceived relationship effectiveness and ultimately, NPD success.

A major issue when discussing the topic of trust has always been the contingent nature of trust, the extent or degree of trust which is displayed between parties is often affected by contextual factors (Mayer, Davis and Schoorman 1995; McEvily, Perrone and Zaheer 2003). This is particularly relevant for the study of NPD, where the degree of innovativeness of the project, the business context and nature of the industry, may influence the amount of cross-functional integration required, or, may affect the level of trust required for effective working relationships and successful new products (Olsen, Ruekert and Walker 1995).

Finally, the next challenge for NPD researchers could be the tantalising possibility of using "trust" in the NPD as an "organising principle" which would reduce the need for top management to use high levels of formalisation and control (McEvily, Perrone and Zaheer 2003). In such "trust rich" settings, high levels of organisational trust and

interpersonal trust could shape the work-behaviours between Marketing and R&D personnel, ultimately producing successful new products.

6.10 Conclusion

The study presented here provides clear empirical support for the proposition that interpersonal trust is a two-dimensional construct (affective and cognitive-based trust) and that it plays a key mediating role in the complex dynamics of cross-functional working relationships in NPD projects by affecting two important relationship variables, functional conflict and interpersonal collaborative behaviour. However, the effect varies depending on which dimension of trust was being measured. Affect-based trust, which reflects the social aspects of relationships based on through the "care and concern" of others, had little effect on functional conflict but had a direct positive effect on interpersonal collaborative behaviour. On the other hand, cognitive-based trust, which reflects perceptions of competence, reliability and dependability, had a strong direct effect on functional conflict, but little effect on interpersonal collaborative behaviour.

The study supports the long held belief in the NPD literature that effective working-relationships are based on cognitive-aspects of the relationship, yet it also provides clear evidence that interpersonal collaborative behaviour is an important explanatory variable in effective working relationships. Interpersonal collaborative behaviours may be indicative of the higher form of cross-functional linkage as proposed by Jassawalla and Shashittal (1998) which extend beyond the previous definitions of functional integration as "information sharing and co-operation" to interpersonal behaviours which are "volitional" in nature and affect-rich. Acknowledging the role of interpersonal collaborative behaviours in effective NPD cross-functional working relationships is

important as the display of such behaviours offers numerous advantages for the organisation such as reduced formalisation, reduced conflict and increased role flexibility (Williams 2001).

Further, this study addressed a significant gap in the NPD literature identified by Jones and Stevens (1999), where the vital role that organisational politics play in the NPD activities of companies is not fully understood. The in-depth interviews conducted in the preliminary research for this study clearly identified the important role that the political perception of their counterpart manager played in shaping their attitudes and work behaviours displayed when they interacted on NPD projects with the other manager. To improve our understanding of the role that the interpersonal politics play on managerial behaviours and perceptions in the NPD, a new construct was created and tested i.e., "Perceptions of the Marketing Manager as a Political Ally". The findings indicate that the perception of the Marketing Manager as a political ally has direct effects on both forms of interpersonal trust, as well as functional conflict and interpersonal collaborative behaviour, and thus provides added explanatory power as a key antecedent of important relationship dynamics justifying its inclusion in the model.

In conclusion, the new conceptualisation of the Marketing and R&D Manager CFR presented and empirically tested in this study aimed to provide a greater understanding of the complexities of working relationships at the interpersonal level. The introduction of interpersonal trust as a two-dimensional construct and the role that one of its key antecedent variables plays, Perceptions of the Marketing Manager as a Political Ally" has increased our knowledge beyond those of previous conceptualisations of this critical cross-functional working relationship.

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APPENDIX 1

University of Wollongong 

An "Australian first" survey of:

Working Relationships between Technically Trained Managers and Marketing Managers

When completing this survey:

1. Please focus on your most recently completed **new product development (NPD) project.** You may use a new product development project and a Marketing Manager from a previous employer as the focus of your answers.

   Please give a brief description of the project (e.g., new flavour, new component, machinery etc)

   _____

2. Please focus on the "Manager" who (a) was most responsible for the marketing aspects of the project (e.g., market research, advertising, promotion etc) and (b) with who you had a working relationship. Throughout this survey they will be referred to as the **Marketing Manager.**

   Please give the actual job title of the manager you will be referring to when filling out this survey:

   _____

3. From the list below circle the ONE option that best describes the nature of the new product project that you will be focussing on for this survey.

	Circle
A modification or improvement to an existing product	1
A new product line for the firm	2
An addition to one of the firm's existing product lines	3
A cost reduction (existing product produced at a much lower cost)	4
A repositioning (an existing product targeted at a new market)	5
A "new to the world" product (a radical breakthrough innovation)	6
A Customisation request for one of your products from customers	7
Please specify: _____	
A New Service	8
Please specify: _____	

APPENDIX 1

Interpersonal Communication on the Project

Below is a set of statements regarding how **frequently** you and the Marketing Manager **communicated** with each other during the new product/service development project in the following ways.

Scale only: Do not circle								
Never	1	2	3	4	5	6	7	**Very Frequently**

4. The Marketing Manager and I communicated during this project….

To ANSWER, please choose a number from the shaded scale above that best reflects your opinion and WRITE it down on the space provided for ALL items listed.

- by electronic mail **Your answer goes here** → _____
- by voice mail _____
- in scheduled **one-to-one** meetings (face-to-face) _____
- in impromptu **face-to-face** conversations (e.g., in the hall) _____
- in scheduled **one-to-one** phone conversations _____
- impromptu **one-to-one** phone conversations _____
- informal **face-to-face** conversations in a non-work setting (e.g., after-work drinks, barbecues etc.) _____
- by teleconferencing _____
- by hand written memos _____
- by reports _____
- by fax machine _____

5. Below is a set of statements which refer to how the Marketing Manager and yourself **exchanged information** with each other during the project. **To ANSWER,** please choose a number from the shaded scale below that best reflects your opinion and WRITE it down on the space provided for ALL items listed.

Completely Disagree	1	2	3	4	5	6	7	**Completely Agree**

- The Marketing Manager *always* responded to my communication  ____
- The Marketing Manager provided me with a lot of feedback ____
- There was a lot of *two-way* communication between the Marketing Manager and myself ____
- We exchanged *e-mail* frequently ____

6. Below is a set of statements which refer to the **quality** of the communication from the Marketing Manager during the project. Please write down a number.

Completely Disagree	1	2	3	4	5	6	7	**Completely Agree**

- The information provided by the Marketing Manager was very useful for my work on this project ____
- I was very satisfied with the content of the information provided by the Marketing Manager on this project ____
- The information provided by the Marketing Manager was highly relevant to my work on this project ____
- The information provided by the Marketing Manager was highly credible ____
- The form and presentation of the information provided by the Marketing Manager was very satisfactory ____

7. Below are a set of statements regarding how **open** your communication was with the Marketing Manager during the project. Please write down a number.

Completely Disagree	1	2	3	4	5	6	7	**Completely Agree**

- We openly discussed project matters with each other ____
- We told each other things we would not want others to know ____
- If I had a problem with him/her I told him about it ____
- Sometimes this manager held back on telling me what s/he knew about our project situation ____

Working Relations on the Project

Below is a set of statements regarding the way you and the Marketing Manager usually **handled disagreements or disputes** between yourselves during the new product project. Please write down a number.

Completely Disagree	1	2	3	4	5	6	7	**Completely Agree**

8. When disagreements or disputes occurred between us we usually …….

- ignored or avoided the issue ____
- smoothed over them ____
- brought them out into the open and sorted them out between ourselves ____
- had a higher level manager or authority sort the issue out between ourselves ____

9. Below is a set of statements regarding your assessment of the Marketing Manager as a **work colleague** during the project. Please write down a number.

Completely Disagree 1 2 3 4 5 6 7 **Completely Agree**

- Most people, even those who aren't close friends of the Marketing Manager, trust and respect him/her as a fellow worker ____
- He/she approaches his/her job with professionalism and dedication ____
- Given his/her track record, I see no reason to doubt his/her competence and preparation for the job ____
- I can rely on him/her not to make my job more difficult by careless work ____
- Other work associates of mine, who must interact with him, consider him/her to be trustworthy ____
- Ours is a relationship in which we both freely share our ideas, feelings, and hopes ____
- I can talk openly to him/her about difficulties that I'm having at work and know that he will want to listen ____
- If I shared my problems with him/her, I know that s/he would respond constructively and with understanding ____

10. Below is a set of statements regarding your views on the **politics** (i.e., activities aimed at acquiring or maintaining power, or getting one's own way) between the Marketing Manager and yourself during this project. Please write down a number.

Completely Disagree 1 2 3 4 5 6 7 **Completely Agree**

- I could rely on the Marketing Manager to look after my political interests in the firm ____
- The Marketing Manager and I often played politics against each other ____
- I saw the Marketing Manager as a political ally of mine in this firm ____
- I spent a lot of my time "covering my back" because of the Marketing Manager's politics ____

11. This question is designed to assess the **level of conflict** that you had with the Marketing Manager during this project. Please write down a number.

Completely Disagree 1 2 3 4 5 6 7 **Completely Agree**

- During this project there was consultative interaction and useful give-and-take ____
- Disagreements between team members impaired discussion of issues ____
- There was constructive challenge of ideas, beliefs and assumptions ____
- Members were comfortable about raising dissenting viewpoints ____
- Different opinions or views focused on issues rather than on individuals ____
- Even people who disagreed, respected each others' viewpoints ____
- When the two of us got together in group meetings, tensions between the two of us frequently ran high ____
- I generally disliked having to work with him/her ____
- There were no disagreements between myself and the Marketing Manager over the running of this project ____
- Throughout the project, there was little interpersonal conflict between myself and the Marketing Manager ____

12. Below is a set of statements regarding your opinions about the **interest** that the Marketing Manager showed in this project. Please write down a number.

Completely Disagree 1 2 3 4 5 6 7 **Completely Agree**

The Marketing Manager ……

- showed great enthusiasm for this project ____
- closely followed the progress of this project ____
- made this project his/her main work priority ____
- made all of the resources for which he was responsible available for the project ____

13. Below is a set of statements regarding your opinions about your **work behaviour** towards the Marketing Manager during this project. Please write down a number.

Completely Disagree	1	2	3	4	5	6	7	**Completely Agree**

- I documented all aspects of my discussions with the Marketing Manager regarding this project ____
- I monitored changes in the project situation because the Marketing Manager would definitely take advantage of such changes to my detriment ____
- I worked openly with the Marketing Manager because s/he would *not* take advantage of me ____
- I shared information cautiously with the Marketing Manager to avoid it being used against me ____
- I continually monitored his/her compliance in meeting our joint agreements during this project ____
- I continually monitored his/her progress on this project ____
- I spent a lot of time checking his/her project inputs (e.g. reports, customer information) ____

14. Below is a set of statements regarding the **effort** you and the Marketing Manager put into your working relationship during this project. Please write down a number.

Completely Disagree	1	2	3	4	5	6	7	**Completely Agree**

- The Marketing Manager and I have devoted a lot of time and energy into making our relationship work ____
- We made an effort to increase the amount of time we spent together ____
- There is a lot of equity in our relationship which would be lost if it ended ____
- I've made an effort to demonstrate an interest in our relationship ____
- The Marketing Manager has invested heavily in our relationship ____

15. Next, with respect to the project under discussion, I would like your opinion on how **effective** your working relationship was with the Marketing Manager. Please write down a number.

Completely Disagree	1	2	3	4	5	6	7	**Completely Agree**

- Throughout this project, I was very satisfied with our working relationship ____
- During this project, the Marketing Manager fully carried out his/her responsibilities and commitments to me ____
- I think that the time and effort that I spent developing and maintaining this working relationship was very worthwhile ____
- During this project, the Marketing Manager responded well to feedback and advice from myself ____
- Overall, our working relationship was very successful ____

16. Below is a set of statements regarding your opinions about the **motives and intentions** of the Marketing Manager during this project. Please write down a number.

Completely Disagree	1	2	3	4	5	6	7	**Completely Agree**

- There were few hidden agendas in our work ____
- Neither of us had to wonder about the purpose behind the other's behaviour ____
- S/he acted with good intentions ____
- S/he often had ulterior motives ____
- S/he would use me if it benefited him/her ____

The Marketing Manager and You

17. Below is a set of statements regarding the **level of cooperation** between you and the Marketing Manager during the new product project. Please write down a number.

Completely Disagree	1	2	3	4	5	6	7	**Completely Agree**

The Marketing Manager and I ……

- achieved project goals collectively ____
- had a mutual understanding about the project development process ____
- informally worked together on project matters ____
- freely shared ideas, information, and/or resources on project matters ____
- work together as a team ____

18. Below is a set of statements to identify how **similar** you are with the Marketing Manager on certain issues during the new product project. Please write down a number.

Completely Disagree	1	2	3	4	5	6	7	**Completely Agree**

The Marketing Manager and I are **similar** in terms of:

- The time it takes to make a decision ____
- Our tolerance for risk ____
- Our belief that there is always a "right" answer ____
- Our personal style of conflict resolution ____
- The amount and type of information that is required before we make decisions about our products ____
- Our general work experience ____
- Our understanding of our customers ____
- Our understanding of **technical** matters ____
- Our understanding of **marketing** matters ____

19. Below is a set of statements which relate to the amount of **power** that the Marketing Manager has in your firm. Please write down a number.

Completely Disagree	1	2	3	4	5	6	7	**Completely Agree**

In my firm the Marketing Manager ……

- has the clout to get his/her way on major issues ____
- is one of our firm's most important managers ____
- has a lot of power ____

Project Formalisation and Support

In this section, I would like your opinion on the project controls and the support given by your "top management". The term "top management" used in refers to the level of management in your firm that you feel is **most** responsible for approving NPD projects and allocating financial resources.

20. This question relates to the extent that **communication** between yourself and the Marketing Manager was **formalised** during this project. Please write down a number.

Completely Disagree	1	2	3	4	5	6	7	**Completely Agree**

- In coordinating the activities between Marketing and R&D during this project formal communication channels were generally followed ____
- To coordinate Marketing and R&D activities during this project, standard operating procedures were established ____
- During this project, the terms of the coordination between Marketing and R&D were explicitly verbalised, or written down ____
- During this project, there were precise dates for the start and completion of activities to be undertaken ____
- During this project, progress was monitored by means of formal procedures (e.g., milestones, budgets, actions undertaken) ____
- The project proceeded by means of a well-documented plan of action ____

21. Below is a set of statements regarding the **centralisation of authority** of the NPD process used during the project. Please write down a number.

Completely Disagree	1	2	3	4	5	6	7	**Completely Agree**

- I could take little action on the project until top management approved a decision ____
- A person who wanted to make his/her own decision on the project would be quickly discouraged by top management ____
- Even small project matters had to be referred to someone higher up for a final answer ____

22. Below is a set of statements which relate to the organisational **support** that top management provided both to you and the Marketing Manager during the project. Where the term "top management" used in refers to the level of management in your firm that you feel is **most** responsible for approving NPD projects and allocating financial resources. Please write down a number.

Completely Disagree	1	2	3	4	5	6	7	**Completely Agree**

- Our organisational structure facilitated cross-functional cooperation and collaboration ____
- Our top management formally promoted and encouraged cross-functional teamwork ____
- Our top management provided enough opportunities for Marketing and R&D to socialise together ____

23. Below is a set of statements regarding your opinions about the **interest** that top management showed in this new product project. Please write down a number.

Completely Disagree	1	2	3	4	5	6	7	**Completely Agree**

Top management ……

- showed great enthusiasm for our NPD activities ____
- closely followed the progress of this project ____
- made this project their main work priority ____
- made all of the firms resources available for the project ____

APPENDIX 1

Further Project Information

Below is a set of statements regarding how much **you** and the **Marketing Manager** needed to work together to achieve your goals on this stated project. I would like you to rate the amount of help that was required from each other. Please write down a number.

Didn't need their help at all	1	2	3	4	5	6	7	**Completely dependent on their help**

24. Concerning this project, in order for you to accomplish your goals and responsibilities, how **dependent** were you on the Marketing Manager with respect to:

    - Obtaining resources (e.g., personnel, equipment, information) ____
    - Obtaining support (e.g., advice, technical assistance) ____
    - Obtaining outputs (e.g., plans, reports, strategies) ____

Now concerning this project, how **dependent** was the Marketing Manager on you if he/she was to accomplish his/her goals and responsibilities with respect to:

- Obtaining resources (e.g., personnel, equipment, information) ____
- Obtaining support (e.g., advice, technical assistance) ____
- Obtaining outputs (e.g., plans, reports, strategies) ____

25. Below is a set of statements regarding your opinions about the **success** of the new product development project. Please write down a number.

Completely Disagree	1	2	3	4	5	6	7	**Completely Agree**

- The NPD project achieved its budget objectives ____
- The NPD project met its time schedule objectives ____
- In terms of contribution to sales, the new product project was successful ____
- In terms of contribution to profit, the new product project was successful ____
- The overall performance of this NPD project met our objectives ____

26. Which of the following **organizational functions** were involved in the new product project that you have based your answers on? **Please circle as many as apply**

Manufacturing (Production)	1	R&D (Design & Development)	5
Quality Assurance or Control	2	Maintenance/ Technical Service	6
Marketing	3	Sales	7
Finance	4	Other: _____	8

27. Please give a brief overview of this **specific project** in terms of its target customer, budget, and number of core people involved, time scale, and organisation of the group:

    Type of customer: **Please circle** Consumer 1 Bus2Bus 2 Other 3: _____

    Size of Budget ($actual spend) _____

    No. of core people involved_____

    Time Scale (years, months) _____

    Organisational group e.g., new product team, committee, etc

    _____

28. Please write down the job title you had **during** the project: _____

29. How long had you been in this position? _____ years ____ months

30. During the project was your firm a single (i.e., stand alone) company or a business unit (subsidiary) of a larger company?

    Please circle: Single Company 1 Business Unit 2

31. At the time of the project what was your firm's primary business activity (e.g., food manufacturer, aircraft components manufacturer, electronic components manufacturer, etc):

    _____

32. Which markets did you mainly sell to:
    Please Circle Consumer.. 1 Business .. 2 Both .. 3

33. During the project how many full-time employees did your company have in Australia? ___

34. During the project what approx. % of your firm's annual sales was being spent on new product development? ____ %

35. During the project what was your company's approx. % of sales revenue provided by new products developed in the previous 3 years? ____ %

A Summary of the study results will be e-mailed to you shortly!

APPENDIX 2
MULTI-ITEM MEASURES

Construct	Items	Adapted From
Perceived Relationship Effectiveness **α = .94** **AVE = .77**	Seven-point scale anchored by 1 "Completely Disagree" and 7 "Completely Agree." Respondents were asked to rate: (1) Their satisfaction with the working relationship; (2) Their belief that the MM carried out their responsibilities and commitments; (3) The value of the time spent developing and maintaining the relationship; (4) The MM's response to feedback and advice; and, (5) Overall success of the working relationship.	Ruekert and Walker (1987)
Project Formalisation **α = .84** **AVE = .64**	Seven-point scale anchored: 1 "Completely Disagree" and 7 "Completely Agree." (1) In coordinating the activities between Marketing and R&D during this project formal communication channels were generally followed; (2) To co-ordinate Marketing and R&D activities during this project, standard operating procedures were established; (3) During this project, the terms of the co-ordination between Marketing and R&D were explicitly verbalised, or written down.	Ruekert and Walker (1987) Moenaert et al. (1994)
Communication Quality **α = .93** **AVE = .73**	Seven-point scale anchored: 1 "Completely Disagree" and 7 "Completely Agree." (1) The information provided by the MM was very useful for my work on this project; (2) I was very satisfied with the content of the information provided by the MM on this project; (3) The information provided by the MM was highly relevant to my work on this project; (4) The information provided by the MM was highly credible; (5) The form and presentation of the information provided by the MM was very satisfactory	Moenaert et al. (1992)
Cognition-based Trust **α = .88** **AVE = .63**	Seven-point scale anchored by 1 "Completely Disagree" and 7 "Completely Agree." Respondents were asked: (1) Whether most people trust and respect the MM; (2) Whether the MM approaches his/her job with professionalism and dedication; (3) Whether the R&D Manager doubts the MMs competence and preparation; (4) Whether the R&D Manager can rely on the MM to not cause problems through careless work; and, (5) Whether other work associates consider the MM to be trustworthy.	McAllister (1995)

Appendix 3: Exploratory Factor Analysis of Key Variables

Figure A1: Exploratory Factor Analysis: Quality of Communication

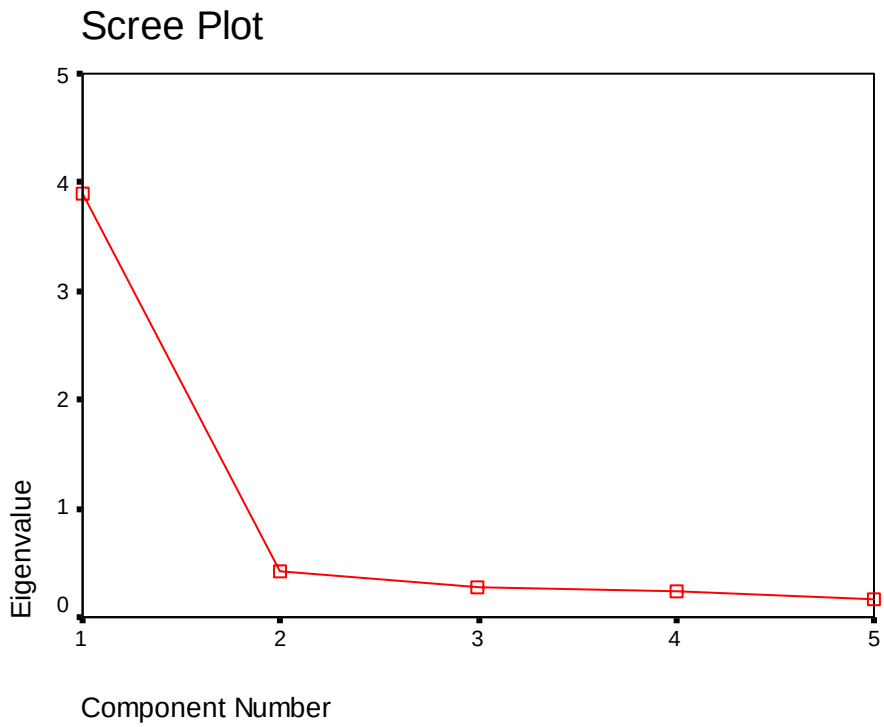

Figure A2 Exploratory Factor Analysis: Interpersonal Politics

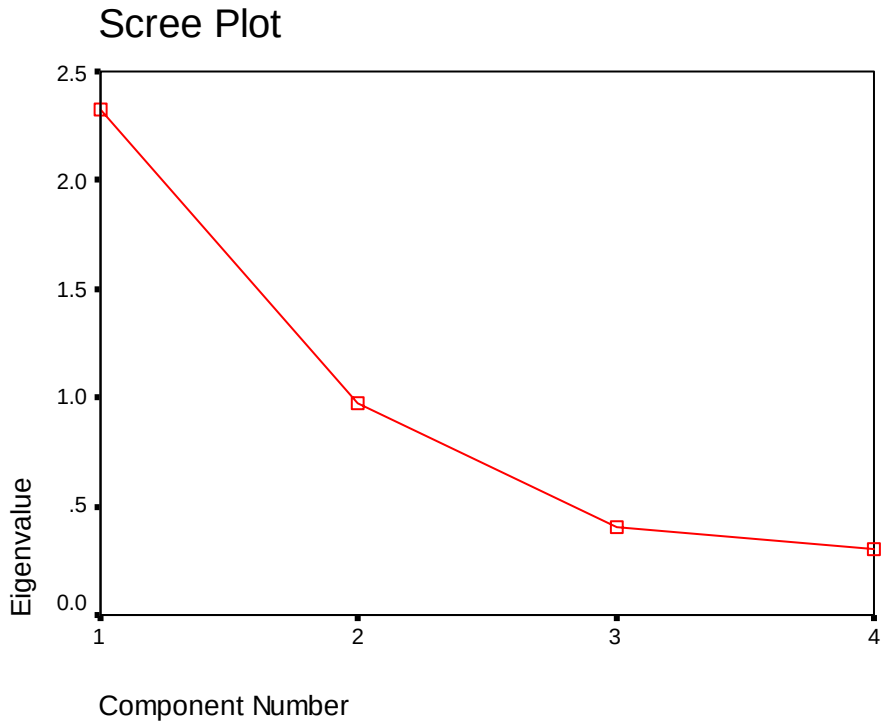

Figure A3 Exploratory Factor Analysis: Interpersonal Collaboration

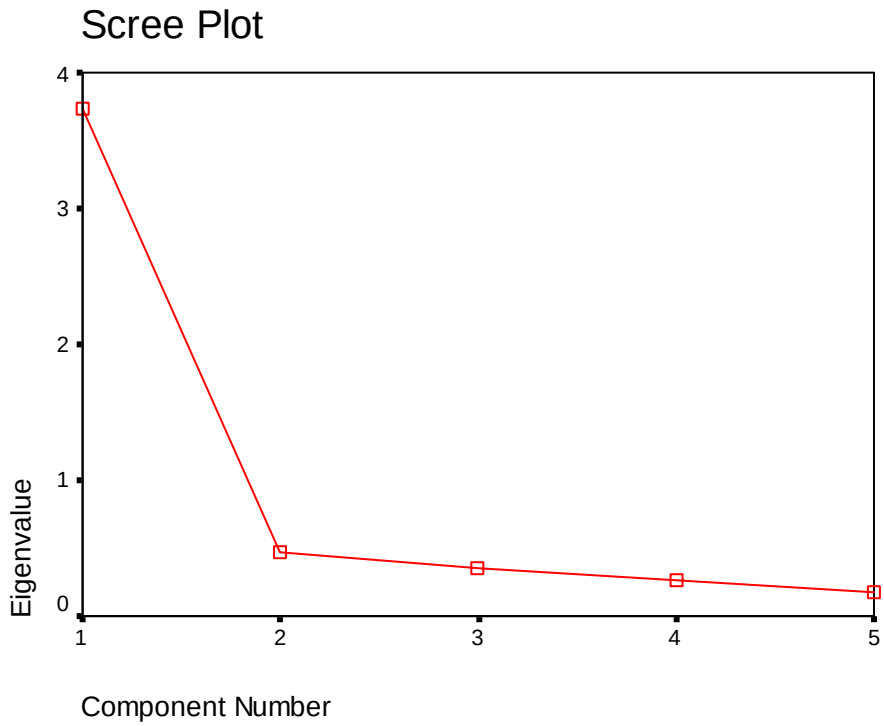

Figure A4 Exploratory Factor Analysis: Perceived Relationship Effectiveness

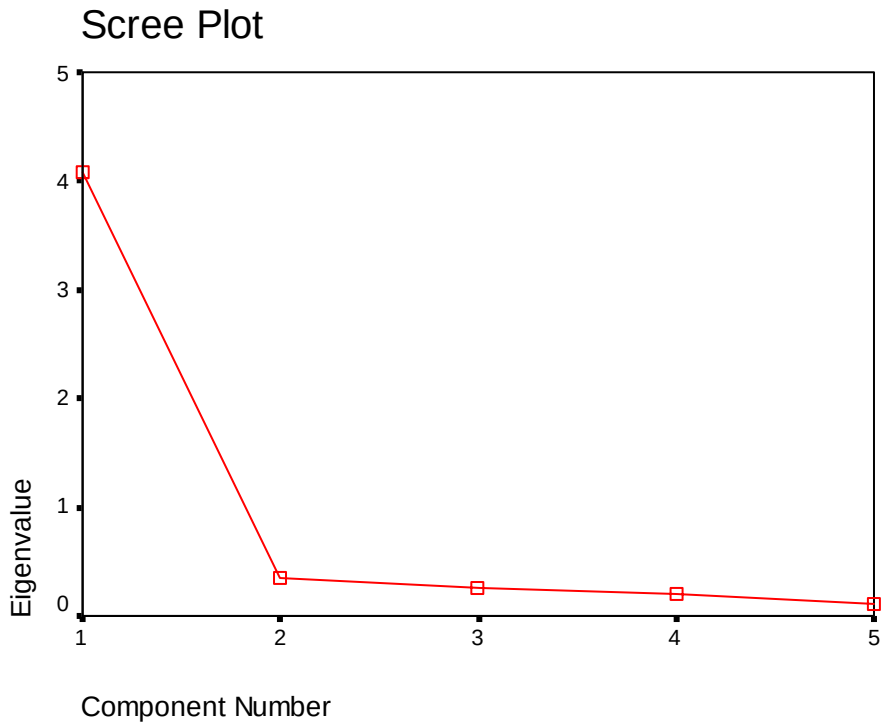

Figure A5 Exploratory Factor Analysis: Project Formalisation

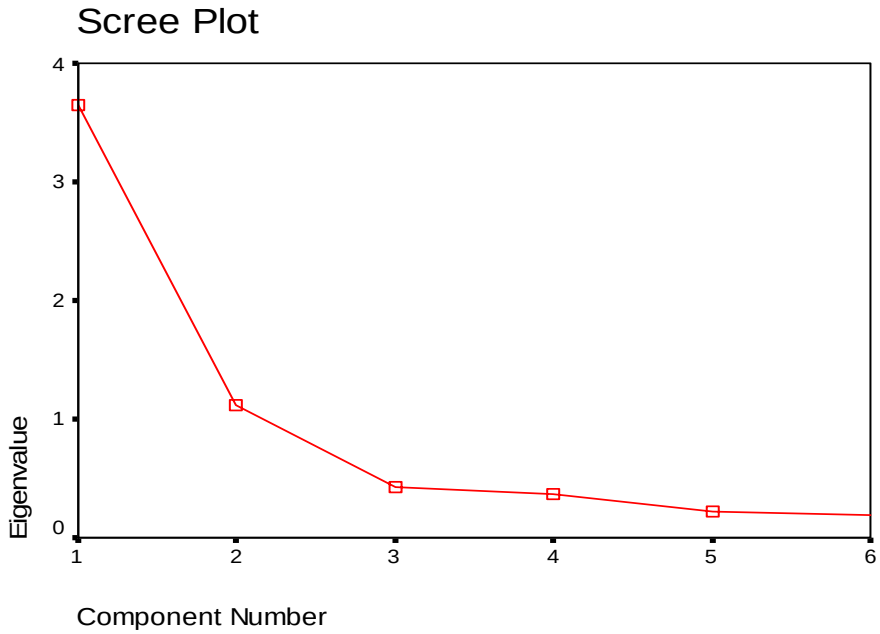

Figure A6 Exploratory Factor Analysis: Affect Based Trust

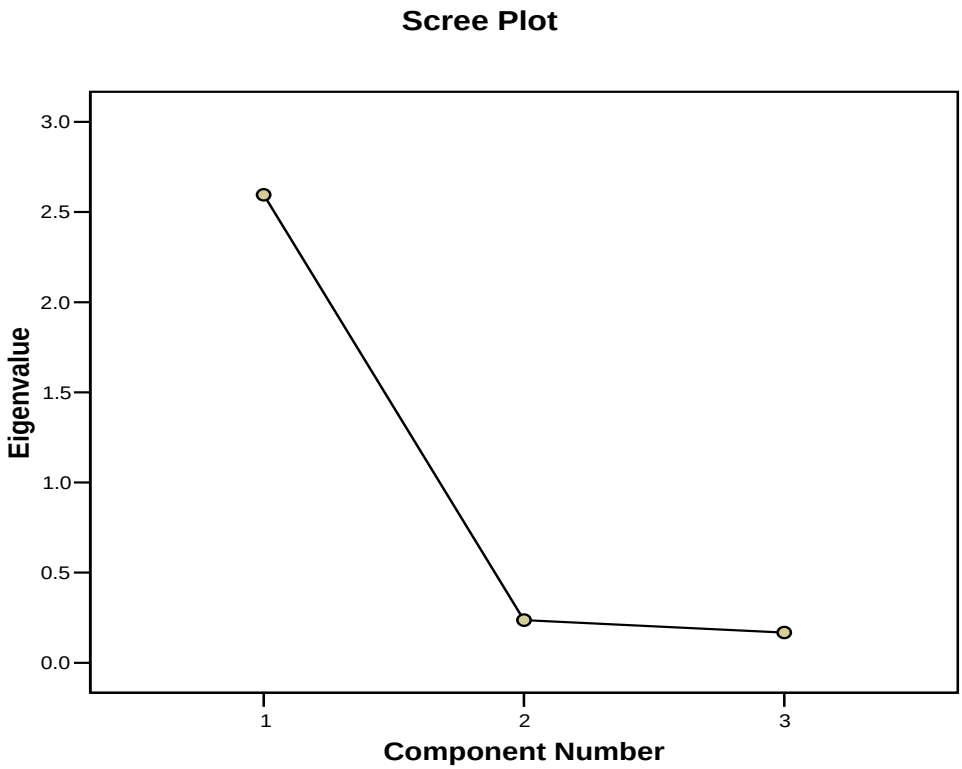

Figure A7 Exploratory Factor Analysis: Cognitive-Based Trust