New Product Screening in Fast Moving Consumer Goods

by Christopher David Stagg

Doctor of Philosophy

The University of Aston in Birmingham

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Thesis Summary

Theory suggests that the dimensions that are incorporated in the new product screening decision will differ according to the stage of the development process. The outcome of the application of different screening dimensions would be quicker, realistic and more reliable screening decisions. This research project builds on existing new product development and screening literature by investigating new product screening in international *fast moving consumer goods* companies. It further builds on the existing literature by measuring decision-making relating to projects in 'real time', as managers' responses refer to projects they are currently working on. The introduction of branded consumer products allows us to evolve scales used in new product research by further developing variables relating to branding, promotion and retailer power.

The project uncovers multiple dimensions of new product screening and evaluation within this branded product sector. These dimensions are found to differ in their ability to discriminate between two groups of *accepted* and *rejected* projects at each of four stages of the new product development process. This investigation provides the intelligence with which managers can determine the likelihood of project *acceptance* and *rejection* at different stages of the development process. It highlights the need for managers to apply stage-specific dimensions in the new product screening decision and advocates the redefinition of new product screening from both an academic and managerial perspective. The screening decision should be not be viewed as a single, early decision in a product development process, but a series of stage specific decisions regarding future project potential.

Key Words: new product development, fast moving consumer goods, screening, product evaluation, brand development

To Rhodri

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Barr Soft Drinks Ltd.
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Cadbury Ltd.
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Colgate-Palmolive
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Country Choice Ltd.
Country Style Foods
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Hosta Meltis Ltd.
HP Bulmer
HP Foods Ltd.
Jacob's Bakery Ltd.
Jeyes Ltd.
John West Foods Ltd.
Johnson & Johnson Ltd.
Just Juice Drinks Co. Ltd.
K Foods UK (The Low Fat Snack Co.)
Kimberly-Clark Ltd.
Kraft Jacobs Suchard Ltd.
KMI (King of Shaves)
Leaf UK Ltd.
Mars Confectionery Ltd.
Master Foods Ltd.
Mathew Clark Brands
McCain Foods
McCormick Foods
McVities UK Ltd.
MD Foods Ltd.
Memory Lane Cakes Ltd.
Millway Foods Ltd.
Müller Dairy
Nestlé
New York Bagel Co. Ltd.
Northumbrian Fine Foods
Orchid Drinks
Pascoe's
Pasta Reale
Patak Spices Ltd.
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Pillsbury Europe Ltd.
Pork Farms Bowyers Ltd.
Premier Brands
Proctor & Gamble Ltd.
Purity Laboratories
Ralston Purina Northern Europe Ltd.
Revlon International Ltd.
RGB Coffee Ltd.
RHM Foods Ltd.
Robertson's Ltd.
R. Twinning & Co. Ltd.
Sara Lee Bakery Ltd.
Sara Lee Household & Bodycare Ltd.
SCA Hygiene Ltd.
SC Johnson Wax Ltd.
Scottish Courage Ltd.
Silver Spring Soft Drinks
SK Chilled Foods Ltd.
SMA Nutrition
Smith & Nephew Ltd.
Stafford-Miller Ltd.
Starman Ltd.
St. Ivel Foods
Taylor's Speciality Foods
The Cookie Coach Company Ltd.
The Fabulous Bakin' Boys
Treats Frozen Confectionery
Trebor Bassett
Trevor Sorbie International
Ülker Biscuits & Chocolates Ltd.
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1 Chapter One
Introduction

This introduction chapter highlights the role of new product screening and evaluation in a modern organisational context. It provides a general background to this research project, outlining the academic and managerial benefits to be gained from further research into the screening and evaluation of new products. It proposes a rationale for the research project and introduces the objectives that the project seeks to fulfil. The chapter then provides an overview of the thesis, including the primary hypotheses and research findings. The chapter ends with a brief outline of the subsequent chapters in the thesis.

Chapter One - **Introduction**

The basic strategy of the modern corporation is to exploit the close relationship between technology, market and product in order to provide a steady flow of new goods with increased aggregate value (Albala and Rubenstein, 1994). These products are more attuned to customers' wants and needs than those of their competitors. The organisations provide strong marketing, technical and sales support during development and launch of the products (Montoya-Weiss and Calantone, 1994). It is through this marriage of consumer need and technical capability that a successful product is born, offering the organisation a focus area where sustainable competitive advantage can be achieved (Davis, 1994). Central to the continued flow of new products is the new product development (NPD) process. It is the manner in which these new products are developed that ultimately gives the best indication of future market success.

1.1 Background

In new product development, there is a tension between the goal of screening out costly new product failures and fostering a culture that inspires and empowers individuals to innovate. The creation of an innovative and open new product development culture, where management supports new ideas and encourages communication and involvement from among its diverse resources, is of major importance in developing winners (de Brentani, 1992). In an ideal new product process, management could identify the probable new product winners in advance. They would then be able to allocate the firm's limited development resources to these projects. As a result, failure rates would be low, misallocated resources would be kept to a minimum and the return on investment would be maximised (Cooper, 1985a).

To maintain competitiveness the firm's product development process must help create what the customer will buy in preference to what is on offer from competitors. Effective product development allows companies to capitalise quickly on changing consumer trends, lend flexibility in times of crisis, erect barriers to entry and probe new market opportunities (McIlveen, 1994). Changes taking place in the wider new product environment; increasingly hostile competitive environments, heightened competition from home and abroad and the faster pace of technological change, have posed new challenges for NPD research. We will develop these issues later in the thesis.

New product development is defined as the overall process of strategy, organisation, concept generation, product and marketing plan creation and evaluation, and commercialisation of a new product (Crawford, 1994). It is widely recognised as one of the most important value-generating processes in the modern organisation. It is, however, a high risk and difficult venture. This is typified with 'really' new products where the process typically involves emerging markets in which consumer demand is latent and product requirements unarticulated (Song and Montoya-Weiss, 1998). As a result a large proportion of ideas that enter the NPD process fail. Urban and Hauser (1993) noted that studies of new product success continue to show extremely low success rates with little improvement over time. Wind and Mahajan (1997) suggest that new product failure rates are still substantial and the cost is large. However, research cannot reduce failure altogether since certainty in any NPD program could only be achieved by rejecting all new products (Albala, 1975). Research should provide managers with analytical guidance that enhances decision making by identifying key questions, issues, and tasks to be undertaken (Cooper, 1985a). Cooper and Kleinschmidt (1986, p72) noted that the majority of new product studies may have overlooked the obvious.

"Too pre-occupied with issues of strategy, synergy, orientation and selecting the right technology and market areas, studies have failed to look at what happens during a new product project. Fewer still have investigated the strengths and weaknesses of the activities that compromise the new product process and the impact

that their activities have on project outcomes. If what happens during the new product process itself is key to success, then a clear need exists to examine more closely those actions or activities that make up the new product process."

However, the strengths and weaknesses of NPD processes and the impact their activities have on project outcomes may be industry specific. So far research has concentrated on the development of new industrial products, highlighting *industrial* screening dimensions and antecedents to *industrial* product success. This concentration of research efforts hides a scarcity of research addressing products in the consumer goods sector. Are the failure rates of consumer products less of a problem? Do consumer product organisations have a more integrated approach to the development and marketing of new products? Current new product research is ill equipped to answer such questions. It has, however, been acknowledged that the challenges faced by firms in the packaged goods industry are somewhat different to that of the industrial product sector. Consequently, screening dimensions and drivers of success for new consumer packaged goods are different from those in high-technology industry (Akao, 1992).

The focus of this research is, therefore, on new product development within the *fast moving consumer goods (fmcg)* sector. More specifically it highlights screening and evaluation procedures and how they reflect specific stages of the development process. Research must establish not only how managers evaluate new *fmcg* projects, but also whether evaluation criteria are applied with equal weighting at each stage of the development process. This thesis will reveal screening and evaluation criteria that best discriminate between project *acceptance* and *rejection* at four different stages of the NPD process.

1.2 Research Rationale

Unprecedented levels of distributive trade power and increasing competition from home and abroad has increased the significance of new products for *fmcg* organisations. Firms must capitalise on this increasing need for new product success by anticipating future desires for products and services and transforming these wishes into real, new or improved, products and services (Buijs, 1979). If this transformation is to take place then the process by which new products are developed must be adapted to identify probable new product *acceptance* and *rejection* at the earliest opportunity. It is a fundamental responsibility of the NPD process to identify and screen out those projects that will ultimately fail in the marketplace whilst fostering those products that will prove to be commercially successful.

However, while NPD processes have become more sophisticated as a result of academic investigation, their generalisibility is diminished by the focus on a narrow range of industrial products. Much of this research has focused on the investigation of the whole process of new product development (Hart *et al* 1998; Cooper, 1994; Cooper and Kleinschmidt, 1986; Saren, 1984), stages within the process (Rochford and Rudelius 1997; Page, 1993) and information inputs to the process (Schmidt and Calantone, 1998; Hart and Baker, 1994; Ciccantelli and Magidson, 1993). However, research has neglected new product research in branded *fmcg* manufacturers (Hanna *et al*, 1995). It is surprising that research has avoided a domain that has otherwise dominated marketing thinking. Moreover, research has largely ignored the screening and evaluation of new products throughout the NPD process, concentrating instead on the early screening of new industrial concepts and ideas (Cooper and Kleinschmidt, 1993d; de Brentani, 1986; Cooper and de Brentani, 1984; Muncaster, 1981). This thesis takes the opportunity to investigate screening within the branded *fmcg* sector and to evaluate how criteria differ in importance at specific stages of the NPD process. A primary discriminator of success for new products such as differential advantage can highlight such a concept. In an industrial product such as Intel's Pentium® II processor, differential advantage refers to technical advantages such as speed and power of the processor. For a new *fmcg* product such as SmithKline Beecham's Ribena Spring soft drink this may be more to do with product design and styling or perceptual advantages through post launch marketing efforts. It is the contrasting impact the consumer has on the product development process that affects the probability of future market success. Von Hippel (1978) noted that industrial NPD appeared to be 'customer-active' with customers initiating ideas by approaching manufacturers with clearly defined objectives and requirements. Consumer product ideas were usually 'manufacturer active'. In these instances the manufacturer plays the primary role in product development by actively identifying consumer needs and desires. We did not know we wanted 'Alcopops' or 'Walkmans' until innovative companies like Bass and Sony put them into our hands.

Dramatic changes in the business environment allows this research project to focus on three key areas: (1) A shortening product development cycle allows us to observe screening criteria at different stages of the NPD process. (2) The greater numbers of *fmcg* products being developed counteracts problems of a high attrition rate associated with the NPD process. (3) The measurement of product categories with high volumes of new product introductions and liberal idea generation offers greater flexibility in measuring projects in 'real-time', an under-exploited research area. By focusing research on the NPD process we will improve the understanding of whether current tools can help identify potential new product winners.

1.3 Research Objectives

This research project will identify dimensions of new product screening that are specific to the *fmcg* sector. It will then identify which of these criteria discriminate between *accepted* and *rejected* projects at four stages of the development process. This will measure the importance of project evaluation criteria at different stages of the new product development process. We build on existing literature by sampling managers who are responsible for new product decisions in international branded *fmcg* organisations. We further build on the existing literature by sampling in 'real time', with managers' responses referring to projects they are currently working on. This research project evolves scales used in current NPD research by developing the variables of branding, promotion and retailer power. By sampling products during the NPD process the research side-steps the controversial area of the most effective method of measuring new product performance (post-launch). Instead it utilises a dichotomous *Go/No Go* outcome based on the decision to allow a project to carry on to the next stage of the NPD process or to screen it out.

With the above in mind, the objectives of this study are four-fold. First, to examine the nature of new product development within the *fmcg* sector. Second, to determine the dimensions of new product screening within *fmcg* organisations. Third, to assess any changes in the importance of the evaluation criteria across the NPD process and their importance in *Go/No Go* decision making. Finally, to develop a model that will guide management decision making in this crucial business activity.

The fulfilment of these objectives is important for a number of reasons. Without an objective assessment of the nature of the screening decision at each stage of the development process, managers are potentially guilty of applying inappropriate screening criteria to new product projects. The risks associated with the application of inappropriate screening criteria relate to both Type I and Type II errors. A Type I error occurs when a project that could have been a market success is screened out or *rejected.* A Type II error concerns a failure to detect a project that is *accepted* to launch but becomes commercially unsuccessful. As Cooper (1985; p 35) stated;

"Too 'weak' a screening procedure fails to weed out the obvious 'losers' or 'misfits' with the resulting misallocation of scarce resources and the start of a creeping commitment to the wrong projects. In contrast, too 'rigid' a screen results in many viable and worthwhile projects being rejected, and perhaps is even more costly to the firm in terms of lost opportunities".

Therefore, a more thorough understanding of the most appropriate screening criteria at each stage of the development process will be a welcome benefit for any manager involved in new product decision making.

1.4 Research Overview

This introduction chapter has noted the importance of new product development as a value generating process in the modern organisation (section 1.1). The discussion notes that the process by which products are developed has a significant impact on future success or failure. Therefore, there is a need to survey projects within specific industries in order to improve industry-specific understanding of the NPD process. This investigation sheds light on the screening of new products within the *fast moving consumer goods* sector (section 1.2). The key objective of this research project is to assess the nature of new product screening at each stage of the new product development process within this branded product sector (section 1.3). A thorough review of academic and management journals yielded a pool of screening criteria from empirical, case study and anecdotal research in all aspects of new product development. The research instrument incorporated 116 screening items in 11 factor groupings, presented to managers under the headings of *project*, *synergy*, *market* and *branding* criteria. This instrument was validated through detailed pre-testing and pilot-testing. The thesis addresses two primary hypotheses.

Hypothesis 1: The 11 groups of screening criteria are composed of a larger set of underlying screening dimensions that differentiate between *accepted* and *rejected* projects in the *fmcg* sector.

Hypothesis 2: The criteria that differentiate between *accepted* and *rejected* projects in this sector are dynamic and change in importance over the NPD cycle.

In order to test these hypotheses we surveyed managers responsible for new product decision making. Data were collected on *accepted* projects (those that were currently being developed) and *rejected* projects (those that were recently 'screened out'). Projects were categorised as being at one of four stages of the NPD process; (1) Concept/Idea stage, (2) Evaluation stage, (3) Development stage and (4) Pre-Launch stage.

This research project advocates the need to reassess the way managers and academics view new product screening. The traditional view of screening as a single decision at an early stage of development is a wholly inadequate method of assessing future product potential in the *fmcg* sector. This project advocates the use of a stage-specific screening model that empirically identifies the screening dimensions that discriminate between *accepted* and *rejected* projects.

By adopting a stage-by-stage approach to new product screening managers are focusing on those dimensions that can best help them identify potential new product winners. The crucial issues are *'help'* and *'potential'*. This project rejects the notion that research can provide anything but guidance on the most appropriate way of screening new product projects. The purpose of this study is to identify the dimensions that will give the best indication of future market performance without placing unnecessary barriers in the way of product innovation.

It must be made clear that the project does not attempt to identify those factors that will guarantee product success in the marketplace. Nor does it suggest those dimensions that will improve the magnitude of product success. Rather it implicitly acknowledges that a product cannot be successful in the marketplace if it has been screened out of the development process. Product development projects must successfully navigate each stage of the development process before they are unleashed onto the buying public. Accordingly, managers can make faster and more reliable screening decisions by concentrating on those dimensions that discriminate between *accepted* and *rejected* projects at each stage of the development process. This will give each development project the best chance of getting to, and being a success in, the marketplace.

This chapter will now briefly outline the forthcoming sections of the thesis.

1.5 Chapter Outline

Chapter two provides a much more in-depth look at a wide variety of literature in the fields of new product development, new product screening and brand management. It defines new product development and highlights the importance of a successful new product programme within a modern organisation. It looks at the NPD process and addresses the high rate of new product failure from that process. Traditional methods of product screening, the antecedents to new product success and the managerial applications of new product research are then discussed. The chapter ends with a discussion of how research could benefit from changes in the population and methodologies and proposes areas for research development.

Chapter three looks at key NPD investigations that were crucial in the development of the current research project. These projects provide a framework from which the current research study was developed and propositions formulated. The chapter describes the development of the research design through the NPD process, unit of analysis, screening dimensions employed and the conceptual framework. This assessment of the conceptual and theoretical stages of research development ends with a discussion of the research contributions made by this study. The chapter concludes by highlighting empirical, case study and anecdotal literature that facilitated the development of testable hypotheses.

Chapter four provides a detailed discussion of the instrument and methodologies used in the data collection process. It begins with a discussion of the merits of the selected data collection method. It then looks in detail at the design of the research instrument, adopting Churchill's (1995) nine stage approach and incorporating the pre and pilot testing stages. The chapter then outlines the salient issues arising from the main survey in this investigation. Sections are included that look at research administration, response rate and questionnaire follow-ups. The chapter concludes with an important assessment of questionnaire and item non-response and missing data analysis.

Chapter five provides the analysis and results from which the hypotheses proposed in chapter three can acceptably be tested. The first phase of this chapter provides detailed statistics regarding the organisations, respondents and projects included in the final sample. Phase two of the chapter begins with a detailed discussion of the techniques to be used to address the dimensions of new product screening within the *fmcg* sector. The chapter then goes on the address issues of item analysis, reliability, dimensionality and validity for each of 11 proposed groups of screening criteria. The third and final phase of this chapter takes the uncovered dimensions of new product screening and addresses their ability to discriminate between *accepted* and *rejected* projects at four stages of the NPD process.

Chapter six begins with a theoretical discussion of the structure and make-up of the uncovered dimensions of new product screening in the *fmcg* sector. It goes on to discuss the nature of each of the uncovered screening dimensions in turn, reflecting on the findings of other research projects. Particular effort is made to identify how these dimensions would impact on the screening decision in current *fmcg* manufacturers. The chapter then discusses those dimensions that discriminate between the groups of *accepted* and *rejected* projects at each stage of the development process. The dimensions are grouped into those providing a high, moderate or low impact on the screening decision. Again, particular emphasis is placed on specific, day-to-day screening decisions. The chapter then provides a synthesis of chapter five and the discussions of chapter six to assess the six hypotheses proposed in chapter three. The managerial implications of these findings are discussed in detail. The chapter concludes with an overview of the research findings.

The seventh and final chapter throws further light on the discussions of Chapter 6. The major findings of this research project are the managerial implications and these will be summarised in this section. The final part of the conclusions chapter will look at limitations of the current study and present thoughts on opportunities for the future development of research into new product screening in the *fmcg* sector.

2 Chapter Two
Literature Review

This chapter offers a critical review of a wide variety of literature pertinent to the study of new product screening. The chapter defines new product development and addresses its importance in a wider organisational context. It examines the new product development process and associated product failure rates. The chapter then looks at new product screening and the antecedents to project success. The implications of new product research for managers in the field are also discussed. The chapter ends by discussing how new product research could benefit from changes in research sample and research methodologies and proposes areas for research development

Chapter Two - Literature Review

T. S. Elliot wrote, *"we should not confuse information with knowledge"*. This offers a considerable challenge when trying to gain an understanding of the literature in a particular subject area and new product development is no different. Within this academic and management discipline we must also be aware of the minefield of rhetoric. The elusive goal of new product success and the antecedents to success provide much debate. It is, however, important to bear in mind that facts are much more critical to new product success than rhetoric. It is with these ideals in mind that a literature review is undertaken to highlight key research projects in the field. It is from this literature review that opportunities are uncovered for the development of research and from which we identify a compelling theoretical justification for this research project.

The following review highlights research from complementary fields of literature such as management, new product development, marketing, brand development and brand strategy. Much of this review reflects on the large body of research addressing the issue of post-commercialisation new product success and/or failure. These studies offer a substantial, empirically tested body of literature from which a research framework can be devised. The chapter begins with a general review of the many definitions of new product development. It goes on to develop a summary of some of the seminal works in the field of new product development and new product screening. Key areas are highlighted, notably the nature of the sample frame, the research methodology, the process of new product development and the measurement of project 'kills' as well as successes and failures.

2.1 New Product Development Defined

New product development has many and varied definitions. Dirken and Kaper (1973) suggested that product innovation was the total organisationally-related procedure of information processing and treatment which makes up the process of creating goods to be produced industrially. This means the systematic collection and evaluation of data, techniques and objects, so that an idea is transformed into mechanisms, design, material and method of production, such that the developed product conforms as well as possible to a balanced combination of economic, social and technological criteria, whereby needs, use and respect for the intended users and their environment are in the foremost place (in Buijs, 1979). This definition suggests that the developing firm undertake production of the product. We know this is not always the case, particularly in the *fmcg* sector where outsourcing is commonplace in both the development and manufacturing processes. Where agencies were once only called on in times of crisis, clients are now incorporating outside agencies into the development process (Miller, 1999). A simplified definition of innovation offered by the Central Advisory Council on Science and Technology suggests that NPD concerns the technical, industrial and commercial steps which lead to the marketing of new manufactured products and to the commercial use of new technical processes and equipment (Rothwell, 1972). This widens the scope of interest to include the development of new competitive advantage-generating processes and technologies. Souder (1987) defined NPD as a creative process in which two or more existing things are combined in a novel way to produce a unique thing that is new to the organisation, group, or society. As has already been noted, Crawford (1994) referred to NPD as the overall process of strategy, organisation, concept generation, product and marketing plan creation and evaluation, and commercialisation of a new product. These definitions incorporate, to some degree, the following issues;

1. Product creation and evaluation.
2. Product commercialisation and marketing.
3. Development of new value-generating products or processes.
4. Fit between product offering and market need.

For new product development to offer benefits to both producer and consumer, it must incorporate some of these criteria. A conclusion to draw is that product development has many and varied definitions meaning different things to different firms and different functions within the firms. Craig and Hart (1992) noted that particular terminology tends to depend on the business area in which it is used. New product development is often the term of choice for marketing and general management functions while 'design' is often preferred in engineering and technical functions. 'Research and development' is often a euphemism for product development while, within the R&D department, there is often interchangability between the terms 'innovation' and 'new product development'. A casual glance at the job section of any marketing journal or magazine also highlights the many different ways that product development is referred to. Managers responsible for NPD within the *fmcg* sector are referred to as 'brand manager - NPD', 'innovations manager', 'technologist', 'new product development manager', 'market research manager - NPD' and so on. We must be aware of, and reflect within any study of new product development, this wide variation of definitions and terminology.

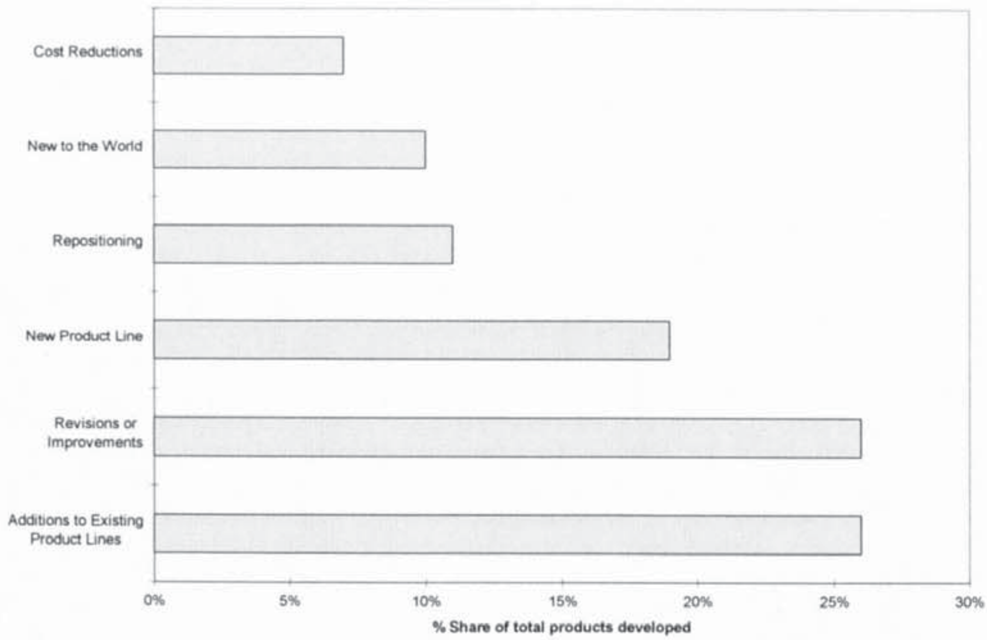
The nature of new product development is such that it refers to differing degrees of 'newness' and degrees of 'innovativeness'. Cooper (1993) acknowledged that newness might be new to the company, in the sense that the firm has never made or sold this type of product before, although other firms may have. They could, however, be new to the market or 'innovative': the product is the first of it's kind on the market. Booz *et al* (1982) identified six different categories of new products;

1. New to the world products - the first of their kind, create an entirely new market.
2. New product lines - new to the firm but not new to the marketplace.
3. Additions to existing product lines - new items to the firm but fit within existing product lines. May also represent items fairly new to the market.
4. Improvements and revisions to existing products - not so new products, essentially replacements of existing products.
5. Repositionings - new applications for existing products.
6. Cost reductions - the 'least new' of all the product categories. Yield similar benefits as existing products at lower costs.

Rockwell and Particelli (1982) reported that the proportion of new product developments by category of innovation varies (Figure 2.1). The contrast in the proportions of new products being introduced is quite marked. Seventy percent of these developments fall within the 'low' to 'moderate' innovation category (Kleinschmidt and Cooper, 1991; Rochford, 1991). The consequence of this imbalance could be as far reaching as to necessitate different NPD processes or the utilisation of different components of a product development 'toolkit'. Radical new products may require a fuller process than modifications (Hart and Baker, 1994).

Products within these categories can be seen to exist on a continuum of 'newness' and 'innovativeness'. Additions to existing product lines and revisions/improvements are developments that are both new to the firm. The four remaining categories are all changes within current product lines. They also noted that these types of new products were not developed in equal numbers.

Figure 2.1 New Product Definitions



Adapted from Rockwell and Particelli (1982)

Rochford (1991) and Kleinschmidt and Cooper (1991) also sought to place some structure on the definition of product 'newness'. They both sought to categorise developments as low, medium and highly innovative.

Highly innovative	***Kleinschmidt and Cooper*** Highly innovative products: New-to-the-world products and product lines that are innovative to a company. ***Rochford*** New to the market, the first of its kind. What some call an innovation.
Moderately innovative	***Kleinschmidt and Cooper*** Moderately innovative products: Lines new to the firm but not new-to-the-world. ***Rochford*** New to the firm, taking the company into new markets, new technologies, or new production methods.
Low innovation	***Kleinschmidt and Cooper*** Low innovative products: All product modifications, re-designed products, re-positionings and minor extensions. ***Rochford*** New in the sense that it is better for the customer with the product yielding some net benefit to the customer.

Johne and Snelson (1988) summarised that there were three broad categories of product development activity open to manufacturing firms: (1) developments of existing lines, i.e. old product development; (2) developments of new product lines in areas of current technological expertise, i.e. new product development based on known technology: (3) developments of new product lines in areas which the business has little or no technical expertise, i.e. new product technology based on new technology.

The varying degrees of innovativeness, their use within NPD research and their impact on the antecedents to success has been summarised by Montoya-Weiss and Calantone (1994) and Craig and Hart (1992). They conclude that the reluctance of researchers to adequately distinguish between different developments is due to the inherent difficulty of categorising them. However, the degree to which a product can be considered as 'new' or 'innovative' may have significant impact on new product success and the antecedents to product success. To this extent it is important that in any NPD study a working definition of the 'degree' of innovation is agreed upon, that is both relevant and applicable to the industry in question.

Allied to the issue of the most appropriate development process for differing degrees of innovation, there is a case to suggest that different antecedents to success will be uncovered for radically innovative new products than will be seen for product modifications or minor improvements. Hultink and Robben (1995) hypothesise that measuring revenue growth and unit sales goals may be more important for new products with slight improvements than for new-to-the-world products. Kleinschmidt and Cooper (1991) suggest that the innovative product is unique, differentiated and may even be patentable. The innovating firm thus achieves a differentiated and proprietary position, and has a higher likelihood of success than the follower. Importantly, however, for an innovation to have any impact on the differential advantage of a product, the measurement of 'innovative' must reflect customer rather than management perception (Cooper and Kleinschmidt, 1990). Research must be clear in the definition of innovation and scope of investigation so that the problems highlighted above can be overcome and the findings of investigations utilised more effectively by practitioners.

2.2 The Need for New Product Development

As was touched upon in the introduction to this thesis, it is a basic assumption that the aim of industrial enterprises in conducting development work is to use the proposed new product or process for commercial gain (Rothwell, 1972). The company, in a state of interaction with its environment, anticipates future desires for products and services, transforming wishes into real, new or improved, products and services through the product innovation process (Buijs, 1979). A strong new product initiative is considered an essential weapon in both offensive and defensive strategies (Edgett, 1996) and is no longer an option, but a strategic necessity (Craig and Hart, 1992).

Although the sophistication of NPD processes in bringing products to market successfully has improved during the last 25 years, the benefits have been diluted by a variety of changes in the new product environment: new, global competition; slow-growth markets; sophisticated segmentation; escalating costs; constrained resources (Rockwell and Particelli, 1982). During the 1950's the marketplace was a passive receptacle for the fruits of R&D (Rothwell, 1992). Today's marketplace is an increasingly volatile external environment, characterised by shorter product cycles, heightened competition from home and abroad, maturing industries and flat markets and the quickening pace of technological developments (Cooper and Kleinschmidt, 1987). The resulting effect is a greater demand for NPD efforts and a heightened demand for new product winners. The benefits of a successful new product programme within a volatile marketplace such as the *fmcg* sector are ever larger. Eight companies; Unilever, Proctor and Gamble, Mars, Nestle, Kellogg, Coca-Cola, United Biscuits and Kraft, own nearly 60 of the UK's top 100 grocery brands (Mitchell, 1990). The increasing importance of successful new products highlights the best and worst aspects of the organisations involved. Best, because, when developed effectively, new products hold the highest potential for creating true incremental value in the minds and lives of consumers. Worst, because even today more heat than light emanates from the fires of the new product debate (Stanojev, 1997).

A successful product development programme is increasingly becoming the key weapon in an organisation's management strategy. Booz *et al* (1982) found that for the companies they surveyed, an estimated 42% of company sales in the 1985-1990 period *would* come from new products, up from 33% in 1980. A more recent study by Mahajan and Wind (1992) found that new products contribute about 25% per year to the total sales of SBU's. This highlights the difficulties faced by new product managers today. Corporate strategy demands higher levels of performance while the reality of new product development is that the probability of failure remains unacceptably high. As a result, firms take on more new product projects in the hope that by backing more horses they will pick more winners, thus overcoming this new product attrition rate. This brings into focus the importance of deriving a successful new product process with the increasing importance placed on successful innovation and new product winners. Organisations such as 3M have long been held in high esteem for their formalised commitment to new product development. Up to 1992 the company's long-standing goal was to derive 25% of annual sales from products that had been on the market for less than five years. In 1992, due to the increasing competitive intensity mentioned above, it set this target to 30% of each year's sales coming from products launched within the last four years. This commitment to new product success has led to 3M being recognised as one of the most consistently admired companies in the USA (Kotler *et al*, 1996).

Long before organisations undertake 'real' product development work there should be a clear rationale in place. Pre-development activities and strategic planning identify opportunities to be pursued. There should then be a clear reason for bringing a new product to market, clear communication between trading partners and the development of a clear value proposition to the consumer. All too often, however, commitment to new products is rare. More common is half-hearted attachment, allied to plans to bale out if the going gets tough (Davidson, 1987). Corporate obstacles to creativity in NPD are rife and encompass (Buggie *et al*, 1990):

1. The need for individuals to 'play it safe' due to a company's low tolerance for costly mistakes.
2. Stringent requirements for justification of innovative moves which are fiercely resisted by defenders of the 'status quo'.
3. The lack of incentives to risk one's reputation as a winner with another foray into uncharted territory.
4. Pressure to produce current results as opposed to contemplating future possibilities.
5. Tight scheduling in organisations that leaves little time for creative speculation.
6. A prevailing attitude that efforts to produce change will be futile.

These 'barriers' to innovation run counter to widely held views that the creation of an innovative and open culture within the firm where management supports new ideas, and encourages communication is of considerable importance in creating new product winners (de Brentani, 1992). As a result, the failure rates of new product projects remain worryingly high.

2.2.1 New Product Failure Rates

Change is the only permanent element in the complex problems that face managers in a developed market economy. Since an astonishingly high proportion of new product ideas end in disaster - however you interpret the figures - avoidance of disaster is of considerable importance to any NPD programme (White, 1976). The rate of market based new product failure has been the subject of much speculation. Early studies (Crawford, 1979) estimated failure rates from 20% to as high as 90%, but concluded that the best estimate is around 35%. The frequently cited Booz *et al* study (1982) report that between 30% and 40% of all new product development projects fail. Cooper (1992) found that around 33% of new industrial products fail at launch. More recently, a survey of 2250 new product launches between 1997 and 1998 concluded that only one in six new products succeed (Miller, 1999).

Table 2.1 highlights some of the difficulties relating to making an accurate assessment of the rate of new product failure. Variability can be seen in the degree of failure cited according to the industry of study.

Table 2.1 Failure Rates by Product Category

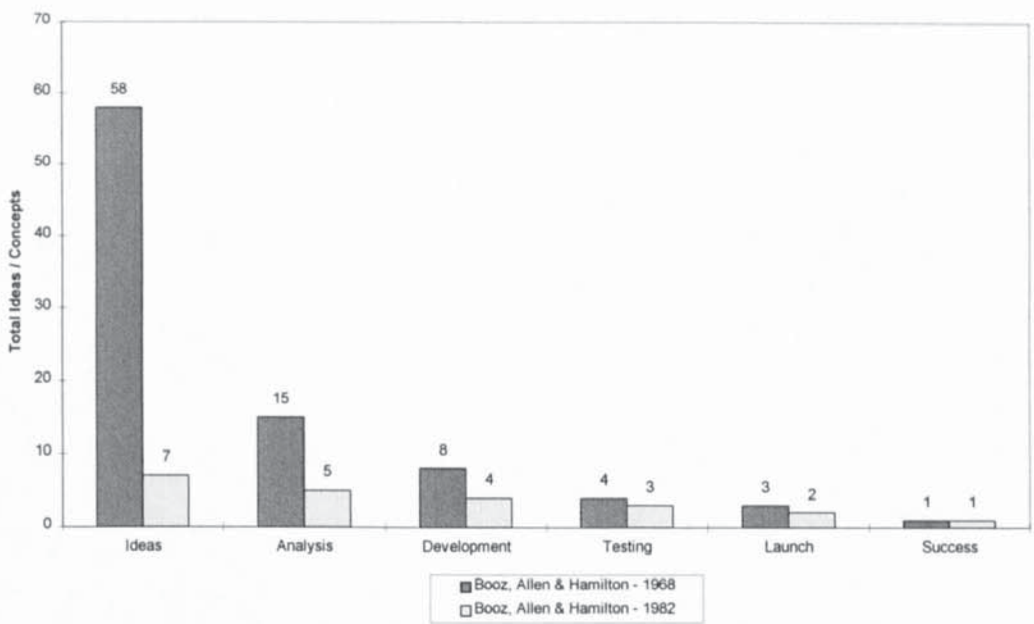
Sample frame	*Failure rate*	*Research*
Food and drug	86 %	Nielsen Researcher, 1980, Vol. 2, pp 16-17
Food	61 %	EFO, The 1991 Innovation Survey. Weston, CT. Group EFO, 1991
Industrial	38 %	Hopkins, David. New Product Winners and Losers, New York: The Conference Board, 1980
Industrial	24 %	Cooper, Robert, G, "New Product Successes in Industrial Firms", Industrial Marketing Management

Adapted from Redmond (1995)

However, it is clear that from the scattered studies on new product success rates that new product development processes continue to show extremely low success rates with little improvement over time (Urban and Hauser, 1993; Power *et al*, 1993). Wind and Mahajan (1997) note that failure rates are still substantial and the cost is large.

However, while the aim of many studies is in improving overall rates of new product success, the natural attrition rate of new products has to be acknowledged. It is widely recognised that you must 'kiss many frogs to find a prince'. Innovation is an inherently high-risk undertaking and one of the few things to be sure about is that there will be failures. Management must accept this, and not use one failure as an excuse for withdrawing from the innovation race altogether (Rothwell, 1992). Figure 2.2 shows the results of the Booz *et al* studies (1968, 1982) into new product 'fall-out'. A change can be seen in that it only took seven new ideas to develop a successful new product in 1982 whereas it had taken 58 in 1968.

Figure 2.2 New Product Attrition Rates



Adapted from Booz *et al* (1968, 1982)

Page (1993) undertook a similar assessment of project attrition. He found that from 100 new product ideas that enter the development process, 26.6 of them are typically tested in some formal manner, 12.4 of them are introduced into the market and 9.4 are commercially successful. This shows a slight decline from the values reported by Booz *et al* (1982). However, respondents in this survey suggested that they were running harder to stay in the same place in an environment where the pace of new product development was accelerating and markets were becoming more competitive, with a contrasting reduction in resources available for product development. Looking at these attrition rates across a product development cycle highlights the fall-out rate of ideas through the process.

The question remains as to what is an acceptable level of new product failure and, consequently, a desirable level of success in a new product programme? The goal of new product research is not to reduce failure altogether but to improve the process of product development by enhancing the knowledge and the information available for product development decisions. Cooper (1985; p 43) proposed a major secondary justification for all these product development studies;

"The diagnostics of such an evaluation help guide the project by identifying key questions, issues, and tasks to be undertaken".

Since no new product program will offer 100% success, measures of post-commercialisation performance should be taken in context. The terms 'success' and 'failure' contain certain ambiguities. A 'failure' may result in knowledge or experience that is later used very profitably (Hlavaceck, 1974). Similarly, empirical researchers must include controls to ensure the businesses they are investigating were aiming to fulfill similar objectives. This issue is important because reluctance on the part of analysts to state the objectives against which developments were undertaken can cause successes to be classed as failures and vice versa. For example;

"A business with high market or profitability hurdle rates will classify a product development as a failure if it fails to meet these, while another business with low

hurdle rates will classify a similarly performing development as a success" (Saunders, 1993; p 161).

Therefore, trying to eradicate failure altogether may remove the valuable feedback loop that failure can provide. It could, however, be suggested that it is a myth that most new products fail. That is not to say that most products launched by companies do not fail, but that most products that are launched are not new at all, being either me-too products or worse (Saunders, 1990).

2.3 New Product Development Process

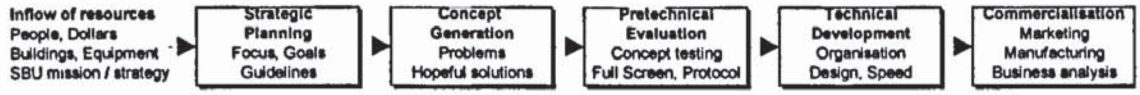
The reported pattern of systematic new product failure is worrying given the importance managers place on new products. Cooper (1993; p 166) noted that;

"Projects too often seem to acquire a life of their own. They proceed like an express train, careering down the track, slowing down at the stations (review points), but never intending to stop until they reach their ultimate destination, market launch".

The track to which Cooper refers is the new product development process. This process has been referred to as a formal blueprint, roadmap, template or thought process for driving a new product project from the idea stage through to market launch and beyond (Cooper, 1994).

Crawford (1996) noted that the new product process essentially turns an opportunity (the start) into a profit flow (the finish). He concentrates on the concept of the process as a value generating activity. Figure 2.3 shows the key stages in that value generating process.

Figure 2.3 The Product Innovation Process



Adapted from Crawford (1996)

For a development process to be successful, Cooper (1981) suggests that it must be sufficiently detailed and specific to act as a guide for managers yet not too pedantic so as to discourage use. It must be strongly market oriented and of paramount importance must be to deliver a product with differential advantage in the marketplace: delivering unique benefits to the customer. In order to manage for the high failure rates acknowledged earlier, the process must have a series of 'bail out' points built in. The process he proposed consisted of seven key stages: each stage separated from the previous one by an evaluation point where *Go and Kill* decisions were taken about the project. These stages were: (1) Idea. (2) Preliminary assessment. (3) Concept. (4) Development. (5) Testing. (6) Trial and (7) Launch. The principle of this type of process is that review points break up discrete stages. Funding for subsequent development stages is often conditional on the satisfaction of the previous evaluation point. This leads to the process being about measurement and control, of both time and resources. It also ensures an engineering focus, concerned with the physical product and not necessarily the marketing or business case for development. This process is, however, too heavily functionally oriented. It gives the impression of a 'pass-the-parcel' approach where one function performs its tasks for the project and then hands on their finished product to the next department. Johne and Snelson (1988) noted that by its very nature the development process was a creative process with many convergent and divergent activities requiring feedback, re-working and multiple approaches. These issues draw into question the validity of any inflexible sequential approach to development work.

Considerable difficulties are found when researching the NPD process due to the variety of conceptions and compositions, along with differences in the terminology used (Page, 1993). Johne (1984) described the process as consisting of two phases of development, initiation and implementation. Initiation involves the front-end activities of idea generation, concept screening, and concept testing and development, while implementation includes 'product development proper', market testing and commercialisation. A useful listing of the span of operational activities and sub-activities undertaken within the development process is illustrated in Table 2.2. The diversity of types and terminology is quite apparent. The processes do, however, fit into a broad schema of stages, as highlighted by the shading bands.

These process stages can be broadly described as;

1. Pre-development planning
2. Concept/idea generation
3. Analysis
4. Development
5. Launch
6. Post-launch evaluation

This overview goes slightly further than the conceptualisation offered by Cooper (1981) in that it includes a new product strategy/planning stage that will give direction to a firm's strategic innovation programme. It also offers a post-launch evaluation phase providing market-led feedback to the product management team. This schema is supported by the recent work of Song and Montoya-Weiss (1998) who noted six sets of general NPD activities: (1) Strategic planning. (2) Idea development and screening. (3) Business and market opportunity analysis. (4) Technical development. (5) Product testing and (6) Product commercialisation.

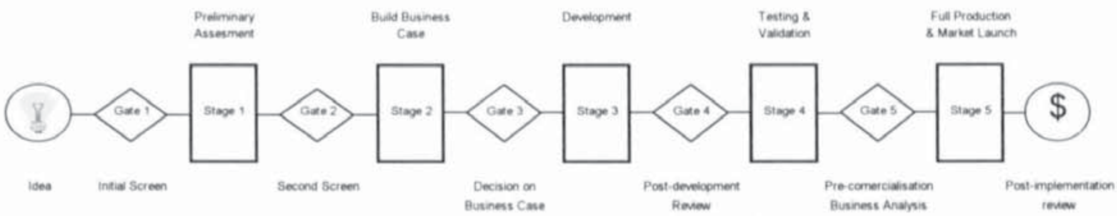
Table 2.2 New Product Development Process Stages

Cohen, *et al*, 1997	Griffin, 1997	Rochford & Rudelius, 1997	Edgett, 1996	Mishra, *et al*, 1996	Schmidt, 1995	Cooper, 1994	Crawford, 1994	McIlveen, 1994	Ciccantelli & Madginson, 1993	Cooper & Kleinschmidt, 1993a
							Strategic planning		Decision to develop new product	
Concept development and selection	Concept generation	Idea generation Screening	Idea screening	Initial screening	Initial screening	Initial screening	Concept generation	Concept brief initiation	Product concept defined Conduct focus groups & surveys in target mkts.	Ideas *Gate 1* Initial screen
	Project evaluation	Preliminary market analysis Preliminary technical analysis Preliminary production analysis Preliminary financial analysis Market study	Preliminary market assessment Preliminary technical assessment Detailed market study/ market research Business/financial analysis	Preliminary technical assessment Preliminary market assessment Product development Detailed market study or market research	Preliminary assessment of the market Preliminary engineering, tech & manuf assessment Market study or market research	Preliminary market assessment Preliminary technical assessment Detailed market study Business/financial analysis	Pre-technical evaluation	Product samples & feasibility evaluation		*Stage 1* Preliminary assessment *Gate 2* Second screen *Stage 2* Detailed assessment *Gate 3* Decision to develop
Product development and testing Process development and trial production	Development	Product development In-house product testing Customer product testing Market testing	Product development Process procedures System design & testing Personnel training Test market/trial sell	Prototype testing in-house Prototype testing with customer Trial production Test marketing-trial selling	Product development Financial analysis Prototype or sample testing in-house Prototype or sample testing with customer	Development of Product In-house product tests Customer tests Test market/trial sell	Technical development	Ingredients testing, packaging, shelf life & food safety issues Small scale trials Samples testing & product review Costings	Develop, design & manufacture prototype Modify product idea based on focus groups & surveys Market test prototype	*Stage 3* Development *Gate 4* Post-development review *Stage 4* Validation
Advertising development and promotion	Manufacturing development Commercialisation	Pre-launch financial analysis Commercialisation	Pre-launch business analysis Full-scale launch	Start-up or full production Central location test Market launch	Pilot production/trial or test production Test marketing/trial sell prior to launch Start-up of full-scale production Launching the product in the market	Pilot or trial production Pre-launch business analysis Production start-up Market launch	Commercialisation	Scale-up (pre-production) trials Product launch & transfer to production	Modify prototype based on market test Finished product/ service goes to market	*Gate 5* Decision to launch *Stage 5* Launch
			Post-launch review & analysis	Financial analysis						Post-launch review

Griffin, 1993	Mahajan & Wind, 1992	Cooper, 1991	Hart & Snelson, 1991	Rochford, 1991	Buggie, *et al*, 1990	Howley, 1990	Cooper & Kleinschmidt, 1986	Ronkainen, 1985	Booz, Allen & Hamilton, 1982	Rockwell & Particelli, 1982	Baker & McTavish, 1976
Opportunity identification			New product strategy	Strategic planning	Organisation and target setting	Product development strategy			Define/know new product strategy	Develop new product strategy	
				Opportunity identification (idea generation & screening)	Strategy development					Generate ideas/ concepts	Idea generation
Concept development	New product idea generation	Idea	Idea generation	Business analysis	Innovation session	Idea generation	Initial screening	Concept phase	Generate ideas for new products	Screen & evaluate	Screening
	New product concept screening	Initial screen	Idea screening		Building session with functional project team	Gap analysis			Screen & evaluate concept	Conduct business analysis	Commercial evaluation
						Taste testing by consumers and screening					
	Detailed market study for concept development test	Preliminary assessment	Concept development	Feasibility	Evaluation meeting	Name / packaging development	Preliminary market assessment	Feasibility phase	Specification & planning	Develop	Technical development
	Detailed market study for mkt. identification positioning & strategy	Second screen	Business analysis	Development	Conduct a second cycle of sessions	Business analysis of target market	Preliminary technical assessment				
	Business financial analysis	Detailed investigation (business case preparation)			Qualification / business analysis		Detailed market study/market research				
		Decision on business case			Design a management action plan		Business/financial analysis				
Product design	Product development	Development	Product development	Testing		Physical product development	Product development	Product/ process development phase	Prototype development	Test	Testing
	Consumer tests of products	Post-development review	Test marketing	Introduction		Taste testing by consumers	In-house product testing				
Process design	Pre-market volume forecasting	Testing & validation				In-home test	Customer tests of product		Test & evaluate design		
	Market test/trial sell						Test market/trial sell				
Commercial production	Market launch planning	Pre-launch business analysis	Commercialisation	Commercialisation			Trial production	Scale-up phase	Volume manufacture	Commercialise	Commercialisation
		Full production & market launch					Pre-launch business analysis	Standardisation			
							Production start-up				
							Market launch				
		Post implementation review									

There is, however, the feeling that any conceptualisation of the development process must take cognizance of the dilemma between the requirements of practical efficiency and thoroughness (Johne and Snelson, 1988). Cooper (1994) in a later piece of research was at pains to point out that they had been able to learn from the myriad studies of product development processes. They were able to incorporate much of the knowledge concerning key success factors and what distinguishes between winners and losers. This 2[nd] generation process also took the approach of identifiable stages interspersed with evaluation points (Figure 2.4).

Figure 2.4 Second Generation New Product Development Processes



Adapted from Cooper (1991)

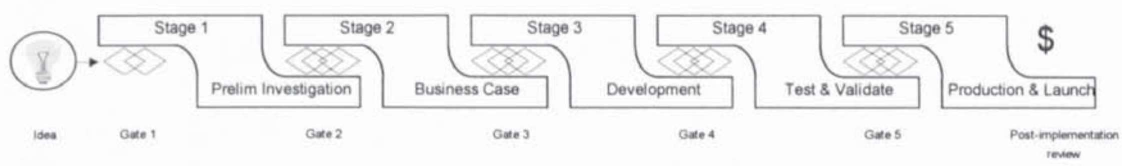
The 2[nd] generation process was, however, cross functional, with no stage owned by any one function. The activities undertaken necessitated a cross-functional approach with players from each function impacting the project's progress at each stage. A key facet of this process is the marriage of marketing's 'customer-focused' knowledge with manufacturing's 'technical/engineering-focused' knowledge. The decision points are also 'owned' by more than one function with cross-discipline decision making concerning the future prospects of the project. These 2[nd] generation process models incorporate all activities from idea generation through to commercialisation of a product. They do not focus solely on the mid-process development stages. The process incorporates a greater emphasis on the up-front pre-development work involved in product development and how the result of this work is a greater market-orientation to the overall process. The 2[nd] generation process also allowed for parallel processing of stages within the process. While the initial process did not demand sequential processing of the project it certainly encouraged it. During the process, activities are undertaken concurrently in order to reduce overall cycle-time. The process also allows for sharper decision making at the *Go/Kill* decision points. There are, however, many acknowledged problems with both the original and 2nd generation processes:

1. Projects must wait at each gate until tasks have been completed.
2. Overlapping of stages is all but impossible.
3. Projects must go through all stages and gates.
4. The system does not lead to project prioratisation and focus.
5. Some new product processes are spelled out in far too much detail.
6. Some new product processes tend to be bureaucratic.

The 3rd generation of Cooper's (1994) new product processes (Figure 2.5) tries to balance out the need for a thoroughness of actions, activities and information, with the need to move with speed and discipline. It highlights four key issues:

1. Fluidity - fluid and adaptable with overlapping stages.
2. Fuzzy gates - conditional *Go* decisions, situationally dependent.
3. Focused - builds in prioratisation methods that look at the 'portfolio' of projects and focuses resources at those most likely to succeed.
4. Flexible - each project is unique and can find its own route through the development process.

Figure 2.5 Third Generation New Product Development Processes



Adapted from Cooper (1994)

It has been suggested that the greater emphasis on NPD within *fmcg* firms has meant a shift from a sequential to a parallel development of ideas. There is no longer a stage one, stage two and so on. Stages are undertaken at the same time, fast-tracking the component parts of NPD - concept, product proposition etc. and putting a lot of hypotheses into the market simultaneously (Dwek, 1996). Ultimately, this interactive method of developing and managing successful new products is not a gamble but the result of well-executed product development initiatives (Edgett, 1996). The new product development process has a critical impact on the success rates of new products. Edgett (1996; p 514) noted that;

"The benefits of early up-front marketing activity are that better ideas are approved and sharper product definition is achieved before the more expensive system development begins".

The NPD process affects the entire spectrum of development activities, impacting on projects ranging from enhancements to the development of brand new products - 60 to 80% of a product's cost is determined during the design process (Birou and Fawcett, 1993). Rothwell (1992) developed a pattern of the evolution of new product processes over time. These processes can be seen to progress from the active producer and passive market in the first generation processes to the full integration of producers, consumers and suppliers in the 5th generation process. Such highly evolved processes are found in many of today's *fmcg* product manufacturers.

Table 2.3 Innovation Processes

1st Generation Innovation Process	Technology push: simple linear sequential process	Emphasis on R&D	The market is a receptacle for the fruits of R&D	
2nd Generation Innovation Process	Need pull: simple linear sequential process	Emphasis on marketing	The market is the source of ideas for directing R&D	R&D has reactive role
3rd Generation Innovation Process	Coupling model: sequential but with feedback loops	Push or pull, or push/pull combinations	R&D and marketing more in balance	Emphasis on integration at the R&D/marketing interface
4th Generation Innovation Process	Integrated model: parallel development with integrated development teams	Strong upstream supplier linkages	Close coupling with leading edge customers	Emphasis R&D and manufacturing integration. Horizontal collaboration and joint ventures
5th Generation Innovation Process	Systems integration and networking model (SIN): fully integrated parallel development	Use of expert systems and simulation modeling in R&D	Strong linkages with leading customers. 'Customer focus' at forefront of strategy	Strategic integration with primary suppliers including co-development of new-products and linked CAD

Adapted from Rothwell (1992)

Since Cooper and Kleinschmidt's 1986 study, investigations have focused further on process issues (Rochford and Rudelius, 1997; Hart and Baker, 1994; Kleinschmidt, 1994; Wind and Mahajan, 1988). They have also set the agenda for developing new product research into process stages since all too often, firms waste time by testing out ideas that should have been eliminated at an earlier stage of development (Dwek, 1996). It is this screening decision that will be discussed in the next section.

2.4 Screening Models

The screening of new product ideas is perhaps the most critical NPD activity, yet it is often performed poorly. Projects with a high probability of failure need to be eliminated early, before significant investments are made and opportunity costs incurred (Calantone *et al*, 1999). Recent studies suggest there is much room for improving new product screening because this decision is often taken informally or unsystematically. It appears that much of the blame for the failure to produce sufficient potential new product winners can be traced to the quality with which firms select and orchestrate their new product initiatives (Bart, 1994). Research notes how firms invite failure on their new product projects largely because of the carelessness and lack of rigor with which they execute such fundamental new product activities as market research, business-competitive analysis, and assessment of synergies (Cooper and Kleinschmidt, 1987a). The context of evaluating new product ideas is where an individual is presented with many new product ideas and must decide, usually without much information, quickly, inexpensively, and efficiently, if any of the ideas have any merit.

Firms typically have more new product ideas than money to develop them all (Cooper, 1981). The philosophy of evaluating new product ideas might be viewed as being similar to a legal contest where all parties (new product ideas) are considered innocent until proven guilty beyond a level of reasonable doubt. Thus, all new product ideas should be viewed as good or successful ideas unless it can be demonstrated that they are not (Baker and Albaum, 1986).

Much attention has been attributed to the new product screening decision and many evaluation tools and methodologies have been recommended as a result. Studies that have identified factors underlying successful innovations *and* those that examine the innovation process itself suggest that the screening decision is of critical importance in the development process (Johne and Snelson, 1988). Cooper (1981) noted that the screening stage was the decision point at which management first commits significant resources towards the development of a new product. From a strategic viewpoint the screening stage largely decides the character and direction of the firm's development program and its eventual product portfolio. However, it will become apparent in the subsequent discussion that research largely views the screening process as a stage within the development processes where decisions are taken about future investment and expenditure. Cooper's (1991) 2^{nd} generation development process views screening as the two 'gates' immediately following idea generation and preliminary assessment (Figure 2.4). This infers that screening is a cursory process targeted at identifying 'possible' future market successes rather than evaluating future project potential throughout the process.

From the idea stage to commercialisation of a new product, there are several decision points where managers must decide whether to continue development and commit additional resources, or to wait to gather additional information before making further commitment, or to drop the product completely from the development portfolio. These decisions are supposed to be made on the basis of rational analysis of future product potential, but with imperfect and incomplete information these are hard to make. The governing factors in most cases seem to be gut feel, past experiences, faith in certain individuals, hopeful guesses, and wishful thinking. Better *Go/No Go* decisions at each stage can enhance a firm's new product development process significantly (Balachandra, 1984).

Initial screening is of considerable importance to the overall new product programme (Cooper, 1993; Mitchell and Hustad, 1981). The *Go* decision at this stage authorises significant additional funding for the project through the stages of the development process. There is a dramatic escalation of resources as a product moves through the development process (Page, 1993; Cooper and Kleinschmidt, 1988; Booz *et al*, 1982) that underlines the critical nature of structured early screening.

Each *Go/No Go* decision is preceded by a cycle of information collection and development, evaluation and recommendation, and decision making. In the development processes outlined earlier, each stage often draws from the expertise of various functional areas of the company (Ronkainen, 1983). However, studies have shown that screening procedures have often been of the text-book, checklist type. Johne and Snelson (1988) note many limitations associated with checklist screening tools. They suggested that checklists do not handle adequately factors such as risk, opportunity costs, the relationship with other NPD projects, and non-monetary aspects of the process such as managerial support and organisational behaviour influences. Cooper and de Brentani (1984) and de Brentani (1986) also highlighted the concentration on financial and technical, corporate and production synergy criteria. The dominance of these factors leads to the development of low risk, incremental products identified in earlier discussions (section 2.1). The early assessment of an innovative idea using discounted cash flow or financial methods is unwise since it is difficult to accurately predict the future cashflow of a product with a 90% chance of failure. Forecasting has been likened to driving a car blindfolded with someone giving directions by looking out of the back window. If that is the case then forecasting the future demand for an innovative new product must include not being able to see out of that back window.

Evaluation of the literature reveals that a very limited number of the proposed evaluation methods have found favour among industrial product development managers (R&D managers). This condition can be partly ascribed to the fact that: (a) Most of the methods require much quantitative input, not readily available within the company, and (b) In many instances the methods are based on techniques much too elaborate for the manager's routine use. The under-utilisation of screening models may also be a manifestation, noted by researchers, that models: (1) Fail to account for internal and external efforts; (2) Lack interdisciplinary perspective; (3)

Are inflexible; (4) Fail to reduce development time; (5) Perform poorly under dynamic market conditions; (6) Lack sufficient accuracy; (7) Have suspect construct validity and temporal stability and (8) Suffer from survivor bias (Montoya-Weiss and Calantone, 1994; Kerin, Varadarajan and Peterson, 1992; Mitchell, 1991; Wind and Mahajan, 1988). Emphasis must be placed on two important characteristics of good planning models: a need to address the manager's real decision problems in the context of his/her organisation, and a need for efficient and easy to use models that are accurate enough to ensure management confidence (Pessemier and Root, 1973). The evaluation dimensions selected and the answers demanded must be commensurate with the quantity and quality of available data at each evaluation point (Albala, 1975) bearing in mind that evaluating new products is a system not an act with the evaluating system evolving as the product evolves (Crawford, 1986).

Many authors stress that the screening effort should be a process continuing throughout product development and not merely a discrete decision at one key point in the process. It is for this reason that screening and evaluation has been considered simultaneously (Johne and Snelson, 1988). Practitioners in today's dynamic environments may understand implicitly the incongruity of using the same model in different environments (Albala, 1975) and for changing sets of *Go/No Go/Continue* criteria (Hultink and Robben, 1995; Ronkainen, 1985).

An intermediate position must be found between the need for certainty in product screening decisions and on the limited availability and reliability of information during the product development process. This can be accomplished by the application of a differentiated systematic sequential screening process which should take advantage of the changing characteristics of the various process stages (Albala, 1975). Muncaster (1981) suggested that the criteria used within new product screening techniques should be weighted according to their instrumental importance in meeting company objectives. Recognition of the opposing conditions of risk and uncertainty (which, in turn, is an indication of the chances of success), on one hand, and the magnitude of the resources required as the project stages are completed, on the other, suggests that a sensible sequential approach can be adopted for evaluation and control (Albala, 1975). The selection or design of an appropriate screening tool must be made in the light of the following considerations (Cooper, 1985):

1. It is a tentative commitment in a sequential process - not an irreversible decision.
2. It must strive for a balance between rejection and acceptance errors.
3. The screening decision must take into account the uncertainty of information and absence of financial data.
4. Criteria used in screening should reflect the corporation's (often) multiple objectives and evaluation criteria.
5. The screening decision must be realistic and amenable to implementation.

Specific criteria vary in importance across companies and product types. It has been suggested that a great deal of information might not be necessary for evaluating new product proposals at the idea screening stage, if the critical criteria can be identified (Baker and Albaum, 1986). Also, a series of evaluation models may make more sense than one big 'test'. A process-specific conditional model would move the decision and the project along faster. Those projects meeting more specific early evaluation criteria would be conditionally moved on to the next stage of development. This would still represent the tentative commitment required by Cooper (1994) but would optimise the early versus late information requirements since they would be constructed from time dependent dimensions.

The development of a realistic and amenable screening and evaluation tool must address the need for clear and actionable termination criteria. The difficulty managers face in terminating new product projects has been acknowledged (Schmidt and Calantone, 1998; Balachandra, 1984). Research suggests that individuals get so emotionally involved in projects that they are very reluctant to terminate them even if there are many clear signals that the project is not going to be successful. It is only by understanding the minimum acceptable requirements for these criteria that managers can make informed decisions on the movement of a project through the development process. Potential failures can often continue for a considerable time under their own momentum, with extremely high opportunity costs for more promising projects. It is essential that top management accept the responsibility for the termination of these failing projects (Rothwell, 1992).

Johne and Snelson (1988) noted that many firms view the factors influencing new product development as similar to those affecting the management of existing products. Thus, although the goals or objectives may differ in degree or priority for an existing product versus a new product, the types of measures used to evaluate performance may not be very different (e.g. a more modest increase in market share for a mature existing product as opposed to a more aggressive goal for market share growth for a new product). However, if managers were able to make better screening decisions, higher levels of new product success and profitability would result, both of which in turn translate into a stronger competitive edge (Calantone *et al*, 1999).

2.5 Antecedents to New Product Success

A large proportion of NPD research is concerned with those factors that are considered to impact in a positive way on new product success. Critical success factors can be identified and used as a form of 'best-practice' to guide managers in product development decision making. It is important that we have a broad understanding of these success factors since they will have a significant impact on the two key management challenges; a need for a better method of selecting new product projects, and better management of the product development process (Cooper and Kleinschmidt, 1987b). Better awareness of the factors that discriminate between new product success and failure is instrumental in providing the criteria for new product screening and evaluation. If a *market growth rate* factor is found to be the number one discriminator between successful and unsuccessful ventures then a *rapidly growing market* becomes a top priority criterion in project selection process (Cooper and Kleinschmidt, 1987b).

Determinants of new product success vary depending on the type of success measurement considered (Cooper and Kleinschmidt, 1995a). The most appropriate measure of new product success varies according to many factors: whether the innovation is a product or a process; whether it is intended for consumer or industrial use; whether the innovation is completely new or a new item in an established product or product class and whether project success is being measured from the viewpoint of the firm or the consumer (Lilien and Yoon, 1989). New product success has, in most instances, been measured in terms of how well products have met previously defined corporate or business unit expectations (Cooper, 1981; Crawford, 1980; 1979). Typically this measurement has taken place across several criteria (Griffin and Page, 1993; Booz *et al*, 1982) with the most commonly used being profit contribution, sales volume and return on investment (Rochford and Wotruba, 1996).

Analytical and empirical research has propagated long lists of success factors. A comparison of the success measures employed in NPD research can be seen in Table 2.4. It compares 70 empirical research projects on characteristics of survey method, sample respondents, sample size research measures and analysis. These investigations generally offer a view of new product development from four analytical perspectives: the market and macro operating environment; actions or attributes of the firm as a whole; the group of people within a firm involved in development work and particular individuals involved in the process. However, when the basis of the analytical perspective is not stated clearly, the mix of factors frequently presents a confusing picture (Johne and Snelson, 1988). For this reason it is important to distinguish between success measured at the project level or programme level. Griffin and Page (1993) suggested that academics had, to date, tended towards investigating product development performance at the firm level, when, in reality, managers are inclined to measure, and want to understand more completely, individual project success. Since 1993, the focus of academic investigation can be seen to have followed this recommendation with key studies reporting results measured at the project level (Song and Parry, 1997b; Gatignon and Xuereb, 1997; Calantone, Schmidt and Song, 1996; Cooper and Kleinschmidt, 1995c; Cooper, 1994; Parry and Song, 1994). If the firm seeks a differential advantage through the product (Cooper, 1979a) then the focus of success studies should be placed on understanding new product success at an individual project level.

Table 2.4 Empirical Investigations Into New Product Success and Failure

Authors	Research Instrument & Survey Method	Sample Respondents & Industry Membership	Sample Size	Research measures	Analysis
Rothwell, 1972	Coding & cross-checking information from many sources using personal interviews, telephone & correspondence.	Four key roles, Technical innovator, Business innovator, Chief executive & Product champion in chemical & scientific instrument industries in USA & Europe (I)	29 paired innovations	Criterion of success is commercial A 'failure' is an innovation which fails to obtain market share &/or profit, even if it 'works' in technical sense.	Principle component analysis, index variables formed, factor analysis.
Cooper, 1979a	Detailed extensively pre-tested questionnaire with 77 variables. Telephone contact & Mail survey.	Functionally neutral president/owner (smaller firms) & division manager/ corporate NPD officer (larger firms) in industrial product firms in Canada (I)	177 firms 195 projects (102 success, 93 failure)	From the viewpoint of the firm profitability exceeds or falls short of acceptable profit for such a project or investment	Correlation matrix, factor analysis & linear discriminant analysis
Cooper, 1979b	Questionnaire, 77 statements new product venture & environment. Telephone contact & Mail survey.	Appropriate manager, in Canadian industrial companies known to be active in NPD (I)	177 firms 195 projects (102 success, 93 failure)	From the viewpoint of the firm, i e the degree to which profitability exceeded or fell short of acceptable profitability for such a project or investment	Correlation matrix, factor analysis & linear discriminant analysis
Calantone & Cooper, 1981	Detailed pre-tested questionnaire with scaled questions, 77 variables. Mail survey.	Functionally neutral president/owner (smaller firms) & division manager/ corporate NPD officer (larger firms) in industrial product firms in Canada (I)	177 firms 195 new product cases	From the firms perspective· profitability exceeding or falling short of acceptable profit for such a project	Cluster analysis, ANOVA's, Duncan multiple range tests, Cross split half discriminant analysis
Cooper, 1981	Pre-tested questionnaire with 48 variables. Mail survey & telephone follow-up.	Managers in Industrial product firms active in new product development (I)	195 new product projects	The degree to which the product's profitability exceeded or fell short of the minimum acceptable profitability or that type of investment	Factor analysis, linear discriminant analysis, multiple regression analysis, Cross split half validation
Balachandra, 1984	Personally administered questionnaire detailing critical variables for Go / No Go decision.	Project leader & R&D manager in major manufacturing sectors (machinery & instrument) (C&I)	40 firms 114 projects	Actual project Go / No Go outcomes were known	Stepwise discriminant analysis
Cooper & de Brentani, 1984	Questionnaire using seven point Likert scales with 86 screening items. Personal interviews	Managers regularly involved in screening decisions in industrial product firms (I)	63 firms 192 managers, 370 new project proposals	Project acceptability was measured, "strong accept to strong reject"	Factor analysis, Cronbach alphas calculated, 2 group discriminant analysis
Maidique & Zirger, 1984	Phase 1 Open ended questionnaire. Phase 2. Structured questionnaire. Phase 3. Case study.	Presidents, vice-presidents & senior functional managers in the US electronics industry (I)	Phase 1. 79 respondents Phase 2. 59 respondents Phase 3. 20 respondents	Whether the innovation did or did not achieve financial break-even	Phase 1. Qualitative analysis Phase 2. Cumulative binomial statistic, cluster analysis Phase 3. Qualitative analysis
Ronkainen, 1985	Stage 1. Development of NPD process flowcharts. Stage 2. Analysis of Go/No Go decision criteria. Personal interviews.	Managers who participated in NPD decisions in Fortune 500 companies producing high technology items (I)	4 firms	Not stated	Qualitative analysis of variance in decision criteria.
Yoon & Lilien, 1985	Personal interview.	Industrial firms registered in France. Many industries (C&I)	52 firms 112 products	Measures the effects of market characteristics & strategy on new product performance	ANOVA, t-test, Summary statistics.
Baker & Albaum, 1986	Mail survey	New product managers responsible for corporate new product decisions in Fortune 500 companies (C)	86 new product managers	Not stated	% of correctly classified projects were derived for screening models using 33 & 5 evaluative criteria
de Brentani, 1986	Questionnaire utilised 86 screening attributes. Personal interview.	Managers who rate new product proposals in Canadian industrial product firms with identifiable new product programs (I)	59 firms, 192 managers, 368 useable responses	Screening criteria measured on 7-point Likert scale. Degree of project acceptance/rejection ranged from strong accept to strong reject	Factor analysis on the 86 screening variables, multiple regression
Cooper & Kleinschmidt, 1986	Detailed pre-tested questionnaire. Personal interviews.	Managers most responsible for new products in Canadian industrial product manufacturers (I)	123 firms 252 case histories	4 Measures of new product performance, overall project profitability, payback period, domestic market share & foreign market share	Frequency tables, two tailed t-test, Pearson correlation coefficients, ANOVA's, Duncan multiple range tests

C - Consumer product companies, I - Industrial product companies

Authors	Research Instrument & Survey Method	Sample Respondents & Industry Membership	Sample Size	Research measures	Analysis
Cooper & Kleinschmidt, 1987a	Detailed pre-tested questionnaire with 40 variables. Personal interview.	Functionally neutral senior managers in industrial firms active in product development in Canada (I)	125 companies 203 products	10 success measures, profitability level, payback period, domestic & foreign market share, relative sales, relative profits, sales vs. objectives, profits vs. objectives, opportunity window on new categories & new markets	Factor analysis, Pearson product-moment correlation's, correlation coefficients,
Link, 1987	Questionnaire derived from literature, business experience & executive discussion, 19 variables. Mail survey.	Marketing managers in large Australian industrial marketing companies in a range of industries (I)	135 firms	Measuring perceived determinants of success & failure over a period of time (5 yr)	Mean perceived factor importance scores, Factor analysis,
de Brentani & Dröge, 1988	Formal questionnaire with projects rated on 15 screening variables. Questionnaire.	Managers in industrial product firms (I)	192 managers 59 firms	Projects measured as 'accept' & 'reject' at screening.	LISREL structural equation modelling
Johne & Snelson, 1988	Face-to-face interviews	Senior people involved in innovation strategy & middle managers involved in product devts. Fortune 500 (US)& Times 1000 (UK) firms in electrical & mechanical engineering, chemicals & foods (C & I)	40 firms	Firms measured according to level of innovation ~ subjectively measured, 'growth faster than industry peers over a 3 year period as a direct result of organic product development'	Distribution of leading & less successful product innovators by industry, & anecdotal evidence
Lilien & Yoon, 1989	Firms selected by telephone interview. Data collected by personal interview.	Industrial firms registered in France (I)	112 new industrial products 52 firms	Not stated	Correlation analysis
Cooper, 1990	Lengthy, detailed & pre-tested questionnaire. Personal interviews.	The project leader & some team members in industrial product firms (I)	125 firms 203 new product projects	Profits meeting or exceeding company's financial success criterion, market share & company profit & sales goals	Projects measured according to top, middle or bottom success rate per factor analysed
Cooper & Kleinschmidt, 1990	Detailed, pre-tested questionnaire. Personal interviews.	Functionally neutral senior managers in Canadian industrial product firms active in NPD. Many industries (I)	125 firms 250 new projects	4 multi-dimensional project characteristics: product advantage, market attractiveness, competitive situation & synergy / familiarity	Mean factor scores, Duncan multiple range test
Hise *et al*, 1990	Questionnaire. Mail survey with follow up mailing.	Vice president of marketing in many industries in the US (Business Week's annual R&D Scoreboard) (C & I)	252 companies	The extent to which most recent new product was considered to be a success (met or did not meet original expectations on all important respects)	Percentage response rates for each variable, chi squared test
Zirger & Maidique, 1990	23 items thought to influence product outcome. Questionnaire administered to senior managers.	General managers, presidents or CEO's of firms or functional vice-presidents in Fortune 1000 companies in the electronics industry (I)	172 paired new product successes & failures	Products measured on 10 point scale - major financial loss to major profitability contributor with financial break-even as a mid-point.	MANOVA test, Hotelling & Wilks test, principal component analysis, Cronbach Alpha's, linear discriminant analysis, split sample analysis
Cooper & de Brentani, 1991	Lengthy, pre-tested questionnaire, 18 constructs, 65 variables. Self-administered mail survey.	Managers familiar with the product development activities of the firm in commercial financial service companies (I)	37 firms 106 new service products	Yes/no categorisation based on meeting the companies minimum criteria for success, degree of success & meeting of sales & profit objectives	Summary results, correlation coefficients, ANOVA's, Pearson product-moment correlation's,
Cooper & Kleinschmidt, 1991	Lengthy questionnaire with open-ended & scaled questions. In depth personal interviews.	General managers, marketing managers & technical managers in 5 firms, IBM, 3M, GM, Northern Telecom & Emerson Electric (C & I)	29 managers from 9 industrial divisions in 5 firms	Not stated	Summary response rates per question
de Brentani, 1992	Self administered, pre-tested questionnaire 23 variables. Mail survey.	Managers familiar with the new product development activities of their firm in industrial financial service firms (I)	37 firms 106 new business financial services	Overall success or failure were measured using a (+ or -) 6 point scale ranging from 'borderline' to 'overriding' success/failure	Factor analysis, regression analysis
de Brentani & Cooper, 1992	Self-administered questionnaire, 16 factors. Mail survey.	Senior managers familiar with product development in industrial financial service firms (I)	37 firms 106 new industrial financial services	The degree to which the product met (or fell short of) the firm's minimum criteria for success	Mean score per factor, multiple regression analysis
Edgett, Shipley & Forbes, 1992	Questionnaire.	Matched sample of Japanese & British firms (C&I)	116 Japanese firms 86 British firms	Respondents assessed factors that contributed to success & failure	Summary statistics
Gemünden, Heydebreck & Herden, 1992	Questionnaire Mail survey & interviews.	Manufacturing cos. in Ger, Swz & Aus. Many industries (C & I)	848 companies	The share of sales volume realised through products introduced to the market in the last 5 years	Multivariate analysis, correlation measures

Authors	Research Instrument & Survey Method	Sample Respondents & Industry Membership	Sample Size	Research measures	Analysis
Mahajan & Wind, 1992	Pre-tested-questionnaire. Mail survey.	PDMA members in Fortune 500 firms Many industries (C & I)	78 responses 69 firms	Criteria used to measure new product success were rated. These included, NPV, Payback period, market share, ROI, Sales volume & profit.	Summary statistics
Calantone, di Benedetto & Divine, 1993	Pre-tested questionnaire Telephone contact, mail survey & telephone follow up.	Senior managers involved in product innovation & new product development in US fortune 500 companies (1990 ranking) (C & I)	142 firms	Overall financial success of the firm's NPD program over the last 5 years & the degree of success or failure of the product (great financial failure to great financial success)	Cronbach Alpha's, chi-squared measures of overall fit, Generalised least squares
Cooper & Kleinschmidt, 1993a	Detailed tested questionnaire 95 characteristics measured. Mail survey.	Members of project teams in chemical industries in USA, Ger, UK & Can. (I)	103 new product projects	2 performance indices outlined - Financial index & Cycle time. Uni-dimensional success rate also used	Qualitative analysis of performance indices & correlation measure.
Cooper & Kleinschmidt, 1993d (LRP)	Lengthy pre-tested questionnaire with Likert-type scaled questions. In depth interview.	Managers most responsible for product development in Canadian firms in moderate to high technology, business to business markets (I)	123 firms 203 products	Success measured from financial/profitability standpoint	Projects split into 3 groups (top, middle & bottom percentage) for each factor
Cooper & Kleinschmidt, 1993c (EMR)	Detailed, pre-tested questionnaire, 298 variables. Regularly telephone contact for help & timely completion of questionnaire.	Knowledgeable persons who could best characterise each project under study in major chemical firms & divisions in USA, Can, UK & Germ (I)	21 firms & divisions 103 new product projects	Rated profitability, technological success, annual sales revenues & market shares (both domestic & international) & sales & profit impact on the company	Individual variable scores, ANOVA's, two-tail t-test
Cooper & Kleinschmidt, 1993b	Detailed, pre-tested, 16 page questionnaire, 298 variables. Contact person designated in each firm to assist with data collection.	Knowledgeable persons who could best characterise each project under study in major chemical firms & divisions in USA, Can, UK & Germ (I)	21 firms & divisions 103 new product projects	10 measures of performance including rated profitability, impact on the company, market shares & annual sales, domestic & abroad	Mean values for performance measures, ANOVA's, two-tail t-test, Pearson product moment correlation's
Griffin & Page, 1993	Questionnaire	Practitioners attending PDMA conference, 1991	50 responses	46 measures of success / failure generated from literature	Correlation analysis, Factor analysis, Summary statistics
Hart, 1993	Short, 4 page questionnaire. Mail survey.	British Manufacturing firms, many industries, (C & I)	69 firms	8 Characteristics of successful new product development. Respondents asked to what extent they agreed or disagreed that each item was a major characteristic of their major successes	Analysis was done by simple correlation.
Page, 1993	Pre-tested 8 page questionnaire, 30 questions Self administered mail survey with follow up letter.	Senior managers familiar with scope of NPD activities & processes in their organisations in the USA & Canada (PDMA members) (I)	189 respondents	Questions regarding the structure & compensation for NPD, process for managing NPD, performance of NP programs & demographic information	Comparison of question scores & past research results, sample profiles
Cooper, 1994	Not stated	Industrial new product projects & chemicals in USA, Ger, UK & Can. (I)	2 studies reported, 1. 203 projects 2. 103 projects	Success measured in a variety of ways including financial performance, market share, impact on the firm, meeting objectives & even timeliness	Projects grouped into "top 20% - superior products" & "bottom 20% - me too products" for each measure
Cooper *et al*, 1994	Detailed pre-tested questionnaire measuring 104 variables. Mail survey.	Individuals at a senior level who had most involvement in the development of the new product in financial services firms (banks, insurance, trust cos) in Canada (C & I)	173 new financial services	14 gauges of new product performance ranging from financial gauges (market share, sales, & profitability) through to measures of customer relationship enhancement	Factor analysis, item-total correlation's, Cronbach Alphas, ANOVA's, t-tests & Duncan multiple range tests
Edgett, 1994	Pre-tested questionnaire, 53 variables. Telephone contact, mail survey & follow-up telephone contact.	Managers at a senior level who were actively involved in new product development in British banks & building societies (C)	88 financial institutions 148 development projects	Not stated	Factor analysis, aggregate mean response rates, t-tests
Parry & Song, 1994	77 statement questionnaire split into environmental variables & controllable variables. Mail survey.	New product development managers in 129 state-owned enterprises (People's Republic of China), many industries (C & I)	258 reported product successes & failures	Success & failure measured on 11 point scales (0, barely met minimum profit criteria, 10, far exceeded / was far below minimum profitability criteria)	Mean success/failure rating, correlation coefficients, paired comparison t-test for mean differences
Yap & Souder, 1994	8 Structured questionnaires. Internal company reports & archives used. Personal interviews.	Chief executives, chief technical officers & chief marketing officers in small US high-technology industrial electronics firms (I)	12 firms 48 projects	Firms defined success & failure within their own frames of reference Based on a project outcome score (far below to far above expectations).	Spearman correlation coefficients.

Authors	Research Instrument & Survey Method	Sample Respondents & Industry Membership	Sample Size	Research measures	Analysis
Balachandra, Brockhoff & Klaus, 1995	Not stated	Electrical machinery & other industrial sectors (I)	114 projects 40 firms	Firm categorisation of successful & failed projects	Stepwise discriminant analysis
Bruce, Leverick & Littler, 1995	Questionnaire & case study. Mail questionnaire & personal interview.	Those UK firms involved in collaborative product development in computerised business system (mobile comms & EDI) supply (C & I)	106 questionnaire responses 8 case studies	Factors likely to improve effectiveness of product development collaboration Successful collaborations were self nominated by respondents.	Key discriminators of successful collaborations identified Anecdotal evidence from cases provided.
Bruce, Leverick, Littler & Wilson 1995	Questionnaire. Mail questionnaire.	UK suppliers of ICT (information & communication technology) products involved (to some extent) in collaborative product development (C & I)	106 responses (36% response rate)	Rate factors on their importance as reasons for entering into collaborations.	Summary scores presented with factors discriminating between successful & unsuccessful collaborations.
Calantone, Vickery & Dröge, 1995	Questionnaire measuring responses to 8 NPD activities. Telephone interview.	CEO's from firm's & SBU's in the furniture industry (C&I)	65 firms	Strategic importance of stage rated	Summary statistics, correlation's,
Cooper & Kleinschmidt, 1995a	Detailed, tested questionnaire.	Members of project teams in the chemical industry in UK, Ger, USA & Can (I)	21 divisions of major companies 103 new projects	7 measures of success including was the product considered to be a financial & commercial success by the company	Pearson product moment correlation coefficients, ANOVA's, two-tailed t-test & Duncan multiple range tests
Cooper & Kleinschmidt, 1995b	Detailed 4 page questionnaire with Likert-type measures. Mail survey with follow-up interviews.	Corporate executives responsible for their company's NPD programme in NPD active firms in USA, Can, Ger & Den. Many industries (C & I)	135 firms	7 success measures dealing with sales & profit objectives & impact, profitability, success rate & overall success	Correlation coefficients, comparison of poor, medium & good performance of factors
Cooper & Kleinschmidt, 1995c	Detailed 16 page, pre-tested questionnaire with 94 variables measured with Likert-type questions. Mail survey.	Respondents who worked on project together (consensus answers) from world class multinationals in the chemical industry in four countries (C & I)	21 multinational firms & divisions 103 actual new product projects	7 performance gauges measured; Success rate, Profitability rating, technical success rating, Domestic market share, Impact on the firm, Time efficiency & On-schedule project.	Item-total correlation's, Cronbach alphas, Mean performance measures, factor analysis of performance measures, Cluster analysis of projects, ANOVA's
Cooper & Kleinschmidt, 1995d	Detailed, pre-tested four-page questionnaire, 48 variables.	Corporate officers responsible for the companies NPD program in NPD active companies in Europe & North America. Many industries (C & I)	135 firms	10 measures of product performance, success rate, % sales, profitability relative to spending, technical success rating, sales impact, profit impact, success in meeting sales & profit objectives, profitability relative to competitors & overall success	Factor analysis, performance maps showing factors, loadings & clusters of firms, ANOVA's, *F*-values, Duncan multiple range tests, Cronbach alpha's
Hanna, Ayers, Ridnour & Gordon, 1995	Mail survey, in-depth interview & consultation with industry analysts.	National association of product development managers responsible for NPD activities within their companies in US consumer marketing & business marketing organisations (C)	147 management responses 43% consumer 57% business	Not stated	Tabular representation of the ranked characteristics, significant difference measures.
Hultink & Robben, 1995	Questionnaire centring around 16 core measures of new product success. Telephone contact & Mail survey.	Respondents from different functions in large Dutch companies, many industries (C & I)	92 firms	16 core measures of success taken from Griffin & Page (1993)	Mean ratings for each of the 16 success measures, *t*-test, *F*-test
Kleinschmidt & Cooper, 1995	Detailed, 16 page, pre-tested questionnaire 116 variables were defined Mail survey & telephone assistance.	Knowledgeable persons who could best characterise the project in the chemical industry in UK, Ger, USA & Can (I)	21 major firms 103 major new product projects	Projects outcome based upon rated profitability (exceeding or falling short of acceptable profit for this type of investment) & other measures such as annual sales revenues	Pearson product moment correlation coefficient, ANOVA's, two tail t-test, actual vs. stated importance of factor grids
Olson, Walker & Ruekert, 1995	Personal interview with structured questionnaire for those most responsible for project & mail survey with other informants.	Key employees from marketing, R&D, manufacturing & design from Fortune 500 companies in many industries (C&I)	15 divisions of 12 firms provide information on 45 NPD projects	Measures of process & satisfaction, newness of product concept, co-ordination mechanisms & project outcome.	Scale reliability, ANOVA's, MANOVA's
Ambler & Styles, 1996	Semi-structured interview using senior BCG consultants.	The brand or marketing manager responsible for the product launch in FMCG manufactures in Spain, Germany, USA, Australia & Italy (C)	11 successful extensions	*Grounded theory* was used with cases examined as, "a single brand or line extension & the decision process associated with it's launch	*Grounded theory* method is used for the purpose of theory development as opposed to theory extension

Authors	Research Instrument & Survey Method	Sample Respondents & Industry Membership	Sample Size	Research measures	Analysis
Calantone, Schmidt & Song, 1996	Detailed pre-tested questionnaire. Mail survey & phone follow-up.	Managers involved with selected new product development projects in Industrial Fortune 500 firms, & Govt owned enterprises in Can, USA & China, many industries (C & I)	Canada, 195 projects USA, 142 projects China, 470 projects	New product performance measured at an individual project level on an 11 point scale from -5, a great financial failure to +5, a great financial success	Factor analysis, summated scales, coefficient alphas, structural models for each country & compared through multiple group analysis,
Edgett, 1996	Questionnaire. Mail survey.	Senior executives in charge of product development initiatives in Financial institutions from Canada & USA (I)	82 firms	The success performance measure was measured as a percentage (% of projects launched that were a success / failure / killed)	Mean success /failure / kill rates, comparison data
Griffin & Page, 1996	Questionnaire. Hand delivered & mail survey.	Respondents pre-screened for knowledge of & experience with product development practices - PDMA members from many industries, (C & I)	80 useable responses	To determine recommended project-level success measures by selecting 4 success measures that provide overall assessment of a particular NPD strategy	ANOVA's, summary statistics according to project strategy, *t*-tests
Mishra, Kim & Lee, 1996	Questionnaire consisting of 77 statements developed by Cooper (1979).	Marketing department managers from Korean Chamber of Commerce & Industry cos. & Can cos., many industries (C & I)	144 firms 288 products	An 11 point scale was used to measure how well each statement described the selected product. 0 - strongly disagree 10 - strongly agree	Paired-comparison *t*-tests, correlation coefficients, mean factor scores, Point biserial correlation's
Rochford & Wotruba, 1996	Questionnaire booklet. Telephone contact followed by mail survey.	Sales managers in US service firms (C & I)	112 Responses	Increasing the firm's market share Increasing the firm's sales volume $/un Increasing the firm's profits overall (7 Point scale - 7 = extremely important, 1 = not important at all)	Coefficient alpha's for the success measures, average performance scores, multiple regression analysis, factor analysis, *t* tests
Song & Parry, 1996	Mail questionnaire with four follow-up questionnaires & telephone / fax reminders.	Japanese companies that traded on the Tokyo, Osaka & Nagoya stock exchanges in 1993 (C&I)	404 firms 788 new product introductions	The links between product success & 10 factors.	MANOVA, Chi-square analysis, Chronbach's alpha, Inter-item correlation's,
Ayers, Dahlstrom & Skinner, 1997	Questionnaire booklet. Mail survey.	R & D & marketing personnel directly involved in NPD, 4 Divisions of a major US computer manufacturer (C)	19 New product development projects 115 survey responses	The extent to which a project met its commercial objectives, as a dichotomous variable	Construct validity, structural equation modelling, split-half validation
Gatignon & Xuereb, 1997	Pre-tested & Pilot-tested questionnaire. Large-scale mail survey with single follow-up.	Marketing executives (shown to be knowledgeable informants about NPD) in a broad cross section of industries in the USA (C & I)	393 useable responses	Degree to which the new product's objectives have been achieved, which are relative to competition & expectation within the industry	Descriptive statistics, reliability coefficients, summary results
Kristensen, Østergaard & Juhl, 1997	Pre-test interview (qualitative) followed by questionnaire-led interview (quantitative).	Persons responsible for product development or the marketing manager in Danish food processing companies with 20 or more employees (C)	55 Firms	8 Scaled criteria. Market share, earning capability, customer satisfaction, lower costs, ROI in 2 years, improve firm's reputation, technical advantage, customer placating.	Mean success scores, regression analysis, ANOVA's,
Rochford & Rudelius, 1997	Detailed pre-tested questionnaire. Mail survey with follow up postcards & phone calls.	Managers from R&D, marketing, manufacturing & top management who were involved with the newly developed product in medical device manufacturers in the USA (I)	79 firms	Most recent new product measured on 13 items using an 11 point scale. Research captured a representative sample of new product performance rather than simply 'success' & 'failure'	Product performance measured across development stages including high & low performing products by functional respondent
Song & Parry, 1997	Group interviews feeding into English & Japanese pre-tested questionnaires. Mail survey with telephone calls to identify suitable new products & 4 follow-up letters & 2 phone calls.	The manager of project in consultation with his/her project team members in non-service Japanese companies that traded on the Tokyo, Osaka & Nagoya stock exchanges in 1993 (C & I)	404 firms 788 useable questionnaires	Relative product performance reflects the perceived level of success achieved by the new product in the marketplace in terms of relative profitability, & sales volume	Coefficient alphas, MANOVA, Split-sample, Measurement model & psychometric properties, revised model & Coefficient α, estimation of hypothesised model, cross-validation
Hart *et al*, 1998	Phone for preliminary notification then mail questionnaire.	Dutch & UK industrial firms (I)	166 managers	Collected information regarding screening criteria at stages of the NPD process.	Summary statistics
Li & Calantone, 1998	Three waves of questionnaire mailing & a telephone follow-up	Presidents or CEO's in US software industry (C&I)	236 useable responses	Market knowledge competence was measured as an antecedent of product advantage.	Factor analysis, two tailed *t*-tests
Song & Montoya-Weiss, 1998	Mail questionnaire with multiple follow-up letters & faxes.	Project manager / leader & one other NPD team member from companies listed in the 1993 high-technology industries directory (I)	163 really new products 169 incremental products	39 items to describe the proficiency of NPD activities.	Summary statistics, *t*-tests, regression analysis
Song, Thieme & Xie, 1998	Questionnaire with four follow-ups & telephone reminders.	Respondents from within marketing, R&D, manufacturing (C&I)	16 firms 256 responses	Degree of interaction between functional areas rated for various NPD activities.	Coefficient alpha's, Factor analysis, Correlation coefficients, Stepwise regression.

Griffin and Page (1993), suggested that success/failure measures span five general categories: (1) Measures of firm benefits; (2) Program-level measures; (3) Product-level measures; (4) Measures of financial performance and (5) Measures of customer acceptance. Montoya-Weiss and Calantone (1994) place new product performance measures in one of three categories: (1) Financial objectives; (2) Market share objectives and (3) Technical objectives. Cooper and Kleinschmidt (1995a) include other more subjective performance measures such as time efficiency within the development process and the impact of the new product project on the firm overall. Craig and Hart (1992) highlight the increasing tendency of firms to use softer, more subjective measures in tandem with financial measures. Cooper and Kleinschmidt (1987b) highlighted those factors that separated new product successes from failures and grouped them into the categories identified in Table 2.5.

Table 2.5 Critical Project Success Factors

Groupings	*Sources*
Product factors	Maidique and Zirger (1984); Cooper (1982; 1980); Cooper (1979a)
Market factors	Cooper (1982; 1980); Cooper (1979a)
Marketing factors	Maidique and Zirger (1984); Booz *et al* (1982); Cooper (1982; 1980); Cooper (1979a); Rothwell (1974); Rothwell (1972)
Synergy factors	Maidique and Zirger (1984); Cooper (1982; 1980); Cooper (1979a)
Management factors	Maidique and Zirger (1984); Rothwell (1974); Rothwell (1972)

Ultimately, there is a conspicuous lack of agreement over the best method of measuring new product success. There has been a tendency to employ financial measures of success, highlighting a trend of researchers studying corporate performance and indicating a general bias in setting financial objectives (Craig and Hart, 1992). The short-term measurement of financial success criteria can often be subject to problems that are idiosyncratic to the firm and country of origin. This can cause problems when assessing future funding for new product initiatives. The need for American and British public companies to routinely account for financial results on a much shorter-term basis than Japanese and German companies makes those in charge of releasing funds in Anglo-Saxon companies nervous about substantial product development expenditures. Should any new product venture show signs of a 'less than expected' level of profit, the common response of reducing resource commitment could limit the projects potential to reach longer term financial objectives. This results in the organisation being more reluctant to release future funds, leading to a spiraling crisis of confidence (Saunders, 1993). Johne (1992) suggests that the traditional way of measuring a project against internal financial criteria is misleading. A return that is higher than the stipulated minimum does not necessarily imply outstanding success in the market.

This traditional approach is flawed because it rewards what is safe, not what is stretching. Success may also be time dependent. Hart (1993) noted that success might not last. There is no guarantee that success today will guarantee success tomorrow. Griffin and Page (1996) acknowledge another facet of timing. They suggest that the timing of the measurement of post-commercialisation success will influence those factors that are critical to project success. Aspects of product performance were considered to be more important for short term project success, whereas customer and financial impacts were more important in the long term.

A much more holistic view is that it is in the nature of the objectives set that the firm will determine the most appropriate way in which performance of the project or programme is measured (Hart, 1992). In the same way that the performance of some athletes is not based solely on the measurement of speed, so the performance of many products is judged on criteria other than financial performance such as domestic market share or technical success. Moreover, few athletes would contemplate competing in an event where the measure of performance was unknown. New product project success is not, therefore, a simple, one-dimensional concept, nor are the many possible measures of success independent of each other (Cooper and Kleinschmidt, 1987). The type of success that an organisation seeks to achieve represents to a large degree the organisational and new product strategies chosen by the firm. As a result, different determinants of success are uncovered, depending on what type of success one considers (Cooper and Kleinschmidt, 1995a). Ultimately the measure of success is a multi-faceted concept. If a firm sets the objective of attaining a large market share, it may have to forgo some degree of profitability in order to achieve that market share. The suggestion that the project is any less successful due to concentration on this particular performance objective is a misguided one. It is through the performance of the product in a variety of measures that the final and most comprehensive measurement of project success is attained.

A need exists for studies to side-step issues such as the most appropriate measure of success to apply and how to reconcile success factors with external influences that limit current NPD investigations. The absence of studies measuring the success of new products within the *fmcg* sector is also hampering the complete understanding of the impact of success criteria within product development. New product research is, by design, reducing its relevance to managers by being influenced by so many of these external factors. These issues need to be addressed if new product research is to progress further.

2.6 Managerial Application of Current Research

One key question remains unanswered within the study of new product development: Why has the breadth of research undertaken and the insights gained not impacted in a more positive way on new product performance? Several issues have been raised in response to this dilemma. In spite of increasingly rigorous statistical analyses, much past and current research remains exploratory, focused on the identification rather than explanation of factors (Montoya-Weiss and Calantone, 1994). Calantone and Cooper (1981) suggest that the way the results of previous studies have been presented is not readily amenable to management action. A scenario format would permit the use of important anecdotal evidence that lends richness and credibility to an otherwise sterile exercise. This is supported by the view that emphasis should be placed on two important characteristics of good planning models: a need to address the manager's real decision problems in the context of his or her organisation, and a need for efficient and easy to use models that are accurate enough to ensure management confidence (Pessemier and Root, 1973).

Studies of new product success show extremely low success rates and little improvement over time. A disturbing explanation for this poor success rate is that given the dramatic changes in the business environment, the available marketing research and modelling approaches are ineffective (Wind and Mahajan, 1997). Product development models may not have been sufficiently adapted to take account of the findings of 'success' literature (Hart and Baker, 1994). The hope is, however, that better awareness of the critical issues within NPD will improve understanding of whether current tools and models can be helpful in creating new product winners. This may also increase the effectiveness of the NPD process and the associated marketing research and modelling approaches (Wind and Mahajan, 1997). If, as Hart and Baker (1994) suggest, the development of successful new products is a task of cross-functional information management and decision-making, then the incomplete information and cross-functional friction found within many organisations implies a process that is fraught with difficulty and intrinsically prone to failure.

2.7 Areas for Research Development

Investigations in new product development assist managers by improving the rate of new product success. However, the mix of variables studied, the industry and country focus and methodologies used show considerable convergence, constraining further development into NPD issues and limiting dissemination of knowledge into the topic. Methodological considerations are of considerable importance in new product development research. Whichever success factors ultimately predominate can be seen to be, at least in part, a function of both the methodology and the population sampled (Maidique and Zirger, 1984). As mentioned earlier, a major secondary justification of many innovation studies has been that such investigations help guide new product projects by identifying key questions, issues, and tasks to be undertaken. By highlighting areas where there are gaps in the literature, the aim is to focus attention on areas where a shift in the research performed could provide valuable incremental research insights. In promoting the use of additional methods of analysis, we acknowledge the diminishing returns from NPD research.

2.7.1 Research Population

2.7.1.1 Industry Focus

A significant opportunity exists to exploit the dearth of research into the success and failure of new consumer products, specifically *fast moving consumer goods*. To date, research has focused on the investigation of the determinants of success and failure in industrial NPD. The literature shows a conspicuous absence of studies investigating consumer products. Even studies of new service development have tended to focus on new industrial financial services. It is unclear why studies have concentrated almost solely on new industrial products. The failure rates of consumer product projects are no less of a problem since according to a recent Brandweek survey 90% of all consumer new products fail (Weisz, 1994). This may suggest that the figures reported earlier (section 2.2.1) underestimate the extent of new product failure. Table 2.6 presents a sample of 72 research papers in the field of new product development. The chart compares these investigations in terms of their industry sample and the country within which the research projects were carried out. The studies selected are all empirical investigations that deal with new product success at the project and programme level.

This table reveals that less than 10% of the studies surveyed focus solely on the development of new consumer products. The overwhelming majority of studies concentrate on success and failure in industrial new products or measure cross-industry success criteria. The volume of cross-industry research seems to corroborate the evidence noted in the previous section, that much research is not suitable for management action. If, as was mentioned earlier (section 2.5), research needs to reflect whether the innovation is a product or process, intended for consumer or industrial or consumer use (Lilien and Yoon, 1989) then concentrating research efforts on cross-industry research is not going to offer managers any meaningful or actionable insights. Whilst Lilien and Yoon (1989) recommend 'more homogeneous databases' through cross-industry research, this should draw the line at crossing the divide that is found between industrial and consumer products.

Table 2.6 NPD Research – Country and Industry Focus

	Single Country Focus (Contingent)	*Cross-Country Focus (Comparative)*	*Country Focus Not Specified*
Consumer Product Focus	Baker and Albaum, 1986, USA Edgett, 1994, UK Hannah et al, 1995, USA Ayers et al, 1997, USA Kristensen et al, 1997, Denmark	Ambler and Styles, 1996	
Cross-Industry Focus	Yoon and Lilien, 1985, France Link, 1987, Australia Lilien and Yoon, 1989, France Hise et al, 1990, USA Mahajan and Wind, 1992, USA Calantone et al, 1993, USA Hart, 1993, UK Cooper et al, 1994, Canada Parry and Song, 1994, China Bruce, Leverick and Littler, 1995, UK Bruce et al, 1995, UK Hultink and Robben, 1995, Netherlands Olson et al, 1995, USA Mishra et al, 1996, Korea Rochford and Wotruba, 1996, USA Song and Parry, 1996, 1997b Japan Gatignon and Xuereb, 1997, USA Li and Calantone, 1998, USA Song et al, 1998, USA	Johne and Snelson, 1988 Edgett, Shipley and Forbes, 1992 Gemünden et al, 1992 Cooper and Kleinschmidt, 1995b, 1995d Calantone et al, 1996 Mishra, Kim and Lee, 1996 Song and Parry, 1997a	Balachandra, 1984 Cooper and Kleinschmidt, 1991 Calantone et al, 1995 Griffin and Page, 1996
Industrial Product Focus	Cooper, 1979a, 1979b, Canada Calantone and Cooper, 1981, Canada Maidique and Zirger, 1984, USA Ronkainen, 1985, USA de Brentani, 1986, Canada Cooper and Kleinschmidt, 1986, 1987a, 1990, 1993b, Canada Lilien and Yoon, 1989, France Zirger and Maidique, 1990, USA Yap and Souder, 1994, USA Rochford and Rudelius, 1997, USA Song and Montoya-Weiss, 1998, USA	Rothwell, 1972 Cooper and Kleinschmidt, 1993a, 1993c, 1993d, 1995a, 1995c Page, 1993 Cooper, 1994 Kleinschmidt and Cooper, 1995 Edgett, 1996 Hart et al, 1998	Cooper, 1981 Cooper and de Brentani, 1984 de Brentani and Dröge, 1988 Cooper, 1990 Cooper and de Brentani, 1991 de Brentani, 1992 de Brentani and Cooper, 1992 Balachandra et al, 1995

Whilst it seems sensible to suggest that the antecedents to success will be different for consumer and industrial products there must be some theoretical foundation for such an assertion. After all, if there are no meaningful differences between the two groups of products then there would be no reason to distinguish between them when addressing factors that contribute to new product success. Cohen *et al* (1997) suggest that while success in high-technology industries depends on factors such as capital investment, productivity, allocation of engineering hours and time to market, the challenges faced by firms in the packaged goods (*fmcg*) sector are somewhat different. Consequently the drivers of success for packaged goods are different from those in the high-technology industry. Firms cannot perfectly determine customer wants ex ante (especially for truly new products), so they must invest relatively more time and effort to capture the 'voice of the customer', so that the new product will be more likely to meet customers needs (Akao, 1992). This difficulty in determining customers' need has prompted many *fmcg* sectors to rely heavily on line extensions to stimulate demand.

At present, a good's intended use seems to be the most widely accepted criterion for differentiating industrial from consumer goods (Fern and Brown, 1984). Consumer goods are those destined for use by the individual ultimate consumer and can be used without further processing. Industrial goods, on the other hand, are goods which are used in producing consumers' goods, other business or industrial goods, and services and/or in facilitating the operation of an enterprise, may include land and buildings for business purposes, equipment (installation and accessory), operating supplies, raw materials, and fabricated materials. The Industrial Marketing Committee Review Board (1954) distilled the differences down to those relating to the market or buyers, characteristics of the product and the organisational or operational set-up.

Key differences covering several distinct bases have been put forward in support of the notion that industrial and consumer marketing are different: (1) The type of goods being purchased. (2) The buyers decision-making process. (3) Characteristics of the product market. (4) The nature of the selling firms' marketing activities, and (5) The nature of environmental influences (Fern and Brown, 1984). There is, however, a lack of research investigating product development structures and practices and whether they differ between the consumer and industrial manufacturing sectors. This leaves somewhat vague distinctions between the two types of products (Hanna *et al*, 1995).

It is helpful in these instances to identify examples to help us understand such differences. Primary discriminators of new product success can aid this process. Product advantage, as was suggested in chapter one (section 1.2), may be much more to do with perceptual advantages and marketing skills in *fmcg* categories whereas it may be much more to do with specific product features and benefits in an industrial product. Marketing activities for new products also exhibit key differences. These activities may focus on personal selling within industrial markets, whereas in the *fmcg* sector it may be much more to do with promotional programmes and retailer relationships. The marketing strategy for a new range of hair care products such as Elida Fabergé's Organics is likely to be significantly different to that for a new Xerox copier. Distinctive features of the latter project's promotional effort would be personal selling and customer support.

However, while these distinctions do not necessarily represent universal or comprehensive differences between consumer and industrial products they do advocate the need for more research into consumer NPD. As is suggested by Mishra *et al* (1996), there is no one global formula for the success of new products and a better understanding of the factors affecting new product success would be gained by comparing firms in similar industries.

2.7.1.2 Country of Focus

Table 2.6 also categorises research projects on the country or countries within which the surveys were undertaken. Of the studies that do utilise a single country focus, there is a clear concentration of studies reflecting NPD within North American countries (65%). Montoya-Weiss and Calantone (1994) also identified this apparent geographic bias in their review and meta-analysis of the antecedents of new product success, with 37% of the studies they surveyed being conducted in Canada. A more surprising result, perhaps, is that some of the studies highlighted in our comparison do not indicate the origin of the research sample at all. Since the country of research focus has already been shown to impact on the corresponding antecedents of product success (Saunders, 1993) this is, indeed, odd.

Such country-specific effects are best shown by example. In the case of the United Kingdom, factors specific to the country of origin could include the vast power that supermarkets wield in the *fmcg* sector. The 'big four' retailers account for over half of all products sold. In this example it is easy to understand why even the most powerful suppliers must take heed of what the supermarkets say. In December 1997, the UK grocery market was worth £87bn (Senter, 1999) with the big four accounting for £44.4bn (Tesco, £15.2bn; Sainsbury, £12.7bn; Asda, £8.5bn; Safeway, £7.7bn). The sheer size of these organisations gives them great power in both building retailer private-label products and dictating the new product tune, which the suppliers have to play. The growth of these private-label products has changed the emphasis of product development activities. A lot more NPD is performed with, and through, retailers who demand incremental evolution as opposed to radical breakthroughs (Curtis, 1998).

The importance of the retailers within UK product development is also highlighted by the changing focus of marketing activities within the *fmcg* sector. Retailers have recently begun the process of selecting 'Category Captains' as a part of Effective Customer Response (ECR), where retailers are much more open to manufacturer suggestions as to how to maximise *category* profitability. For the retailer, the selection and care of category captains can make the difference between mediocre business plans and fast-growth categories that give a competitive advantage in the marketplace. Essentially the retailer is searching for brand differentiation from other retailers. ECR-Inspired category management is encouraging retailers to stop viewing each category as a trading unit in its own right (a certain amount of space that must deliver a certain return) and to start asking how each category helps attract and keep its particular target group of customers (Mitchell, 1997). The goal for suppliers is to embrace this shift in marketing management and align their marketing and, therefore, new product development to each retailers' marketing objectives. The retailer stops being the one who wields a big stick and becomes a friend and ally (Mitchell, 1997).

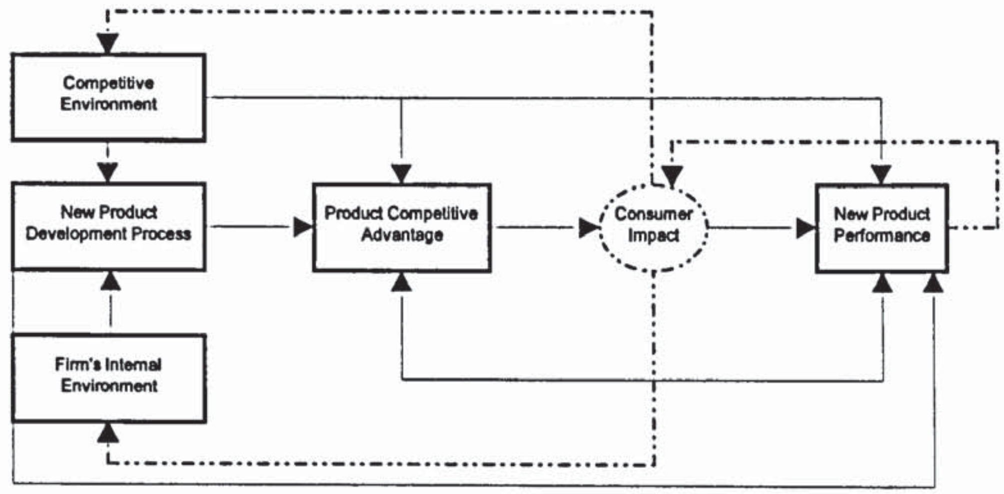
There exists a need to develop studies into consumer new product development and also product development in a country-specific (UK) context. The absence of a significant body of research into either of these domains is a limitation of product development research. To re-affirm Mishra *et al* (1996), a better understanding of the factors affecting new product success would be gained by comparing firms in similar industries and countries that are similar in economic development.

2.7.2 Internal and External Determinants of New Product Success

By changing the focus of study from industrial product development to consumer product development, the area of internal and external determinants of new product success is significantly affected. Von Hippel (1978) noted that new industrial product generation appeared to be a 'customer-active' process. The customer often initiated ideas for new products by approaching the manufacturer with clearly defined objectives and requirements. The customer, therefore, was linked into the entire development process from an early stage and, as a result, customer satisfaction (performance) measures are, in part, self-determined for these industrial products. Consumer product ideas, however, were usually 'manufacturer active', where the manufacturer plays the dominant role in product development by identifying consumer needs and desires. As has already been noted (section 1.2), we did not know we wanted mid-size Japanese cars of unrivalled quality, 'Walkmans' or sensibly priced computers sold without hype until innovative companies put them into our hands. Customers are often lacking in foresight. Marketing only the articulated needs of customers you already serve cedes vast opportunities to more foresighted opposition (Wind and Mahajan, 1997). While it is important to acknowledge that a lack of consumer research does not imply a lack of attention on the consumers role in NPD, surveying consumer products would allow NPD research to build on the identified variables of internal and external success drivers.

This introduction of the consumer interface into product development research can be understood more clearly by viewing a conceptual model of new product performance (Figure 2.6). Research has developed over time concerning the factors that have been considered to impact on the antecedents to successful new product development. Seminal work into new product development has modelled the effect of the process on new product success. This was followed by investigations into the effect of the process and internal (organisational) factors, followed by the affect of process, internal and external (market) factors on product performance. The next stage to be proposed is to measure the effect of process, internal and external factors and consumer factors on product performance. The research and modelling implications suggest a much broader focus on the product and service offerings and not just the physical product features (Aaker, 1996).

Figure 2.6 A Framework of New Product Performance



Adapted from Song and Parry, 1997b

On their own, endogenous (internal) factors cannot account for success or lack of it since success will be determined also by exogenous (external) factors over which managers have little or no control. However, while accepting that they have limited control over exogenous factors, managers can increase the chances of launching new products successfully by ensuring that development work is undertaken efficiently (Johne and Snelson, 1988). Consumer factors can be seen to impact on both endogenous and exogenous factors. This is due to the presence of research data within the development process as well as the external post-launch market evaluation of products by consumers. Since it is known that a successful new product is borne of consumer need and technical capability (Davis, 1994) it is critical that further research be focused on this area of consumer interaction. This consumer interface will lead to the emergence of criteria such as brand equity and brand reputation in affecting the rate of new product success and will, therefore, extend the boundaries of past research into further fields.

As mentioned earlier, the degree of innovativeness of a new product will impact on both the level of success achieved by the product and the antecedents of success. This level of innovativeness can, however, be seen as a function of consumer perception. How innovative consumers perceive a product to be is inherently difficult to gauge since there is a significant variation in the involvement of the customer (or consumer) in industrial and consumer product development. Von Hippel (1986) noted that users' insights into new product needs and potential solutions are inhibited by their own real-world experiences. Users steeped in the present are unlikely to generate novel product concepts that conflict with the familiar. The general aversion to embrace ideas that are 'off-the-wall' will have far reaching ramifications, ranging from the likelihood of new product commercialisation, to the corresponding level of new product diffusion and the ultimate measure of new product performance. Griffin and Page (1996) conclude that success measurement should follow corporate strategy in that practitioners recognise different measurement needs posed by different types of development projects.

2.7.3 Research Methodology

2.7.3.1 Retrospective Sampling

A recurring theme throughout new product literature is the methodology used to gather data on development projects. The majority of studies, to date, have used retrospective methods of sampling to elicit responses from managers responsible for NPD decisions. These investigations ask managers to complete questionnaires with respect to projects that have succeeded or failed within a particular time period, for example the past five years. This method of eliciting new product data has been widely employed for many reasons. Traditionally the product development cycle has been so lengthy that a retrospective 'snapshot' approach has been necessary to elicit data. By utilising a sampling framework that will measure any successful or failed project within the last five or so years the researcher avoids the need for a prohibitively large sample size. By undertaking a retrospective study, the researcher is ensuring that the outcome of the project is already known, i.e. the project is already a success or a failure according to organisational criteria. This is an essential feature in the majority of new product investigations where successful and unsuccessful projects are paired in a sample with each other. It has been suggested that company executives are generally found to be well informed about their products performance. A combination of managerial and quantitative measures yields little ambiguity regarding product 'success' (Wong, 1993). It is widely acknowledged that this method of sampling allows the researcher to acquire data, in a relatively short timescale and at reasonable cost, to allow a fair rate of publication. However, the drawbacks are also well known.

The retrospective approach can be seen to have two major limitations. Initially the method restricts the researcher's ability to understand the dynamics of the project. This is due to the reliance on respondent recall to reconstruct the sequence of new product development events. Secondly, researchers have often selected only successful innovations. Rogers (1976) noted that when retrospectively studying new product diffusion rates, it may be wrong to conclude that a variable 'caused' an observed level of diffusion. Often, the only evidence is a retrospective correlation between this variable and successful diffusion. This issue may also hold true in the case of 'overall' product success.

The use of Likert scale measurements can prove problematic in retrospective sampling when small differences in results are considered to be statistically significant. There is great scope for cultural and perceptual differences in respondent's answers, an issue magnified when considering the time taken between a project's outcome and a subsequent study. This issue may be further exacerbated with the use of a multi-national sample. There is a natural tendency for respondents to accord greater importance to a characteristic due to its inclusion in a scale, which could be heightened by individuals assigning greater importance to work that they have been responsible for. Likert scale measurements of factors influencing success/failure do not allow for respondents to omit specific characteristics due to irrelevance, or for them to include characteristics not thought of in advance by the researchers (Hanna *et al*, 1995). It has been suggested, however, that post-hoc bias can been minimised with objectively worded scales (Cooper and Kleinschmidt, 1994).

Much research continues to rely on self-assessment by managers for classifying developments as successful or unsuccessful. But since the personnel involved in new product development must identify, screen and evaluate new product opportunities, they inevitably exert their own biases on the weights put on decision making criteria (Ronkainen, 1985). Few empirical researchers include controls to ensure the businesses they investigate had similar objectives. Having looked at the wide variety of measures firms use to measure project performance, this issue is of importance. The reluctance on the part of analysts to state the objectives against which developments were undertaken can cause successes to be classed as failures and vice versa. For example, a business with high market or profitability hurdle rates will classify a product development as a failure if it fails to meet these, while another business with low hurdle rates will classify a similarly performing development as a success (Saunders, 1993).

Montoya-Weiss and Calantone (1994) highlight several other threats to internal validity caused by the use of retrospective methodologies. Experimental controls are difficult to develop in product performance studies. Researchers must infer the effect a determinant has on performance using subjective interpretation or self-reported respondent information. Secondly, information on successful new products is often easier to obtain than information on failed new products. Whilst the inherent fear and loathing of failure by managers makes gathering data on failures difficult, the presence of successful products in both the market-place and the forefront of the respondent's mind promotes the issue of 'survivor bias'.

Song and Parry, (1997a) reaffirmed the concerns regarding the retrospective nature of the data collection process noting that limitations of the method were based around the possibility that memories are incomplete and may be coloured by the known success or failure of a project. The problems associated with their study could be addressed by a longitudinal study methodology. This would assess cross-functional integration and internal commitment at various points during the NPD cycle. Such a methodology would have increased the cost of their study significantly and undoubtedly reduced participation rates in both the United States and Japan. They suggest, however, that such a study remains an ambitious goal for further research.

2.7.3.1.1 Measurement Timing Error

As has been touched upon in some of the above discussion, a serious limitation of retrospective methodologies comes from the length and imprecise timing of the retrospective period. Measurement timing error occurs when measurements are made at times that are inappropriate to properly reflect the characteristic being studied (Tull and Hawkins, 1993). Many NPD research projects elicit information from managers about projects that have been in the market for five years or more. As mentioned, this technique relies heavily on memory, is subjective in interpretation and may produce discrepancies when assessing data from different business functions. Results can be biased towards products that have been on the market longer and have had longer to achieve market success (Crawford, 1979). Also, because the product and marketing strategy evolve together (Crawford, 1986) causal antecedents can be divorced from the success/failure result by strategic action and/or reaction on the part of the organisation (Cooper, 1992). In addition to these problems, since most measures of new product performance vary with the time frame specified, the failure to define precise performance measurement benchmark dates may limit the value of this type of research (Hultink and Robben, 1995).

2.7.3.2 'Real-Time' Research

Certain problems regarding retrospective sampling can be overcome using a method that measures projects in 'real-time'. This type of sampling could take the form of a longitudinal or cross sectional analysis.

2.7.3.2.1 Longitudinal Analysis

Longitudinal studies rely on measuring a fixed sample of subjects repeatedly (Churchill, 1995). The essence of the longitudinal method is to discard chronological age as a definition of a population and to replace it with development sequences and their inter-relations (SSRC, 1970). The measurement of new products would be enhanced by attempts to measure them from conception to conclusion. A fixed group of projects could be selected and then measured repeatedly on the same variables. The causes of new product rejection at particular stages of development could be identified with greater accuracy and validity. The objective of many new product surveys to measure change in individuals through time would be fulfilled by a longitudinal design. Additionally 'causal' relationships between early and subsequent events can be more confidently postulated. This measurement method will also permit the measurement of the traits, characteristics, antecedents of project success with greater validity.

However, the very essence of longitudinal analyses is also one of the major drawbacks of this methodological approach. True longitudinal analysis can only be performed with repeated measurements of the same entities over time (Churchill, 1995). Often individual respondents have to be chosen in terms of their accessibility and willingness to cooperate. This may ultimately render them unrepresentative and make generalisation suspect. Churchill (1995; p 177) noted troubles with bias due to unrepresentativeness;

"One never knows in advance whether it will affect the results, much less how".

Over long periods of time longitudinal studies can be subject to greater biases from sample attrition, making precise comparability of the initial and final groups difficult. They can lead to spurious attributions of causality unless the experiment designs are formulated with care (Midgley and Dowling, 1993). In the course of a longitudinal study carried out over many years, it is likely that new hypotheses will arise either from the study itself or from general advances in the relevant fields of social science. There is a reasonable chance, therefore, that the refutation or verification of hypotheses will depend upon original data that were not collected because their possible significance was not perceived (SSRC, 1970). There is also the issue concerning the experimental effect of testing that is particularly relevant to the longitudinal study method. In testing and re-testing the same individuals, the initial testing may raise the probability that respondents' would behave differently on re-testing than if there had been no original testing. The time associated with the longitudinal study method provides an increased need for anonymity and security to protect the confidentiality of respondents in the survey. It is widely acknowledged that the major costs involved in longitudinal research surround data collection and sampling (Mednick *et al*, 1984).

2.7.3.2.2 Cross-Sectional Analysis

The cross-sectional survey method is one of the most commonly used methods of *real-time* analysis and has two distinguishing features. First, it provides a snapshot of the variables of interest at a single point in time. This is in contrast to the longitudinal analysis which provides a series of pictures that, when pieced together, provide a movie of the situation and the changes that are taking place (Churchill, 1995). Secondly, the sample elements are selected to be representative of a known population. The cross-sectional analysis would allow a survey to measure many new products on a series of variables. These projects could be present at any one of the development stages and still be appropriate for the study. This type of methodology also allows for measurement of a large sample of new products within an acceptable time frame and at reasonable cost.

Crawford (1979) promoted the use of *real-time* methods of analysis when he commented that failure rates were too strongly influenced by post hoc subjective judgments. Furthermore, Song and Parry (1979b) concluded that developing a time-series database and testing the determinants of new product success in a *real-time* framework would provide more insight into probable causation and reduce memory-related biases. Researchers need to undertake studies that attend to the parts of the NPD process that managers observe and control (Starbuck and Mezias, 1996). The cross-sectional research method is a common methodology that has often been employed in the new product literature to compare variables in a broad variety of organisations for a similar set of products (Song *et al*, 1997; Galizzi *et al*, 1997; Iansiti, 1995). A cross-sectional methodology would enable researchers to assimilate the knowledge derived from the large body of retrospective new product studies and employ these insights in a *real-time* context.

One common criticism of this method is that it typically does not penetrate very deeply, since breadth is often emphasised at the expense of depth (Churchill, 1995). The very process of generating summary statistics to describe the phenomenon suggests that the eventual *average* might not accurately describe any individual entity in the survey. One example of this issue is (Churchill, 1995, p 180);

"The guy who slept with his feet in the refrigerator and his head in the stove and who, on average, was comfortable".

Also the entire research process must be executed before an analyst can begin to examine the hypotheses that guide the study. Rogers (1976) pointed out two limitations of the cross-sectional analysis that are similar to those found for retrospective analyses (section 2.7.3.1). First it limits the researchers' ability to understand project dynamics by relying on respondent recall. Second, by mainly selecting successful innovations to study it may have been wrong to conclude that a variable *caused* the observed effect when the only evidence is a retrospective correlation between this variable and a successful innovation.

The overwhelming reaction, however, is that the changes in the wider organisational environment will facilitate the application of *real-time* research techniques to the study of new product development. The trend towards a reduction in new product development cycle times permits the development of *real-time* methodologies in new product development research. The large numbers of new product concepts being developed and tested and the improved success rate of new product ideas (Figure 2.2) will counteract the traditional problem of high fall-out-rate from the original sample. Also the application of *fast moving consumer goods* with high volumes of new product introductions, liberal idea generation and fast project cycle times, offers a vastly under-exploited research focus.

2.7.4 Research Design

We have already discussed in some detail the processes by which new products are developed (section 2.3). However, while much research has been addressed the stages of the NPD process (Cohen *et al*, 1997; Griffin, 1997; Rochford and Rudelius, 1997; Edgett, 1996; see Table 2.2) and much research has been attributed to measuring the antecedents to product success (Song and Montoya-Weiss, 1998; Li and Calantone, 1998; Gatignon and Xuereb, 1997), few studies have looked at projects *throughout* the NPD process including those products that are screened out at different stages of the process. It is important that managers evaluate the viability of a new product at every stage of the new product development process (Ozer, 1999).

2.7.4.1 Importance of Development Process Stages

Mahajan and Wind (1992) suggest that the NPD process, particularly the early stages such as idea generation, screening, market identification and positioning and development can benefit from more formal and quantitative approaches. Rochford and Rudelius (1997; p 68) noted that;

"Product success may be particularly influenced by certain key stages in the new product process. Pre-development activities such as preliminary market assessment and technical analysis are critical because the insight and information gained may reduce costs and problems in the later, more expensive and risky development and post-development stages in NPD. Testing and evaluation stages are likewise important as they provide valuable pre-commercialisation feedback, which may reduce the chances of poor new product performance."

They conclude that perceptions of the importance of a stage influence the resources it receives, whether it is undertaken, and how well it is executed. These perceptions can be influenced by the degree of innovation of the product (section 2.1). The necessity of conducting market testing for instance may be less vital for product modifications than for new-to-the-world products. The degree to which the 'full' NPD process is utilised can be significantly affected by the degree of innovation.

Kleinschmidt and Cooper (1995) studied differences in managers' perceptions and reality concerning the importance of new product success criteria. They posited that if management's perception differs from reality (concerning project success criteria), then it could be most serious: important activities could potentially be given little attention, while resources are shifted to activities that may not merit them. This issue of gaps in understanding also holds true for changes in the importance of success criteria over a product development cycle. Assuming an organisation uses some form of project development process, understanding the changing importance of success criteria will allow management to effectively focus attention and resources at critical activities in each stage of the process.

The importance of viewing development stages independently is further highlighted by the screening stage being the decision point at which management first commits significant resources towards the development of a new product. From a strategic viewpoint the screening stage largely decides the character and direction of the firm's development programme and its eventual product portfolio (Cooper, 1981). It is at precisely these stages where the credibility and accuracy of the information to be assessed is at its weakest (McIlveen, 1994). Greater importance should be attributed to understanding criteria specific to the early stages of the process. A key issue within NPD research ought to be whether the same set of criteria are used at each decision-making point and if so, how the weights of criteria vary from one point to another. The assumption that the same set of criteria applies throughout the product-development process would be a presumptuous one (Ronkainen, 1985).

The analysis of the development process via discrete development stages and the changing importance of success criteria across these stages offers the researcher a further contrast with traditional methods of study. Past research has been caught up in the issue of the most appropriate measure of project performance. In this approach, by looking at the importance of particular evaluation criteria across the development process, the study measures projects with a dichotomous *Go/No Go* decision variable. This methodology looks at the importance of development stages within the overall process. The measurement of post-commercialisation performance and the degree of project success become redundant measures.

2.7.4.2 Kills versus Successes

As has already been discussed most studies assess new product success from a financial perspective, usually after commercialisation (section 2.5). It is important, however, to note that projects that are ultimately commercially unsuccessful may have had many successful stages of product development before 'failing', as have many projects which are 'screened out' before reaching the commercialisation stages.

Cooper and Kleinschmidt (1990) highlight that most studies omit this important group of new product projects in their analyses, namely projects that were *aborted* or *killed* before they were commercialised. It is these *kills* that represent the greatest loss, or misallocation of resources. When looking at new product projects over time, it is clear that different stages of the process have different roles in preparing the project for commercialisation and impact in different ways on the ultimate level of project success. The factors that are critical for the successful movement of a project from idea generation to development may be different from those needed to move the project from development to testing. Understanding the dynamics involved in the changing importance of success criteria could be vital for managers in effectively focusing attention and allocating resources at critical activities in the process.

By ignoring these killed projects, existing research may be guilty of using a biased and non-representative sample of projects upon which to base their conclusions (Cooper and Kleinschmidt, 1990). The terms 'success' and 'failure' also contain certain ambiguities. A 'failure' may result in knowledge or experience that is later used very profitably (Bruce *et al*, 1995). Similarly, terminating a product development venture, which if continued may have incurred substantial sums with little, if any, return, could be viewed as a success, if only because it may have saved organisations coming to the same conclusion on an independent and even more costly basis (Hlavaceck, 1974).

By investigating projects that have successfully completed a stage in the product development process as well as those projects that have been killed removes issues of managers being reluctant to divulge information regarding product failures. This methodology also reduces problems associated with survivor-bias and respondent recall issues. Crawford (1979) noted serious issues with NPD studies regarding how long a product is allowed to continue before success/failure measurement. Depending on the industry to be studied, the setting and the buyer's decision process, strategy, management of the process and major expenditures can 'fix' problems and thus effect the success rate. If researchers are using the traditional five year post-commercialisation period from which to measure projects, they may be studying remedial marketing skills and not the success or failure of the project at the screening point. By looking at kills and success the need for post-commercialisation performance evaluation is removed.

2.8 Chapter Summary

As was suggested at the beginning of this chapter, a review of the key areas of research that are relevant to product development has been undertaken. This review has highlighted several areas of the discipline where changes in the focus of research efforts may provide incremental intelligence on new product development activities. We will now go on to integrate these recommendations into a framework of action that will be addressed in later chapters of this thesis.

New product development holds many opportunities for researchers prepared to seek incremental insights through the use of alternative population samples, methods of analysis and processes of analysis. Responding to the opportunities highlighted in this literature review could provide the intelligence from which organisations and managers can gain a better understanding of the factors responsible for new product success and failure. Table 2.7 summarises the opportunities that are available to researchers. The use of complementing methodologies would optimise triangulation (Maidique and Zirger, 1984) and, therefore, our understanding of the problems and solutions in product development research. Useful research is research that helps to complete the picture developed by previous researchers (Alloway and Utterback, 1977).

The study of new product development is both difficult and resource intensive. The process can be idiosyncratic to both the firm and to the project in question (Hart and Baker, 1994). The personnel charged with product development must identify, screen and evaluate new product opportunities, therefore evaluator bias inevitably exists. Furthermore, a firm's industrial environment and administrative style affect product-development decision making (Ronkainen, 1985). A better approach should be sought to ensure that focus is placed on reducing the idiosyncrasies of different industries and countries of differing economic development (Mishra *et al*, 1996). A better understanding of the factors affecting new product development may be gained by adopting a contingent approach and studying firms from within similar industries and countries of similar economic development. All studies recognise the need for further research since, increasingly, scholars express concern over the limitations of past literature and, therefore, question their relevance to today's NPD practitioners.

Table 2.7 Opportunities for the Development of NPD Research

Opportunity	*Research Question*	*Reference*	*Rationale*
1. Research population	What specific criteria are used in the screening decisions of *fmcg* organisations and how do they differ from those found to be important in industrial new product screening?	Udell and Pettijohn, 1991	Consumer goods and services accounted for 70% of US GNP in 1990. Aside from new products to sell, consumer innovation creates jobs, stimulates additional innovations, produces investment capital and helps countries stay competitive in the world marketplace.
2. Research methodology	Does the approach of *real-time* research benefit new product screening by offering new and incremental insights into the subject?	Crawford, 1979	It will take a real-time approach defining in advance the criteria management proposes to use. Failure rates are too strongly influenced by post hoc subjective judgments, measurement timing error or are determined by surrogate criteria e.g. still in the market three years later.
3. Research design	Are the factors critical for new product *acceptance* the same at each stage of the product development process?	Rochford and Rudelius, 1997	Future research should attempt to enhance our understanding of the successive performance measures appropriate for and used at each NPD stage.
4. Kills and Successes	Which screening criteria adequately discriminate between projects that are *accepted* for further development and those that are *rejected* or screened out?	Maidique and Zirger, 1985	New product 'failure' can result in other important by-products, organisational, technical and market developments.

Wind and Mahajan (1997) in their editorial to a recent *Journal of Marketing Research* special issue promoted the need for alternative methods of analysis to take research away from focusing on solutions to current problems in predictable markets. They recommended that researchers instead try and focus their efforts on finding new solutions to new problems in product development. However, limited resources in both academic and practitioner environments suggest that it may be more pertinent to find ways of creating new, incremental solutions to existing problems. Table 2.8 highlights how the areas for research development discussed in this chapter fit into the framework recommended by Wind and Mahajan (1997): (1) Consumer products. (2) Real-time research. (3) Measuring success criteria across a development cycle, and (4) Measuring kills and successes.

Table 2.8 The Current and Needed Focus of NPD Research Based on Customer Problems and Product Solutions

The Solutions	Current	New
New	*1. Consumer products* *2. Real-time research* *3. Criteria across development stages* *4. Kills and successes*	Unexploited Opportunities: Needed Focus of NPD Research Concepts and Methods
Current	Current Focus of NPD Research and Methodologies	

The Problems

Adapted from Wind and Mahajan (1997)

It is clear that if research is to throw light on new product success, for the benefit of both the academic and business community, it must clearly show what types of product development strategies and processes will result in what type of success (Hart, 1992). Ultimately, however, a more thorough understanding of how success criteria can and should be used to screen new product projects is central to the effective allocation of scarce development resources (Cooper and Kleinschmidt, 1990). New product success can never be guaranteed, but given the payoffs of a successful product innovation programme, there is certainly ample justification for directing more attention to the way managers conceive, develop and commercialise new products (Cooper and Kleinschmidt, 1986).

3 Chapter Three
Research Design and Hypotheses

This chapter looks at key research projects that have provided a framework from which the current study could be developed. The discussion highlights the research design, incorporating the conceptual framework from which the research findings could be obtained. The chapter highlights the contribution that this project seeks to make to the field of new product development and reiterates the aims and objectives of the study. This chapter concludes with a discussion of the hypotheses that are to be tested in this investigation of new product screening.

Chapter Three - Research Design and Hypotheses

This research project presents a model that will assess the changing importance of screening criteria across product development stages. It seeks to confirm that managers focus on different screening criteria at different stages of the new product development process. These criteria are used to make *Go* or *No Go* decisions regarding the suitability of a project for further development. The next stages of this thesis are to outline the research design and framework from which these propositions can be confidently assessed.

The research project follows many research investigations by utilising Churchill's (1995) six stage process for designing a research project (Figure 3.1).

Figure 3.1 Stages in the Research Process

1 Formulate the problem
Problem definition
Specifying research objectives

⇩

2 Determine the research design
Establish current sources of information
Hypothesis formulation

⇩

3 Design data collection method and forms
Observational or questionnaire data collection ?
Structured or unstructured form ?

⇩

4 Design sample and collect data
Specify the sample frame, selection process and size
Data collection method

⇩

5 Analyse and interpret the data
Editing, coding and tabulating of responses
Statistical analysis of data

⇩

6 Prepare the research report
Clear, accurate and concise
The standard by which the research is judged

Adapted from Churchill, (1995)

While the process reflects specific, discrete steps, in practice this is not always the case. Luck and Rubin (1987; p 174) noted that;

"The steps were highly interrelated, and the decisions made during one step will often influence alternatives at another step".

Furthermore, repeated iterations of the various stages are often necessary (Churchill, 1995). Other authors in the methodological literature recommend similar processes for example, Aaker *et al*, (1998) and Lehmann *et al*, (1998). Since the formulation of the research problem has been outlined in the preceding chapter, this chapter looks at the application of steps two, three, four and five.

3.1 Previous NPD Methodologies

As noted in the previous chapter, methodological considerations are of considerable importance in new product development investigations. Common designs should have emerged from the wealth of NPD research. These designs would provide a framework to allow replication and an integrative approach from which the study of new products could benefit. The reality is that a wide variation in research designs, methods and operationalisations of the dependent and exploratory variables clouds integration within the study of new product performance (Montoya-Weiss and Calantone, 1994).

Douglas and Craig (1983) highlight the need for 'comparability' of data to remove the danger of using a construct or measure previously developed in one cultural or industry setting, while assuming that it will work in a different cultural or industry setting. They have emphasised the importance of this integration for improving construct validity as well as the same level of accuracy, measurement precision, and/or reliability across different cultural contexts.

As has already been suggested investigations into new product development vary between *quantitative* and *qualitative* research; focus on *project* or *programme* success; the overall *measurement of success*; and the degree of product developments which are investigated from *new-to-the-world* products to *modifications* (Craig and Hart 1992). These differences have been exacerbated by the fact that often variables are not well reported reducing the opportunity for summarisation, replication and improvement (Montoya-Weiss and Calantone, 1994). Much past and current research remains exploratory in nature, focused on the identification rather than explanation of factors (Cooper and Kleinschmidt, 1987b).

Due to this lack of replication within NPD research, many studies still rely on descriptive statistics including means, frequencies and proportions in their analyses. However, Montoya-Weiss and Calantone (1994) do suggest that the nature of statistical inference has improved over time. They base this on the increasing incidence of empiricism within the research. Statistical inference has evolved from:

1. Descriptive statistics, including means, frequencies and proportions.
2. Tests of differences/similarities, including *t*-test, binomial test, ANOVA, MANOVA and χ^2.
3. Measures of dimensionality, including factor analysis, cluster analysis, and discriminant analysis.
4. Interpretation of parameters statistically, including correlation analysis, canonical correlation analysis, regression analysis, path analysis and structural equation models.

The following sections look at specific NPD research projects that provide the context and framework from which the current study could be developed. These studies are by no means exhaustive and it should be recognised that a great many more research investigations were incorporated into the research design (Table 3.3). The first major investigation that provided guidance for this current research project was Cooper's NewProd study (1979b). This research project was among the first to assess the new product practices of firms, focusing on what separates winners from losers. One of the major advantages of the study was the accuracy with which the study could identify new product successes and failures, a key benefit of any new product selection method.

3.1.1 Project NewProd I, Cooper (1979b)

In this early new product development study Cooper (1979b) assessed past product developments to identify those characteristics that were believed to positively impact on the success of a new product. He developed a conceptual model with six blocks or constructs that contained 77 items to assess their contribution to new product success. These included:

1. The commercial entity - attributes and advantages of the new product.
2. Information acquired - nature or quality of information acquired.
3. Proficiency of process activities - how well certain activities were undertaken.
4. Nature of the marketplace - characteristics of the new product's market.
5. Resource base of the firm - compatibility of the resource base.
6. Nature of the project - characteristics of the new product or venture.

Questionnaires were mailed to functionally neutral managers within organisations known to be active in industrial product development in Ontario and Quebec, Canada. Respondents selected two typical, recent new product projects: one clear cut commercial success and the other a distinct failure (success and failure were defined as the extent to which the product's profitability exceeded, or fell short of, the minimum accepted profitability for this type of project or investment). Respondents were then required to characterise each venture on each of the 77 variables rating them on a 0 to 10 scale of *agree* to *disagree*.

After a telephone follow-up to provide 'assistance and encouragement', the final sample contained 102 product successes and 93 failures from 103 firms, representing an effective response rate of 69%.

Cooper advanced new product research by applying factor analysis to the 77 questionnaire items reducing the original data set to 18 orthogonal factors, 11 of which were found to differentiate well between product success and failure through discriminant analysis. These factors were: (1) Product uniqueness/superiority; (2) Market knowledge and marketing proficiency; (3) Technical/production synergy and proficiency; (4) Market dynamism; (5) Market need, growth and size; (6) Relative price of product; (7) Marketing and managerial synergy; (8) Marketing competitiveness and customer satisfaction; (9) Newness to the firm; (10) Strength of marketing communications and launch effort and (11) Source of idea/investment magnitude.

The results of Project NewProd I were presented in much more detail than previous research, although the study differed in terms of its orientation towards product and market characteristics, with very few management, communication or people oriented factors.

3.1.2 Project NewProd II, Cooper and Kleinschmidt (1987a,b,c)

NewProd II (Cooper and Kleinschmidt, 1987a,b,c) took a broader perspective regarding new product success. It addressed issues such as: (1) How can new product success be measured, and are there different ways of looking at success? (2) Do the dimensions of success change according to the way we measure success? This second study investigated 123 successful and 80 unsuccessful new product case histories in 125 industrial product firms. New product success was measured across 10 dimensions: profitability level; pay-back period; domestic and foreign market share; relative sales; relative profits; sales versus objectives; profits versus objectives; opportunity window on new categories and new markets. Factor analysis again identified independent and strong dimensions that characterised new product performance: financial performance; opportunity window and market impact. The authors believed that this work helped clarify what was meant by new product success, which was not a simple, one-dimensional concept, nor were the many measures of success independent of each other (Cooper and Kleinschmidt, 1987).

They concluded by offering six lessons for the management of new industrial products:

1. New product success is a multidimensional concept.
2. There is a consistent and logical pattern to new product success and the components of success for one type of performance were different than for other types of performance - the type of success desired will affect the success factors.
3. Product advantage is a dominant factor in success.
4. A well-defined project prior to the development stage is critical to success.
5. Synergy is vital when it comes to achieving financial performance from a new product.
6. The market environment itself appears to have relatively little impact on new product outcomes.

The view was offered that the market environment has so little impact on project outcome since the reason markets are so competitive in the first place is because they are lucrative. Market attractiveness has, therefore, been well read by competitors with the end result being a lucrative but competitive market. The positive and negative aspects cancel each other out, and performance is neither heightened nor diminished by market competitiveness (Cooper, 1985c). Cronbach's coefficient alpha scores were not used to validate scales in either of the NewProd studies.

While the NewProd studies offer great insight into those criteria considered to impact in a positive manner of new product performance they only provide a framework from which screening and evaluation research can develop. Following these two landmark studies, Cooper and de Brentani (1984) looked at the criteria employed in screening new industrial products.

3.1.3 Industrial Product Screening, Cooper and de Brentani (1984)

A comprehensive list of 86 screening criteria was generated from literature and personal interviews with managers. These criteria were presented to managers involved in screening decisions within their organisations. Respondents were required to identify two new product proposals, one an *accepted* project, the other a *rejected* project. They were required to rate each project according to the 86 items generated in the first stages of the study. A total of 192 managers responded (response rate of 58.1%) yielding data on 370 projects.

Analysis of the 370 project responses showed that many screening items were strongly correlated with each other. As with the NewProd studies, factor analysis reduced these items to 11 composite factors. In contrast to the NewProd research, Cronbach alpha scores were used to validate the items within the 11 factors (α scores varied from 0.46 to 0.90). The outcome of two-group discriminant analysis highlighted the dominant criteria in the *Go/No Go* decision. The dimensions are shown in Table 3.1.

Table 3.1 Screening and Evaluation Criteria

Dominant Criteria	*Secondary Criteria*	*Unimportant Criteria*
• Financial potential • Corporate synergy • Technological and production synergy • Product differential advantage	• Product life • Market maintenance • Diversification strategy • Size of market • Domestic market	• Project financing • Rational market

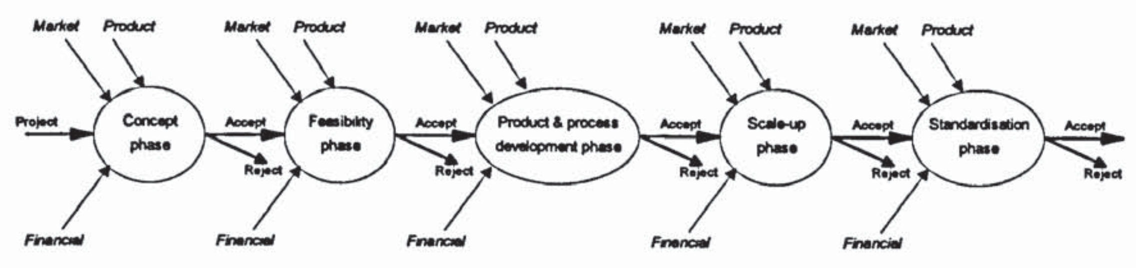
Generally consistent with NewProd, factors perceived important to managers at the initial screen included financial potential, product life, domestic focus and types of strategy (market maintenance and diversification strategy). Comparison with Cooper and Kleinschmidt's (1979b, 1987a,b,c) earlier work suggests that differences exist between perceived causes of success and failure and criteria perceived important to the managers' *Go/No Go* decision. This is the first indication that a 'reality check' (Calantone *et al*, 1995) problem might exist in the forecasting branch of the literature.

Cooper and de Brentani (1984) investigate new product screening, highlighting critical activities in the screening decision. This has considerable influence on the current research project by identifying screening dimensions and those dimensions that influence the *Go/No Go* decision. Cooper and de Brentani (1984) suggest that screening is a single, discrete stage within the development process (as shown in chapter two). Therefore, the criteria considered to be critical in the screening decision are applicable in *any* screening decision, regardless of the stage of project development.

3.1.4 Screening Across Development Stages, Ronkainen (1985)

Ronkainen (1985) suggested that a key issue within NPD research ought to be whether the same set of criteria are used at each decision-making point and if so, how the weights of criteria vary from one point to another. The assumption that the same set of criteria apply throughout the product development process would be a presumptuous one. The data for the study was provided by four Fortune 500 companies producing high-technology items. In this investigation the initial stages of the project were spent developing a flowchart of the product development process that was used by, and acceptable to, participating NPD managers. After the flowchart was agreed upon, managers validated the three basic groups of decision making criteria that had been compiled from the literature. These screening criteria were product, market(ing) and financial criteria (Figure 3.2).

Figure 3.2 Screening Across Development Stages



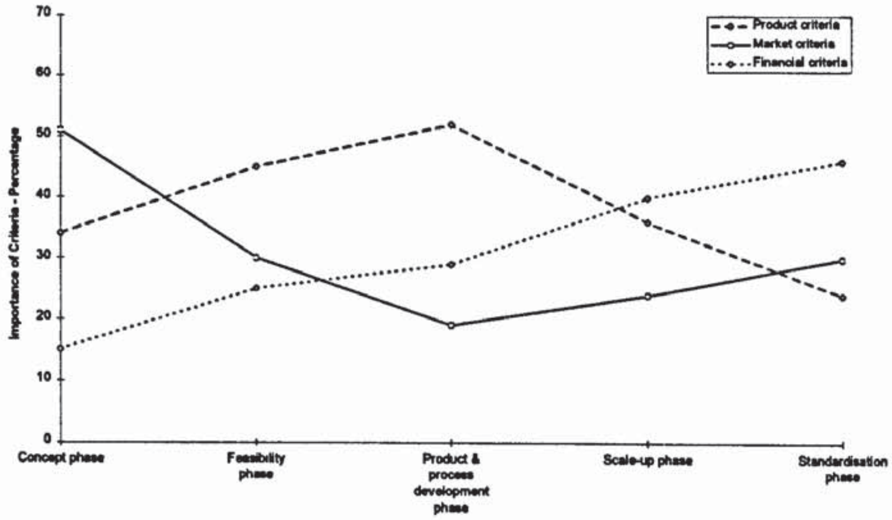
Adapted from Ronkainen (1985)

Managers (30 from each firm) were then asked to allocate 100 points between the major groups of screening criteria at each stage of the development process.

Analysis of variance was used to determine significant differences between the points allocated to each group of criteria at each stage.

The results showed clear shifts in weights among the three sets of criteria as the development cycle progressed (Figure 3.3). In terms of criteria, the product development process could be summarised using three questions in this specific order: (1) Is there a market for the concept? (2) Can the concept be transformed into a concrete product? (3) Can the concrete product be manufactured and marketed profitably? The analysis of particular stages reveals that the use of some criteria is restricted to one particular phase, whereas some are used at every decision-making point.

Figure 3.3 Importance of Criteria Across Development Stages



Adapted from Ronkainen (1985)

The results show that the weights of the three proposed sets of criteria (market, product, financial) shift as the development cycle progresses. They provide strong support for the hypothesis that the set of criteria determining *Go* or *No Go* decisions is strongly related to a particular stage of the product development process and, therefore, changes from conceptualisation to commercialisation.

This investigation outlined the necessity for more information about the weight, distribution and variation of screening criteria over the phases of a product development cycle. Knowledge of this will significantly affect the necessary inputs to the stages of the process. Ronkainen's work also provides a substantial element of the current research framework.

3.1.5 New Product Steering, Hart *et al* (1998)

Hart *et al* (1998) base their findings on a sample of managers from Dutch (134 responses, 59% response rate) and UK (100 responses, 23% response rate) companies developing and manufacturing industrial goods. Their questionnaire centred around 15 core project-level indicators of new product performance identified by Griffin and Page (1993, 1996) and also included five additional criteria: product uniqueness, market potential, marketing chance, technical feasibility and intuition. For each of seven evaluation gates, respondents assessed which of the 20 criteria were used.

Analysis of the responses showed that not all stages were equally important in attaining new product success. Friedman's non-parametric rank order test indicated that the product testing and development stages were perceived as most important and that the business analysis and concept testing stages were least important in attaining new product success in the Dutch sample. No such differences were found in the UK sample.

The researchers also tried to move away from single indicators of performance. They tried to find out if companies showed a usage preference of some performance dimensions over others at different evaluation gates of the development process. They used Griffin and Page's (1993) three dimensions of performance (*market acceptance*, *financial performance* and *product performance*) as well as the additional five items included in the initial stage as a group of *additional indicators*. Table 3.2 presents the results of this analysis showing the average number of performance indicators (from each of the four performance dimensions) used per NPD evaluation gate.

Table 3.2 Performance Dimensions Across NPD Evaluation Gates

Dutch Sample							
Dimension	*Idea generation*	*Concept testing*	*Business analysis*	*Product development*	*Product testing*	*Market launch ST*	*Market launch LT*
Market acceptance	2.0	1.2	2.4	1.1	1.8	2.7	2.5
Financial performance	0.7	0.3	1.5	0.4	0.4	1.2	1.0
Product performance	1.3	1.2	1.0	2.3	1.8	1.4	0.8
Additional indicators	2.5	1.2	1.6	1.3	1.2	1.1	.07
UK Sample							
Dimension	*Idea generation*	*Concept testing*	*Business analysis*	*Product development*	*Product testing*	*Market launch ST*	*Market launch LT*
Market acceptance	2.2	1.7	2.9	1.5	2.2	4.1	4.1
Financial performance	0.9	0.6	2.5	0.8	0.8	1.9	2.3
Product performance	1.2	1.5	1.6	2.9	2.7	2.1	1.4
Additional indicators	3.2	2.3	2.1	1.7	1.5	1.1	0.9
		Highlighted fields show 1.5 or more indicators used at that stage					

Adapted from Hart *et al* (1998)

The findings highlight that the *market acceptance* performance dimension permeates throughout the NPD process in both Dutch and UK samples. *Financial performance* emerges strongly during the business analysis stage in both samples and after launch in the short and long-term in the Dutch sample. *Product performance* despite figuring in almost every evaluation gate, becomes prominent during the product development and product testing evaluation gates. The *additional indicators* shows a prominence during the idea screening gate.

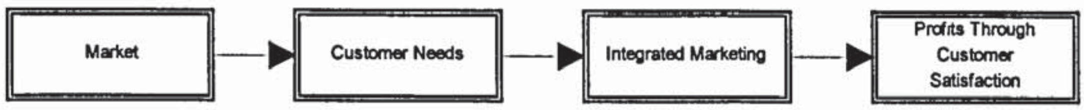
Results from this work, whilst not directly applicable to the current study, still offer an interesting perspective on those dimensions considered to be important at each stage of the development process.

3.2 Thesis Research Design

The central theme of this research project concerns the method by which new *fmcg* products are screened. The primary proposition is that the screening decision should take into account the possibility that not all evaluation measures are of equal value at different stages of the NPD process. Hence the screening criteria should, in some part, reflect the stage of the product's development. The research assesses the affect of the development process on potential new *fmcg* products by building on existing literature that looks at the changing importance of evaluation criteria in industrial products (sections 3.1.1 to 3.1.5). The central proposition of the research, that screening criteria change in importance through the NPD process is supported by both marketing theory and current NPD literature.

The traditional view of the marketing concept (Kotler *et al*, 1998) conceptualises the delivery of a product or service through a series of process stages from concept generation through to market launch for a particular target audience (Figure 3.4). This mirrors the development of a new product through the NPD process by determining the wants and needs of target markets, and delivering desired satisfaction more effectively than competitors.

Figure 3.4 The Marketing Concept



Adapted from Kotler *et al* (1998)

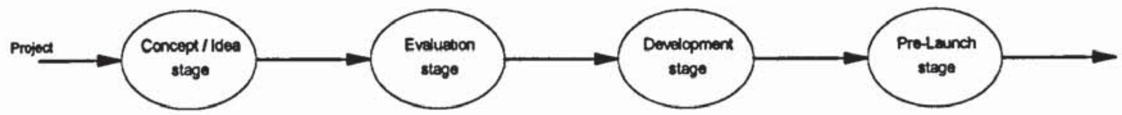
Delivery of the final product in both marketing and new product philosophies results from the application of different information and resources at different stages of the process. Each stage requires a focus on different criteria to achieve the end objective of customer satisfaction. The existing literature also highlights the need for a more thorough understanding of how evaluation criteria affect the movement of projects between process stages. Ronkainen's (1985) assertion that there may be flaws in the assumption that the same set of evaluation criteria apply throughout the NPD process is of critical importance. Rochford and Rudelius (1997) noted that product success may be influenced by key stages in the new product process. Pre-development activities are critical because the insight and information gained may reduce costs and problems in the later, more expensive and risky stages. Testing and evaluation are important as they provide valuable pre-launch feedback, which may reduce the chances of product failure. Hart *et al* (1998) concluded that industrial companies used different new product performance indicators at different evaluation gates in the NPD process. Therefore, whether the same performance criteria are used at each decision-making point and, if so, how the weights of these measures vary, becomes a critical issue in product development research.

3.2.1 New Product Development Process

As discussed previously (section 2.3), there are many research projects assessing the stages and workings of the new product development process. Much of this work supports the view that there are identifiable and practical stages within the process. It is clear, however, that they are often specific to the industry in question. As a result, *fmcg* managers and product development professionals must validate academic conceptualisations of the development process.

As a result of the preliminary work identifying stages of the new product development process (section 2.3) a process incorporating four key stages was proposed (Figure 3.5). This process was then presented to NPD managers within the *fmcg* sector, academics familiar with NPD research and NPD consultants. The four stages were selected for a number of reasons. They were primarily selected in response to Johne and Snelson's (1988) recommendation for conceptualisations of the development process to take cognisance of the dilemma between the requirements of practical efficiency and thoroughness. The process should not be so intricate that its application to firms and managers is limited. It must, however, avoid being too general, offering no guidance to managers who must identify their own conceptualisation of the process within ours.

Figure 3.5 Proposed Stages Within the NPD Process

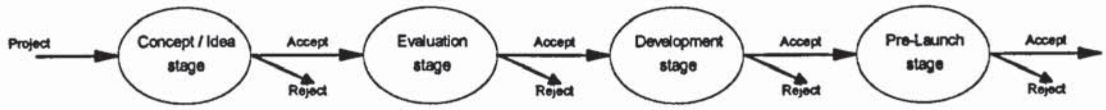


The four stages proposed were clearly identifiable within the process literature and provide a good fit with the needs of thoroughness and practicality. It should be noted that the stages deliberately do not include a *launch* stage, nor a *strategic-planning stage* (Crawford, 1996) since this study is only concerned with the progress of a project through the development process and not pre-development strategy nor subsequent success or failure in the marketplace.

3.2.2 Unit of Analysis

As noted in chapter two (section 2.6) it is necessary to be clear about the level of analysis to be made. When the basis of the analytical perspective is not stated clearly, the mix of success factors often presents a confusing picture (Johne and Snelson, 1988). This investigation measures new product development at the *project* level. Initial contact with managers outlined that that the research was investigating new product development within branded *fmcg* manufacturers. Managers completing the questionnaire were required to provide information on two new product development projects, one *accepted* project and one *rejected* project. We can now further develop Figure 3.5 to include the level of analysis required for this research project. This development is shown in Figure 3.6.

Figure 3.6 Accepted and Rejected Projects During the NPD Process



By adopting a dichotomous *Go/No Go* outcome variable to measure project *acceptance/rejection* this investigation side-steps the dilemma of the most appropriate measure of new product success. The subjectivity associated with measuring product success using *retrospective self-reported* information is removed and replaced with a stage-specific measure of project outcome. As we have shown in chapter two (section 2.6) the most appropriate measure of new product success is the subject of much debate and conjecture. To measure a *degree* of screening success would be to misunderstand the screening decision. The question we seek to address concerns the decision that is taken to either move a project on to the next stage of development or to remove it altogether from the organisations development portfolio. The dichotomous *Go/No Go* variable appropriately fulfils such objectives.

3.2.3 Screening and Evaluation Criteria

A thorough review of both academic and management journals covering all aspects of new product development yielded a pool of criteria considered to impact positively on new product performance i.e. suitability to go on to the next phase of development. This pool of items incorporated measures identified from empirical, case study and anecdotal research in all aspects of new product development. The large pool of screening items that were identified were condensed into 484 measures that were relevant to screening, evaluation and new product success/performance.

Many items within this pool measured similar traits and characteristics, whilst others were specific to the industrial literature and not relevant to the screening decision in *fmcg* organisations. The items were distilled by grouping like items and removing redundant items. From this pool, 108 individual criteria were highlighted to be relevant to the screening decision in *fmcg* manufacturers. These items were added to during pilot and pre-testing (to be discussed in more detail in section 4.1.3.8) to yield a final total of 116 items considered to be important in the screening of new *fmcg* products. This comprehensive list of items builds on the 86 screening criteria identified in Cooper and de Brentani's (1984) study of industrial new product screening (section 3.1.2.1). The individual questionnaire items and source authors can be seen in Table 3.3. Items that were new and untested are referred to in the table as being from 'exploratory research'.

Table 3.3 Questionnaire Variables

Questionnaire factors and items	*Source authors*
Product differential advantage	
(1) We will be the first to introduce this product type to market	*Parry & Song 1994, Song & Parry 1994, Cooper & Kleinschmidt 1993, Zirger & Maidique 1990, Cooper & Kleinschmidt 1986, Cooper & de Brentani, 1984, Maidique & Zirger 1984, Calantone & Cooper, 1981; Cooper, 1981, Cooper 1979 a & b*
(2) This product would be a revolutionary innovation	*Parry & Song 1994, Song & Parry 1994, Cooper & Kleinschmidt 1993, Zirger & Maidique 1990, Cooper & Kleinschmidt 1986, Cooper, 1985, Cooper & de Brentani, 1984, Maidique & Zirger 1984, Calantone & Cooper 1981, Cooper 1979 a & b*
(3) This product would be clearly differentiated from competitors' products	*Song & Parry, 1997 JMR, Song & Parry, 1996, Parry & Song 1994, Song & Parry 1994, Cooper & Kleinschmidt 1993, Zirger & Maidique 1990, Cooper & Kleinschmidt 1986, Cooper & de Brentani, 1984, Maidique & Zirger 1984, Calantone & Cooper 1981, Cooper 1979 a & b*
(4) This product would achieve important technological strengths	*Kristensen, Østergaard & Juhl, 1997, Song & Parry, 1996, Parry & Song 1994, Song & Parry 1994, Cooper & Kleinschmidt 1993, Zirger & Maidique 1990, Cooper & Kleinschmidt 1986, Cooper & de Brentani, 1984, Maidique & Zirger 1984, Calantone & Cooper 1981, Cooper 1979 a & b*
(5) This product would make the firm a major entity in the category	*Cooper & de Brentani, 1984*
(6) This product would be patentable	*Cooper & de Brentani, 1984*
(7) This product would be of higher quality than what is on offer in the category	*Song & Parry, 1997 b, Calantone, Schmidt & Song, 1996, Song & Parry, 1996, Parry & Song 1994, Song & Parry 1994, Cooper & Kleinschmidt 1993, Zirger & Maidique 1990, Cooper & Kleinschmidt 1986, Cooper, 1985, Cooper & de Brentani, 1984, Maidique & Zirger 1984, Calantone & Cooper 1981, Cooper, 1981, Cooper 1979 a & b*
(8) This product would have different applications to competitors' products	*Gatignon & Xuereb, 1997*
(9) This product would be clearly superior to competing products in terms of meeting customers' needs	*Song & Parry, 1997 b, Song & Parry, 1996, Parry & Song 1994, Song & Parry 1994, Cooper & Kleinschmidt 1993, Zirger & Maidique 1990, Cooper & Kleinschmidt 1986, Cooper, 1985, Maidique & Zirger 1984, Calantone & Cooper 1981, Cooper, 1981, Cooper 1979 a & b*
(10) This product would be priced lower than competing products	*Cooper, 1985*
(11) This product would clearly satisfy identified customer needs	*Cooper & de Brentani, 1991*
(12) This product would respond to changes in customer needs and wants	*Cooper & de Brentani, 1991*
(13) This product would be highly consistent with existing consumer values	*Cooper & de Brentani, 1991*
Product promotion	
(14) This product would have a clear USP (unique	*Bartlam, 1996*

selling proposition)	
(15) This product would have consistent advertising support	*Bartlam, 1996*
(16) This product would have constant brand development	*Bartlam, 1996*
(17) This product would have attractive packaging	*Kohli & LaBahn, 1997, Cadbury, 1975*
(18) This product would have functional packaging	*Kohli & LaBahn, 1997, Cadbury, 1975*
Product - Newness to the firm	
(19) This product would be a new product class to company	*Cooper & de Brentani, 1991, Cooper, 1985, Calantone & Cooper, 1981; Cooper, 1981, Cooper, 1979b*
(20) This product would serve new types of users' needs	*Cooper & Kleinschmidt, 1994, Cooper, 1985, Calantone & Cooper, 1981; Cooper, 1981, Cooper, 1979b*
(21) This product would require technologies that are new to the firm	*Cooper & de Brentani, 1991, Cooper, 1985, Calantone & Cooper, 1981; Cooper, 1981, Cooper, 1979b*
(22) This product would require production process that are new to the firm	*Cooper & de Brentani, 1991, Cooper, 1985, Calantone & Cooper, 1981; Cooper, 1981, Cooper, 1979b*
(23) This product would place the firm in new competitive environments	*Cooper & de Brentani, 1991*
(24) This product would use new customer service and technical support	*Cooper & Kleinschmidt, 1994, Ehrenberg, 1991*
Product characteristics	
(25) The product idea came to us from the marketplace	*Cooper, 1985, Calantone & Cooper, 1981; Cooper, 1981, Cooper, 1979b*
(26) Product specifications were very clear from the start of the project	*Kohli & LaBahn, 1997, Song & Parry, 1996, Cooper & Kleinschmidt, 1994, Cooper, 1981*
(27) This product is subject to political & social influences	*Baker & Albaum, 1986, Ronkainen, 1985*
(28) This product would have clearly defined target markets	*Kohli & LaBahn, 1997, Cooper & Kleinschmidt, 1994*
(29) This product would have consumer benefits that were clearly defined	*Kohli & LaBahn, 1997, Cooper & Kleinschmidt, 1994*
(30) This product would have a positioning strategy that was clearly defined	*Kohli & LaBahn, 1997, Cooper & Kleinschmidt, 1994*
(31) This product would have features that were clearly defined	*Kohli & LaBahn, 1997, Cooper & Kleinschmidt, 1994*
(32) This product would have features that would not change for a long time	*Cooper & de Brentani, 1984*
(33) This product would have predictable development patterns	*Cooper & de Brentani, 1984*
(34) This product would have long term relevance to consumers	*Cooper & de Brentani, 1984*
(35) This product would have production facilities that were geared up for launch	*Calantone & Cooper, 1981; Cooper, 1979b*
(36) This product would have production volume that would meet predicted demand	*Calantone & Cooper, 1981; Cooper, 1979b*
(37) This product would have low cost of reclaiming stocks in the event of failure	*Cadbury, 1975*
(38) This product would cause little damage to the company's reputation through failure	*Cadbury, 1975*
(39) This product would have a variety of applications	*Cooper & de Brentani, 1984*
Corporate synergy	
(40) This product would fit firm's present business	*Cooper & de Brentani, 1984*
(41) This product would fit the firm's organisational set-up	*Cooper & de Brentani, 1984*

(42) This product would fit the firm's managerial capabilities	*Calantone, Schmidt & Song, 1996, Cooper & Kleinschmidt, 1994, Cooper, 1985, Cooper & de Brentani, 1984, Calantone & Cooper, 1981, Cooper, 1981, Cooper, 1979b,*
(43) This product would fit top management's preferences	*Cooper & de Brentani, 1984*
(44) This product would be aimed at firm's current consumers	*Cooper & de Brentani, 1984, Cooper & Kleinschmidt, 1994*
(45) This product would have competitors who are known and understood	*Cooper & de Brentani, 1984, Cooper & Kleinschmidt, 1994*
(46) This product would use current sales and distribution channels	*Song & Parry, 1997 a & b, Calantone, Schmidt & Song, 1996, Song & Parry, 1996, Cooper & Kleinschmidt, 1994, Parry & Song 1994, Song & Parry 1994, Cooper & Kleinschmidt 1993, Ehrenberg, 1991, Cooper & Kleinschmidt 1986, Cooper, 1985, Cooper & de Brentani, 1984, Calantone & Cooper, 1981; Cooper, 1981, Cooper 1979 a & b*
(47) This product would use current marketing research techniques	*Song & Parry, 1997 a, Calantone, Schmidt & Song, 1996, Song & Parry, 1996, Cooper & Kleinschmidt, 1994, Parry & Song 1994, Song & Parry 1994, Cooper & Kleinschmidt 1993, Cooper & Kleinschmidt 1986, Cooper, 1985, Cooper & de Brentani, 1984, Calantone & Cooper, 1981; Cooper, 1981, Cooper 1979 a & b*
(48) This product would use current advertising	*Song & Parry, 1997 a & b, Calantone, Schmidt & Song, 1996, Cooper & Kleinschmidt, 1994, Parry & Song 1994, Song & Parry 1994, Cooper & Kleinschmidt 1993, Ehrenberg, 1991, Cooper & Kleinschmidt 1986, Cooper, 1985, Calantone & Cooper, 1981; Cooper, 1981, Cooper 1979 a & b, Cadbury, 1975*
(49) This product would use current sales promotion techniques	*Song & Parry, 1997 a & b, Calantone, Schmidt & Song, 1996, Cooper & Kleinschmidt, 1994, Parry & Song 1994, Song & Parry 1994, Cooper & Kleinschmidt 1993, Ehrenberg, 1991, Cooper & Kleinschmidt 1986, Cooper, 1985, Calantone & Cooper, 1981; Cooper, 1981, Cooper 1979 a & b, Cadbury, 1975*
(50) This product would utilise current consumer support resources	*Cooper & Kleinschmidt, 1994*
(51) This product would utilise current engineering and design resources	*Song & Parry, 1997 a & b, Calantone, Schmidt & Song, 1996, Song & Parry, 1996, Cooper, 1985, Cooper & de Brentani, 1984, Calantone & Cooper, 1981; Cooper, 1979b*
(52) This product would utilise current R&D resources	*Song & Parry, 1997 a & b, Calantone, Schmidt & Song, 1996, Song & Parry, 1996, Cooper & Kleinschmidt, 1994, Cooper, 1985, Cooper, 1981*
(53) This product would utilise current manufacturing experience	*Song & Parry, 1997 a, Cooper & Kleinschmidt, 1994, Cooper, 1985, Cooper, 1981*
(54) This product would uses current manufacturing plant and equipment	*Cooper & Kleinschmidt, 1994, Ehrenberg, 1991, Cooper, 1985, Calantone & Cooper, 1981; Cooper, 1981, Cooper, 1979b*
(55) This product would be strongly supported by senior management	*Song & Parry, 1997 a, Parry & Song 1994, Song & Parry 1994, Cooper & Kleinschmidt 1993, Zirger & Maidique 1990, Cooper & Kleinschmidt 1986, Maidique & Zirger 1984, Calantone & Cooper 1981, Cooper 1979 a & b*
(56) This product would have an internal company champion	*Song & Parry, 1997 a, Parry & Song 1994, Song & Parry 1994, Cooper & Kleinschmidt 1993, Zirger & Maidique 1990, Cooper & Kleinschmidt 1986, Maidique & Zirger 1984, Calantone & Cooper 1981, Cooper 1979 a & b*
(57) This product would have minimal 'line start-up' production problems	*Cadbury, 1975*
Trade synergy	
(58) It would be easy to get shelf space for this product	*Cadbury, 1975, Exploratory research*
(59) The product would have strong trade support	*Stanojev, 1997, Exploratory research*
(60) The firm has strong relationships with the trade	*Exploratory research*
(61) The company has important goodwill and reputation at the trade level	*Cadbury, 1975, Exploratory research*
Nature of the market	
(62) We are the dominant organisation in this category	*Song & Parry, 1997 a & b, Song & Parry, 1996, Parry & Song 1994, Song & Parry 1994, Cooper & Kleinschmidt 1993, Cooper & de Brentani, 1991, Cooper & Kleinschmidt 1986, Calantone & Cooper 1981, Cooper, 1981, Cooper 1979 a & b*
(63) Consumers are loyal to competitors' products	*Song & Parry, 1997 a & b, Song & Parry, 1996, Parry & Song 1994, Song & Parry 1994, Cooper & Kleinschmidt 1993, Cooper & Kleinschmidt 1986, Calantone & Cooper 1981, Cooper, 1981, Cooper 1979 a & b*

(64) Potential consumers are very satisfied with the competitors products they are using	*Song & Parry, 1997 b, Song & Parry, 1996, Calantone & Cooper, 1981; Cooper, 1981, Cooper, 1979b,*
(65) Competitors launch new products frequently in this category	*Song & Parry, 1997 a, Parry & Song 1994, Song & Parry 1994, Cooper & Kleinschmidt 1993, Cooper & de Brentani, 1991, Cooper & Kleinschmidt 1986, Cooper, 1985, Calantone & Cooper, 1981; Cooper, 1981, Cooper 1979 a & b,*
(66) Users' needs change quickly in this category	*Cooper, 1985, Calantone & Cooper, 1981; Cooper, 1981, Cooper, 1979b,*
(67) This product category would be important to the trade	*Exploratory research*
(68) Competing products are not strategically important to owners	*Cooper & Kleinschmidt, 1994*
(69) The product would have a mass market	*Song & Parry, 1997, Song & Parry, 1996, Parry & Song 1994, Song & Parry 1994, Cooper & Kleinschmidt 1993, Cooper & Kleinschmidt 1986, Cooper, 1985, Ronkainen 1985, Cooper & de Brentani, 1984 a, Calantone & Cooper 1981, Cooper, 1981, Cooper 1979 a & b*
(70) The product would have a geographically large market	*Cooper & de Brentani, 1984*
(71) The product would have aggressive competition	*Gatignon & Xuereb, 1997, Cooper & de Brentani, 1984, Calantone & Cooper, 1981; Cooper, 1981, Cooper, 1979b*
(72) The product would have competing products that were very similar to each other	*Gatignon & Xuereb, 1997, Song & Parry, 1996, Cooper & de Brentani, 1991, Cooper & de Brentani, 1984, Cooper, 1981*
(73) The product would have an intensely price competitive market	*Song & Parry, 1996, Cooper & de Brentani, 1991, Cooper, 1985, Calantone & Cooper, 1981, Cooper, 1981, Cooper, 1979b, Cadbury, 1975*
(74) The product would have many competitors in this market	*Song & Parry, 1997 a, Song & Parry, 1996, Parry & Song 1994, Song & Parry 1994, Cooper & Kleinschmidt 1993, Cooper & Kleinschmidt 1986, Cooper, 1985, Calantone & Cooper, 1981; Cooper, 1981, Cooper 1979 a & b,*
(75) The product would have legislation influencing design and testing	*Cooper, 1981*
(76) The product would have weak competitors in this market	*Cooper & Kleinschmidt, 1994*
(77) The product would have stable demand	*Cooper & Kleinschmidt, 1994*
(78) The product would have consumers who were amenable to trying new products	*Cooper & Kleinschmidt, 1994*
(79) The product would have low risk of cannibalising other of own firms products	*Exploratory research*

Competitive and market intelligence

(80) We understand the consumer's behaviour	*Song & Parry, 1997 b, Calantone, Schmidt & Song, 1996, Song & Parry, 1996,*
(81) We know what the consumer will pay for the product	*Song & Parry, 1997 b, Calantone, Schmidt & Song, 1996, Song & Parry, 1996, Ehrenberg, 1991, Cadbury, 1975*
(82) We know how competitors will react to this product launch	*Song & Parry, 1997 b*
(83) Consumer requirements can be predicted	*Gatignon & Xuereb, 1997*
(84) Demand would be easy to forecast	*Gatignon & Xuereb, 1997*

Financial potential

(85) ROI potential would be high	*Kristensen, Østergaard & Juhl, 1997, Stanojev, 1997, Song & Parry, 1997 a, Song & Parry, 1996, Parry & Song 1994, Song & Parry 1994, Cooper & Kleinschmidt 1993, Cooper & de Brentani, 1991, Zirger & Maidique 1990, Baker & Albaum, 1986, Cooper & Kleinschmidt 1986, Ronkainen, 1985, Cooper, 1985, Cooper & de Brentani, 1984, Maidique & Zirger 1984, Calantone & Cooper 1981, Cooper, 1981, Cooper 1979 a & b*
(86) Sales growth potential would be high	*Gatignon & Xuereb, 1997, Song & Parry, 1997 a, Song & Parry, 1996, Parry & Song 1994, Song & Parry 1994, Cooper & Kleinschmidt 1993, Cooper & de Brentani, 1991, Zirger & Maidique 1990, Baker & Albaum, 1986, Cooper & Kleinschmidt 1986, Cooper, 1985, Cooper & de Brentani, 1984, Maidique & Zirger 1984, Calantone & Cooper 1981, Cooper, 1981, Cooper 1979 a & b*
(87) Market share potential would be high	*Song & Parry, 1997 a, Song & Parry, 1996, Parry & Song 1994, Song & Parry 1994, Cooper & Kleinschmidt 1993, Cooper & de Brentani, 1991, Zirger & Maidique 1990, Baker & Albaum, 1986, Cooper & Kleinschmidt 1986, Cooper, 1985, Cooper & de Brentani, 1984, Maidique & Zirger 1984, Calantone & Cooper 1981, Cooper, 1981, Cooper 1979 a & b*

(88) There would be a positive economic climate in this market	*Cooper & Kleinschmidt, 1994*
(89) This product would require significant financial investment	*Exploratory research*
(90) This product would offer high profit margins	*Exploratory research*
(91) This would be a profitable category for the trade	*Exploratory research*
(92) This product has a high probability of commercial success	*Song & Parry, 1997 a, Parry & Song 1994, Song & Parry 1994, Cooper & Kleinschmidt 1993, Zirger & Maidique 1990, Cooper & Kleinschmidt 1986, Cooper & de Brentani, 1984, Maidique & Zirger 1984, Calantone & Cooper 1981, Cooper 1979 a & b*
Market strategy	
(93) The product would be launched to hold category share	*Cooper & de Brentani, 1984, Cooper, 1981*
(94) The product would represent a survival strategy	*Cooper & de Brentani, 1984*
(95) The product would replace a current product	*Cooper & de Brentani, 1984*
(96) The product would represent a technological enhancement	*Cooper & de Brentani, 1984*
(97) The product would help increase the firm's category share	*Kristensen, Østergaard & Juhl, 1997, Exploratory research*
(98) The product would be launched in response to competitor activity	*Exploratory research*
(99) The product would be launched to make the market more difficult for competitors	*Exploratory research*
(100) The new product would have lower costs than existing products	*Kristensen, Østergaard & Juhl, 1997*
(101) The new product would improve the firm's reputation in society	*Kristensen, Østergaard & Juhl, 1997*
(102) The product would be launched to create a range of product offering	*Exploratory research*
(103) The new product would appease consumers demanding innovation	*Kristensen, Østergaard & Juhl, 1997*
Product branding	
(104) An existing brand would be used for the product	*Kohli & LaBahn, 1997*
(105) The brand name for the new product is a leading brand	*Exploratory research, Cadbury, 1975*
(106) The new product fits well with products of the same brand	*Exploratory research, Cadbury, 1975*
(107) The branded product would be differentiated from other products in the firm's portfolio	*Kohli & LaBahn, 1997, Agres & Dubitsky, 1996*
(108) The branded product would fit well with other products in the company portfolio	*Kohli & LaBahn, 1997*
(109) The branded product would convey differentiation from competitors	*Kohli & LaBahn, 1997, Agres & Dubitsky, 1996*
(110) The branded product would establish a distinct segment to target	*Kohli & LaBahn, 1997*
(111) The branded product would be easily registered as a trademark	*Kohli & LaBahn, 1997*
(112) The branded product would be relevant within the product category	*Kohli & LaBahn, 1997, Agres & Dubitsky, 1996*
(113) The branded product would be easily recognised	*Kohli & LaBahn, 1997*
(114) The branded product would ensure easy product recall by consumers	*Kohli & LaBahn, 1997*
(115) The branded product would carry across to other markets	*Exploratory research, Cadbury, 1975*

(116) The branded product would carry across to other languages	*Kohli & LaBahn, 1997*

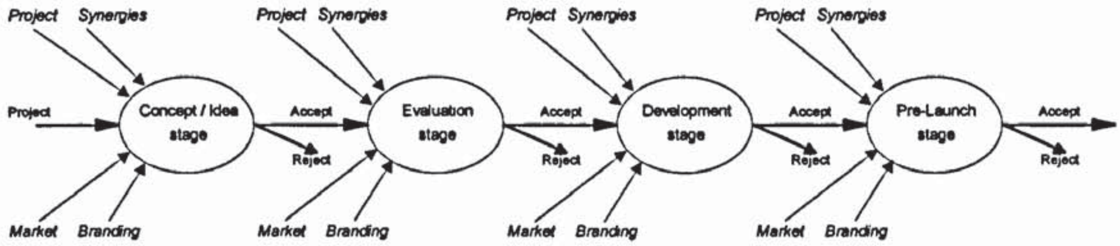
Individual screening criteria were grouped in accordance with the literature to improve the ease with which managers could complete the questionnaire. These groups were, themselves, placed together under the headings of; (1) Project characteristics; (2) Synergies; (3) Market characteristics; (4) Branding characteristics; and can be seen to broadly follow a similar pattern to the factors that were outlined by Cooper and Kleinschmidt (1987b) (section 2.5). Cooper and Kleinschmidt (1990) also employed a research instrument containing measures of *Product Advantage* (12 measures), *Synergy and Newness* (23 measures), *Market Attractiveness* (16 measures) and *Competitive Situation* (16 measures). Table 3.4 provides an overview of the 11 elements of the screening and evaluation decision and number of scale items in this investigation of potential new *fmcg* products.

Table 3.4 Elements of the Screening and Evaluation Decision

Heading	*Grouping*	*No. scale items*
Project characteristics	Product differential advantage	13
	Product promotion	5
	Product - newness to the firm	6
	Product characteristics	15
Synergies	Corporate synergy	18
	Trade synergy	4
Market characteristics	Nature of the market	18
	Competitive and market intelligence	5
	Financial potential	8
	Market strategy	11
Branding characteristics	Product branding	13

The development of the conceptual framework for this research project can now be completed. The successful movement of a project through the development process is governed by the four groups of evaluation characteristics identified in Table 3.4. The final conceptual framework is, therefore, proposed in Figure 3.7.

Figure 3.7 ***Conceptual Framework***
Changing Importance of Screening Criteria Across the NPD Process



This conceptual framework allows us to address the issue highlighted as being crucial to this investigation, namely the changing importance of screening criteria throughout the new product development process. It adopts a simplification of the new product development process that offers both applicability and simplicity. The theoretical framework addresses the need to survey projects that have been *accepted* through to the next stage of development as well as those that have been *rejected* or screened out. A framework of screening criteria were carefully selected and validated that impact on the screening decision at the identified stages of the NPD process. Within this framework considerations of branding, packaging and consumer advertising are all incorporated allowing the researcher to reflect all aspects of the marketing mix, particularly those relating to consumers' perceptions and communications with the consumer (Howley, 1990).

3.2.4 Contribution to the Advancement of NPD Research

The focus of this research project is on new product development within the *fmcg* sector and highlights screening decisions and how they reflect specific stages of the NPD process. The primary goal of this analysis is to provide managers with a framework of criteria that are crucial for a project to successfully move onto the next stage of development. This will allow time and resources to be applied to appropriate screening criteria, in order that NPD managers may focus on their primary role of selecting for continued development those projects that have the best chance of ultimately succeeding in the marketplace rather than those that may fail.

This research project makes its contribution to the field of new product research in three areas; research sample; research methodology and research framework.

3.2.4.1 Research Sample - *fmcg* Products

While new product processes have become more sophisticated as a result of academic investigation, past research has focused on industrial goods and has shied away from investigating differences between structures and practices in consumer and industrial NPD (Hanna *et al*, 1995) (section 2.7.1.1). A focus on industrial products at best hides the lack of guidance for managers in the *fmcg* sector, at worst offers misleading intelligence on the most appropriate screening and evaluation methods for their product categories.

A primary discriminator of success in new products such as product advantage highlights such an issue (section 1.2). In traditional industrial products product advantage often refers to technical advantages, for example processing power or size of hard disk for a new computer. For new *consumer products* this advantage may be more to do with product design and styling or perceptual advantages through post launch marketing efforts.

This research project begins to address this imbalance by investigating screening within the international branded *fmcg* sector. Respondents from within this sector have supported the research from its earliest stage of development, lending their endorsement and validation to the study.

3.2.4.2 Research Methodology - Measuring Projects in Real Time

Measuring new product projects in real time from their conception to their conclusion offers a significant enhancement to product development research. Concerns regarding the validity of three to five year retrospective studies can be, in part, addressed by a cross-sectional sample that surveys projects in *real-time*. The trends towards shorter product development cycle times permit the measurement of new products in this way.

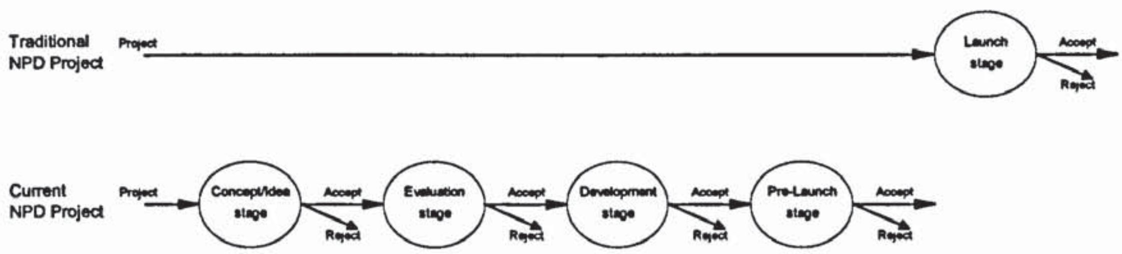
3.2.4.3 Research Framework - Screening Across Development Stages

It has already been established that the same set of criteria may not apply throughout the product-development process (section 2.8.7). This project builds on existing work in industrial products (Ronkainen, 1985; Hart *et al*, 1998) by proposing the measurement of screening criteria across four identified product development stages (section 3.2.1). The large number of 'live' new product projects passing through the stages of the NPD process in *fmcg* manufacturers indicates the suitability of this research project.

This stage-by-stage approach allows researchers to by-pass the controversial issue of the most appropriate measure of product performance by adopting a dichotomous *Go* or *No Go* decision at each stage of the NPD process. Since projects are classified as *Go* or *No Go*, this project will assess the large category of *killed* (*No Go*) projects that do not reach commercialisation. It is this group of projects that researchers have largely ignored (Cooper and Kleinschmidt, 1990). It is fair to assume that for every successful product like Nestlé's Maverick chocolate bar, there are a large number of concepts that were rejected. Understanding how these projects were evaluated and screened out will ultimately improve the likelihood of another Maverick being identified early on in the NPD process.

Figure 3.8 highlights the difference in conceptualisation between the current research project and the *retrospective, post-launch* new product success and failure literature. It is in the management of *dynamic, intra-process* screening that this research project makes its major contribution to the advancement of NPD research.

Figure 3.8 Advancement of New Product Methodology



3.2.4.4 Research Summary

By focusing research on the NPD process we will improve understanding of whether current tools can help create and identify new product winners. As outlined previously, dramatic changes in the business environment permit the measurement of screening criteria at key decision making stages throughout the NPD process.

➊ The great numbers of *fmcg* products being developed counteracts problems of a high attrition rate associated with the NPD.

➋ The measurement of products with a high volume of introductions and liberal idea generation offers greater flexibility in measuring projects in 'real-time'.

➌ A shortening product development cycle allows us to observe screening criteria at different stages of the NPD process.

3.2.5 Research Objectives

This research project measures the importance of screening criteria at different stages of the development process in international branded *fmcg* firms. The project measures projects in 'real time'. The introduction of branded products allows us to evolve scales used in NPD evaluation studies by further developing the variables of branding, promotion and retailer power. By sampling products during the NPD process the research side-steps the controversial area of the most effective method of measuring new product performance (post-launch). Instead it utilises a dichotomous *Go/No Go* outcome based on the decision to allow a project to carry on to the next stage of the NPD process or to screen it out. Managers respond with data from matched pairs of *accepted* and *rejected* projects. This will allow the research project to satisfy several key objectives (section 1.3):

1. To gain understanding of the process of NPD within consumer product organisations, clarifying any discrete stages within the NPD process.
2. To determine those criteria used to evaluate projects within *fmcg* organisations.
3. To measure any changes in the importance of these evaluation criteria across the NPD process and, therefore, their importance in *Go/No Go* decision making.
4. To construct a tool that will guide management decision making in NPD by focusing attention and resources on the stages and evaluation criteria critical to a successful *Go* decision at particular stages of the NPD process.

3.3 Hypothesis Development

A hypothesis is an assumption or guess that the researcher makes about some characteristic of a population to be sampled (Dillon *et al*, 1987) stating explicit preconceptions about the way the market to be sampled works (Lehmann *et al*, 1998). Stating hypotheses serves two purposes. First, it translates the problem into a series of assertions that can be addressed with data and thus largely determines the research design by specifying the data needed. Second, being forced into making implicit notions explicit is a healthy exercise which often leads to modifications of opinions even without data collection (Lehmann *et al*, 1998). The use of hypotheses has clear implications. First, hypotheses under test must be statements of the relationship between variables and second, they must carry clear implications for testing stated relations (i.e. the formulated hypotheses must be testable).

The challenge for the researcher is to devise a research approach that will gather information that can test each of the hypotheses. Hypotheses are not appropriate for all situations. In some cases of exploratory research there may be insufficient information for developing hypotheses or the most reasonable hypothesis statement is simply a trivial restatement of the research question (Aaker *et al*, 1998). One fact underlies the statistical test of a hypothesis (Churchill, 1995; p 822);

"A hypothesis may be rejected but can never be accepted, except tentatively, because further evidence may prove it wrong".

In other words, one rejects the hypothesis or does not reject the hypothesis on the basis of the evidence at hand. It is wrong to conclude that since the hypothesis was not rejected, it can necessarily be accepted as valid.

In the absence of perfect information (as is the case when sampling), the best researchers can do is form hypotheses or conjectures about what is true. The upshot of these considerations is that the researcher needs to frame the null hypothesis in such a way that its rejection leads to the acceptance of the desired conclusion - that is, the statement or condition that the researcher wishes to verify (Churchill, 1995). The null hypothesis reflects the concept that this is a hypothesis of no difference (Diamantopoulos and Schlegelmilch, 1997).

In the product development field, much research effort has been dedicated to identifying variables and proposing explanatory models rather than to testing models and hypotheses (Cooper and Kleinschmidt, 1987c). This project will test six hypotheses that are based on the conceptual framework outlined earlier. These hypotheses take consideration of gaps in previous NPD screening literature. The hypotheses under test in this research project, relate to the relationship between screening variables and project outcome at each stage of the new product development process. The 116 individual screening and evaluation criteria (Table 3.3) were grouped into 11 factors according to the literature (Table 3.4) and are classified under the four broad headings of *project characteristics*, *synergies*, *market characteristics* and *branding characteristics*.

Due to the exploratory nature of research in the *fmcg* sector and the fact that empirical research into screening across development stages is still in its infancy, hypotheses to be tested have been derived from several sources. They have evolved from the literature highlighted in chapter two and the specific research projects outlined at the beginning of this chapter (sections 3.1.1 to 3.1.5). They are also developed from anecdotal literature from managers, marketing journalists and exploratory research conducted by the researcher involved in this project. The hypotheses to be tested in this research are technically one-tailed since they predict a direction to the stated relationship, i.e. A is positively associated with B.

The primary hypothesis in this project concerns the screening criteria that are employed by managers in the *fmcg* sector. As mentioned above, this research project has adopted 11 groups of criteria that were deemed to be relevant to the screening decision in the *fmcg* sector. It is the belief of the researcher that these 11 groups of criteria are not unidimensional but that screening in the *fmcg* sector is based on a larger set of underlying screening dimensions. Based on the above we can propose the first two, primary hypotheses.

H_{1} The 11 groups of proposed screening criteria are composed of a larger set of underlying screening dimensions that differentiate between *accepted* and *rejected* projects in the *fmcg* sector.

This hypothesis tests the null form that the 11 groups of screening criteria are unidimensional. Addressing the dimensionality of screening criteria is crucial if researchers are to address the problem of either too many in depth criteria, or more worryingly, too few superficial criteria. Both options reduce the suitability of empirical models in improving new product screening decisions. The second hypothesis concerns the use of screening criteria at different stages of the product development process. As has already been suggested in chapter two (section 2.4), the screening decision is often considered as a single stage in a development process. The use of empirically derived screening models at different stages of the NPD process is largely overlooked due to the lack of research assessing changes in importance of criteria across NPD stages. Accordingly, the second hypothesis is proposed.

H❷ The criteria that differentiate between *accepted* and *rejected* projects in the *fmcg* sector are dynamic and change in importance over the NPD cycle.

This hypothesis tests the null form that criteria that differentiate between *accepted* and *rejected* projects at each stage of the development process are the same. It is an important hypothesis to test since it forms the main thesis in this research project, namely that the screening criteria change in importance according to specific stages of development.

There is a large body of research that supports the inclusion of the 116 individual screening and evaluation items that may be relevant to the *Go* or *No Go* decision (Table 3.3). However, as we have already indicated, the research is less conclusive about which items are important in this *Go* or *No Go* decision at each stage of the development process. It is for this reason that a brief résumé of the available evidence will assist in the development of the hypotheses to be tested. This will also highlight the theoretical basis to the proposition that evaluation criteria change in importance at different stages of the NPD process (Table 3.5).

Table 3.5 highlights the difficulties associated with integrating research with different objectives and priorities. These differing objectives promote uncertainty in terms of the most appropriate indicators of future market potential at each stage of the development process. It is useful, therefore, to incorporate anecdotal literature that assesses how the same performance criteria may differ in importance at each decision-making point in the NPD process for two recent new product projects. The second half of Table 3.5 describes the critical drivers of project success at each stage of the development process for Lever Brothers' Persil Power detergent and Gillette's Mach3 razor, two recent, high profile product introductions. This section of Table 3.5 reflects on the nature of the drivers of project outcome for each of these products at each stage of their development process. It attempts to identify which of the 11 elements of the screening decision, proposed in Table 3.4, would best represent these identified drivers of project outcome.

Table 3.5 Hypothesis Development

Research source	Concept/Idea stage	Evaluation stage	Development stage	Pre-launch stage
Balachandra, 1984	Potential success in the marketplace		Key profit indicators, Technical feasibility	
Cooper & de Brentani, 1984	1st to market, innovative, leadership position, tech. Edge			
Ronkainen, 1985	Market criteria	Product criteria		Financial criteria
Ambler & Styles, 1997	Brand equity issues			
Hart et al, 1998	Product uniqueness Technical feasibility Market potential	Margin Sales in units Market potential	Product performance Quality	Product performance Quality Customer acceptance
Lever Brothers Persil Tablets	*Market strategy* Persil Power 'fiasco' Implement unit dosing	*Nature of the market* Need to increase no. of homes and usage	*Product characteristics* Formulation - where to put in washer	*Product promotion* 'Not rocket science'
Gillette Mach3 Razor	*Market strategy* Innovate every 9 years Sales growth flattening	*Nature of the market* Consumer willingness to absorb higher cost	*Product characteristics* New manufacturing systems	*Product promotion* Highlight performance breakthrough

From these issues we can see that there is both a compelling theoretical justification and a clear managerial need for understanding the concept of changing importance of screening criteria across a product development cycle. It is important, however, to understand that at this stage the issue is not to focus solely on one criteria or group of criterion at each stage of the development process but to develop a framework of priorities from which educated screening decisions can be taken. It is the purpose of this hypothesis generation stage to highlight the most important screening criteria for each stage of the development process.

The analysis of Table 3.5 enables us to propose a series of sub-hypotheses that refer to specific stages of a products development.

3.3.1 Concept/Idea Stage

Ronkainen (1985) found that the *market based* criteria are the determining criteria during the concept phase. These *market* criteria included *market size*, *growth rate*, *relation to existing lines*, *competitive situation*, *distribution characteristics* and *special political and social factors*. Cooper and de Brentani (1984) identified that quantifiable performance measures dominated the project evaluation, even at this early screening stage. This was despite the limited reliability of such measures at early stages. They noted that products that were *first to market*, promised a *leadership position*, were *innovative* and had *technological edge* were most often accepted at the screening stage.

Lever Brothers' Persil Tablets project (Willman, 1998b) was driven at the Concept/Idea stage by a desire to introduce 'unit-dosing' to a market saturated with 'concentrated' liquid and powder products. The objective was to give the consumer a fixed quantity of product every time, thus, eliminating waste and overuse. This *market* issue was the key driver of project *acceptance* at the Concept/Idea stage of the process. If the project were constrained by too many other screening measures then this promising idea may have been rejected. A similar *market* was the key driver for Gillette's Mach3 razor at the early Concept/Idea stage (Willman, 1998a). Gillette had a strategy of innovating every nine or so years and this combined with a flattening out of sales growth for other of the firm's products. The need for new product development was a strategic one. Based on the above, the following hypothesis is proposed:

H❸ The criteria that are most important in differentiating between *accepted* and *rejected* projects (in the *fmcg* sector) at the Concept/Idea stage of development are ***Market*** characteristics.

This tests the null hypothesis that the criteria that differentiate between *accepted* and *rejected* projects at the first stage of the development process are not from the *Market* section of the research questionnaire. Following on from hypothesis one, this hypothesis also tests the possibility that any uncovered sub-dimensions of the *Market* section may be of critical importance at the first stage of the development process.

3.3.2 Evaluation Stage

Ronkainen (1985) suggested that product-related criteria take over as the most important during the feasibility and product/process development phases. These criteria were *product exclusivity*, *performance/feasibility*, *ease of service*, *legality*, *organisational support* and *safety*. Hart *et al* (1998) noted that *margins*, *sales in units* and *market potential* were critical criteria at the Evaluation stage of the development process.

At this Evaluation stage, the key issue for the Persil tablet project concerned the decrease in the overall usage of the product that would result from 'unit-dosing'. This also reflected a *market* base set of criteria that referred to the need to identify whether increased consumption could be stimulate whilst also increasing the overall number of households using the product. Satisfaction of this criterion allowed the project to maintain its momentum through the development process. A similar set of *market* criteria determined whether Gillette's Mach3 razor would move on to the next stage of development. In this case consumer needed to indicate a willingness to absorb the likely extra cost of this new product. If they were not, then the project would have either been rejected or reworked to take account of the need for a lower unit cost. Based on the above, the following hypothesis is proposed:

H❹ The criteria that are most important in differentiating between *accepted* and *rejected* projects (in the *fmcg* sector) at the Evaluation stage of development are ***Market*** characteristics.

This tests the null hypothesis that the criteria that differentiate between *accepted* and *rejected* projects at the evaluation stage of the development process are not from the *Market* section of the research questionnaire. Similarly, following on from hypothesis one, this hypothesis also tests the possibility that any uncovered sub-dimensions of the *Market* section may be of critical importance at this second stage of the development process.

3.3.3 Development Stage

Balachandra (1984) highlighted the importance of *key profit (financial) indicators* and *technical feasibility* at the development stage of the NPD process while Hart *et al* (1998) view *product performance* and *quality* as key discriminating criteria. Both Lever Brothers and Gillette concur with Hart *et al* (1998) in highlighting the importance of product characteristics at this Development stage of the NPD process. For Persil tablets this took the form of the most appropriate place to put the tablets in the washer. If they were to go into the drawer of the machine they would need to be easily dissolvable. This had repercussions for the strength of the formulation since the tablet needed to stay intact during transit. If they were to be put into the drum they could be made more compactly but also needed to be able to be dispersed quickly. In terms of the Gillette razor the product characteristics were much more to do with the capability to manufacture such an advanced new product. Based on the above, the following hypothesis is proposed:

H❺ The criteria that are most important in differentiating between *accepted* and *rejected* projects (in the *fmcg* sector) at the Development stage are ***Project*** characteristics.

This tests the null hypothesis that the criteria that differentiate between *accepted* and *rejected* projects at the development stage of the NPD process are not from the *Project* characteristics grouping. Also following on from hypothesis one, this hypothesis also tests the possibility that any uncovered underlying dimensions of *Project* characteristics may be of critical importance at this Development stage of the NPD process.

3.3.4 Pre-Launch Stage

Finally Ronkainen (1985) noted that *Financial criteria* weigh most in determining the potential payoff of the product in the scale-up and standardisation phases. These financial measures incorporated *ROI, effect on cash flow, total investment requirement* and *payback*. Hart *et al* (1998) suggested that again issues of *product performance, quality* and an additional measure of *customer acceptance* were important in the screening decision at this Pre-Launch stage of development.

In both the Lever Brothers and Gillette cases, product promotion was the key consideration at the pre-launch stage of development but for contrasting reasons. Lever Brothers, after the technological the Persil Power fiasco, wanted to highlight that their new product was 'not rocket science' but just washed clothes cleaner, easier. Gillette, on the other hand, wanted to highlight the breakthrough in performance of the three bladed shaving system. In both instances the promotion effort was of the most critical importance at this late Pre-Launch stage of development. Based on the above, the following hypothesis is proposed:

H❻ The criteria that are most important in differentiating between *accepted* and *rejected* projects (in the *fmcg* sector) at the Pre-Launch stage of development are ***Project*** characteristics.

This tests the null hypothesis that the criteria that differentiate between *accepted* and *rejected* projects at the pre-launch stage of the development process are not from the *Project* characteristics section of the research questionnaire. Following on from hypothesis one, this hypothesis also tests the possibility that any uncovered underlying dimensions of *Project* characteristics may be of critical importance at this Pre-Launch stage of development.

3.3.5 Other Critical Factors

Again it must be re-iterated that these criteria are not alone in determining the *acceptance* or *rejection* of a project at a particular stage of development. Indeed, supplementary characteristics will play an important role in the screening decision. Cooper and de Brentani (1984) concluded that two synergy factors (*corporate synergy* and *technical and production synergy*) played a key role in management's desire to select projects which can make use of the firm's existing resources at marginal cost, and which exploit the firm's previous experiences and skills. These too may be applicable to those new products in the *fmcg* sector.

3.4 Chapter Summary

The purpose of this chapter was three-fold. First, it highlighted key literature in the field of new product development that guided the build-up of the theoretical framework for this research investigation. This literature stressed the need for research to apply different screening criteria across a product development process. The project is to focus on projects that have been *accepted* through to the next stage of development and also those that have been *rejected* or *screened out*. Second, the chapter showed how the literature was synthesised into a coherent and compelling theoretical framework and identified the contribution this investigation will make to NPD research. This included an assessment of the objectives of the research project. Finally, the relevant screening criteria, appropriate development process, conceptual framework and objectives were explored and several relevant and testable hypotheses were proposed. The next chapter describes how the conceptual framework was operationalised by describing the research methodology and data collection method for the study.

4 Chapter Four
Research Methodology

This chapter provides an overview of the methodology used to examine the research propositions and hypotheses discussed in chapter three. The data collection method is described in detail, incorporating discussions of the sample frame, questionnaire design and pre and pilot testing of the research instrument. This chapter provides a detailed discussion of the main survey for this research project, including matters of research administration, response rate and questionnaire follow-ups. Chapter four concludes with a discussion of the problems of, and remedies for, questionnaire non-response, item non-response and missing data.

Chapter Four - **Research Methodology**

The previous chapter proposed the conceptual framework that will drive this investigation into the changing importance of screening criteria across product development stages. It confirmed that the literature does highlight the need for a better understanding of those criteria that are important at each stage of the new product development process. Six hypotheses were then proposed that will be tested in the subsequent chapters of the thesis. This fourth chapter will outline the research methodology from which the propositions and hypotheses can be confidently assessed. We will then go on to discuss the procedures that were followed in developing the research instrument and in conducting pre and pilot-testing. The method of implementing the main mail survey is then discussed. Finally, an analysis of the survey responses is presented.

4.1 Data Collection

There are two main types of data collection, primary and secondary data collection. Secondary data collection represents a fast and inexpensive research method. It is unlikely, however, that this type of data will provide a complete solution to a research problem. It is often not sufficiently complete, is in the wrong measurement units and is often out of date by the time of its publication (Churchill, 1995). For the current study, secondary data are not available on the methods of screening and evaluating new *fmcg* products. In such an instance we logically turn to primary data collection techniques.

Surveys are the mainstay of marketing research (Lehmann *et al*, 1998). They are relatively cheap and easy to administer and are one of the most common methods of eliciting information regarding respondents thoughts and attitudes. Having already discussed the merits of measuring projects in *real time* (sections 2.7.3.2 and 3.2.4.2) we must assess the merits of the appropriate methodologies.

There are several supplementary questions that must be asked when choosing the method of primary data collection. Should the survey be administered face-to-face, over the telephone or by mail? Should the answers be open-ended or should we provide a limited set of alternatives? The method of administration has serious implications regarding the degree of structure that must be imposed on the questionnaire (Churchill, 1995).

4.1.1 Longitudinal versus Cross-Sectional Analysis

As with any survey, the focus of the design of the project should be based on the research objectives in hand. This research project seeks to measure the importance of a series of screening and evaluation criteria at different stages of the new product development process. The research aims to assess which of the screening criteria discriminate between *accepted* and *rejected* projects across the development cycle.

In research terms, there were two major data collection techniques that were applicable to this study; the longitudinal and the cross-sectional methodologies. Given that this investigation seeks to ascertain the most important screening criteria at each stage of the NPD process yet the study of screening within the *fmcg* sector is still in its infancy, the design of the research project warranted a method that would be most appropriate for 'research-measure' development. In order to assess the relative merits of each, we assess their relative advantages with respect to versatility, speed and cost.

The longitudinal methodology would enable us to detect true changes in responses over time. This results from repeated measurements of the same variable on the same sample (Churchill, 1995). Such a methodology would provide relatively large amounts of data that are usually more accurate (Malhotra, 1996). However, difficulties arise due to the amount of time required of participants. These have been discussed more fully in chapter two but the key points will be summarised here;

1. Respondents are often chosen for accessibility and willingness to co-operate, which may ultimately render them unrepresentative and make generalisation suspect.
2. Over time longitudinal studies can be subject to greater biases from sample attrition, making precise comparability of the initial and final groups difficult (Midgley and Dowling, 1993).
3. In the course of a study carried out over many years, it is likely that new hypotheses will arise either from the study itself or from general advances in the relevant fields of social science. There is a reasonable chance, therefore, that the refutation or verification of hypotheses will depend upon original data which was not collected because its possible significance was not perceived. (SSRC, 1970).

In this instance, the time and cost associated with generating a large enough representative longitudinal sample of new product projects within *fmcg* manufacturers was considered to be prohibitive.

The cross-sectional study method would permit the measurement of new products against a series of screening and evaluation criteria. By building up a large enough database of projects that each reflect different stages of the NPD process, this method would offer a faster, more appropriate data collection methodology. Consequently, the cross-sectional data collection design was chosen. This method provides a snapshot of the screening criteria at that point in time and can be repeated with the same population at a later date. This design offers the most cost-effective method of sampling the screening and evaluation of projects within the *fmcg* sector. The cross-sectional survey is one of the most commonly used methodologies in the marketing literature. Greenley (1995) points out that this is to be expected where empirical evidence is recent and incremental development of knowledge necessary.

4.1.2 Sample Frame

In this investigation, the sample population the *fast moving consumer good (fmcg)* sector, developing *branded* new products within the UK. The sample frame will be drawn from this population. However, while the term *fmcg* is widely used to describe the consumer product sector as a whole, the operational definition of this sector is somewhat vague and unlike the clearly defined nature of Standard Industry Classifications and other categorisations. None of the recognised sources of company data (Kompass, Dunn and Bradstreet) nor any relevant professional bodies (Institute of Grocery Distribution, Chartered Institute of Marketing) could provide a definitive list of *fmcg* manufacturers in the UK. However, broadly speaking, the organisations to be sampled are those that supply branded products to UK supermarkets (retailers).

The problems associated with this sample frame issue are better highlighted by example. The major method of classification for companies is the Standard Industrial Classification (SIC) codes. Top level codes such as *Manufacturing, (20) Food and Kindred Products*, include sub-categories such as *(2037) Fruit and Vegetable Freezing*, *(2044) Rice Milling* and *(2097) Ice Manufacturers*. They also include categories of ingredient manufacturers such as *(2087) Flavouring Manufacturers*. The inclusion of these sub-categories makes for an extremely unwieldy database from which to extract firms that manufacture branded *fmcg* products. Other vital categories within the *fmcg* sector such as *(2841) Soaps and Detergents* and *(2841) Household Cleaning Products* are included in the classification *(28) Chemicals and Allied Products*. This causes further problems when trying to create a database of branded *fmcg* organisations.

A second problem concerns the 'level' of company entry in the organisation database. Many large *fmcg* firms operate in several different product categories. Organisations such as Unilever have many Strategic Business Units (SBU's) such as Elida Fabergé and Van Den Bergh Foods operating in different *fmcg* sectors. Each of these SBU's is relevant for inclusion in the final database of firms for this current research project. However, privately owned firms such as Mars are only included as a parent or holding company. The subsidiaries or SBU's for this organisation such as Master Foods and Pedigree Petfoods were not included in the listings. Hence, a probability sample could, potentially, be biased.

The problems encountered meant that an iterative process was necessary to construct a representative and appropriate sample frame of *fmcg* organisations. Churchill (1995; p 577) recognised that;

"Rarely a perfect correspondence occurs between the sampling frame and the target population of interest".

We must also bear in mind that the data collection method was unable to take advantage of a probabilistic method of sampling since a requirement of the study is that respondents were actively involved in new product development activities. The requirement is to develop an appropriate sampling frame when the list of the population elements is not readily available. Spector (1992, p29) suggested that in these instances the investigation is best undertaken on a sample of respondents which;

"Is as representative as possible of the ultimate population for which the scale is intended".

The management magazines *Marketing Week* (03 July, 1997; 30 July, 1998) and *Checkout* (December, 1997) in association with AC Nielsen publish reports on the UK's biggest brands and their respective brand owners. These reports are supplemented with tables of *'top brands by sector'*, *'fastest growing brands'* and *'brands to watch for'*. These reports provided the framework from which the sample could be generated. They provided the names of the top branded products and their manufacturers and identified the categories that were most relevant for inclusion in the study. The categories that were selected provided appropriate coverage of the *fmcg* sector whilst omitting specialist sectors such as *Over the Counter (OTC)* pharmaceuticals. The chosen categories were:

1. Food
2. Alcoholic drinks

3. Toiletries
4. Pet products
5. Household cleaning products
6. Soft drinks and beverages

However, the database of firms identified from the above surveys were mostly limited to large manufacturers with successful brands. To improve coverage of organisations across the relevant product categories, other management publications such as the trade publication *Brand Strategy* were scoured. They provided details of additional firms and products in these sectors and aided the construction of an appropriate sample frame across categories. The data collected from the above sources was supplemented by the use of on-line address databases such as the *Electronic Yellow Pages* and *Online Thompson Business Directories*.

From the above sources around 400 firm records were generated. Not all of these firms were manufacturers and an initial screening process removed 16 supply and distribution firms from the database. The remaining 384 database entries were contacted by telephone (discussed in more detail in section 4.2.1). This was to identify the manager responsible for the firm's new product development programme and to ascertain their willingness to be included in the study. Of the managers contacted, 350 agreed to take part.

Respondents were identified as those persons responsible for making *Go* and *No Go* decisions about potential new products. Where a contact name was not available the researcher asked switchboard operators to contact someone responsible for the firm's new product development programme. Where this did not identify a suitable respondent the researcher asked to be put in contact with a member of the marketing department. They were considered to be best informed as to the most appropriate candidate for participation in the study. This is in keeping with traditional NPD literature (Table 2.4) where project managers were the most likely respondent. As discussed in chapter two (section 2.1) managers responsible for new product decisions come in many guises within the *fmcg* sector.

The above sample frame represents a judgement sample where the elements are selected because it is expected that they can serve the research purposes (Churchill, 1995). Indeed, this investigation follows established new product literature by adopting a judgmental approach to sample frame generation (de Brentani and Dröge, 1988; de Brentani, 1986; de Brentani and Dröge, 1985; Cooper and de Brentani, 1984). This method of sampling is deemed useful and even advisable when probability sampling is not feasible or prohibitively expensive (Aaker *et al*, 1998) as in this case. For this investigation it was necessary to sample active new product developers. It is a reasonable to suggest that those organisations with market leading products will be active in new product development. The sample of firms was considered to reflect a representative sample of *fmcg* categories and company sizes.

4.1.3 Questionnaire Design

Questionnaire design is properly regarded as an imperfect art (Aaker *et al*, 1998) with no established procedures other than common-sense leading to consistently *good* questionnaires. The preparation of a good questionnaire requires time and thought. Cragg (1991; p 182) suggested that the questionnaire;

"Must serve its goal of providing reliable and valid data in a useable form which meets the needs of the researcher".

There is, however, a widely recognised process by which a *good* questionnaire can be developed (Aaker *et al*, 1998; Lehmann *et al*, 1998; Churchill, 1995). The stages are presented in sequence but a more typical development will involve some iteration and looping since (Luck and Rubin, 1987, p174);

"In practice the steps shown are highly interrelated, and the decisions made during one step will often influence alternatives at another step".

For consistency Churchill's (1995) nine step process for designing a questionnaire was adopted (Figure 4.1).

Figure 4.1 Procedure for Developing a Questionnaire

Step 1	Specify what information will be sought
Step 2	Determine type of questionnaire and method of administration
Step 3	Determine content of individual questions
Step 4	Determine form of response to each question
Step 5	Determine wording of each question
Step 6	Determine sequence of questions
Step 7	Determine physical characteristics of questionnaire
Step 8	Re-examine steps 1 to 7 and revise if necessary
Step 9	Pre-test questionnaire and revise if necessary

Adapted from Churchill, (1995)

4.1.3.1 Information Sought

Deciding on the type of information sought is an easy decision if researchers have been precise and meticulous during the early stages of the research process. By the same token it can prove difficult if the preparation has been sloppy and careless (Churchill, 1995). Poor judgement and/or lack of thought at this stage may mean that the results generated are not relevant to the research purpose or are incomplete (Aaker *et al*, 1998). It is, therefore, necessary to have a full understanding of how the information is to be used and how it will allow the researcher to investigate the hypotheses proposed. Chapter three (section 3.2) gave an indication of the type of information sought by this research project, while the conceptual framework (Figure 3.7) provides guidance on the nature of the relationships to be tested project.

It has been noted (section 3.2.1) that this investigation centres around the development stage at which the *accepted* project is at and the stage at which the *rejected* project was screened out. The screening criteria proposed in the questionnaire all relate to the stage of the projects development. It was also necessary for respondents to indicate whether the data they are providing refers to an *accepted* or a *rejected* project (section 3.2.2). Respondents were required to measure each *accepted* and *rejected* project against the individual screening criteria (section 3.2.3 and Table 3.3). They were also required to provide background information on types of product development, types of responding organisation and types of respondent.

4.1.3.2 Type of Questionnaire and Method of Administration

Having determined the type of information to be gathered in this investigation it is necessary to specify how it is to be collected; i.e. the structure of the questionnaire and how it is to be administered (mail, telephone or personal interview). It has already been noted that questions are not independent, that some types of unstructured questionnaire preclude the use of telephone and mail surveys and that mail surveys are similarly not recommended for unstructured questionnaires with open ended questions (Churchill, 1995). The type of information to be collected and the culture of the country of survey will have an effect on the method of data collection. Disguise is also an important issue in marketing research. This is the extent to which respondents are made aware of the purposes of the study. This investigation requires respondents to be aware of the topic of study and requires specific answers to specific questions. As a result, it adopts a structured, undisguised format for the questionnaire where questions are presented with exactly the same wording, and in exactly the same order, to all respondents. This simplifies administration and makes the results easy to tabulate and analyse (Churchill, 1995; Selltiz *et al*, 1976).

Due to the structured, undisguised, attitudinal nature of the survey and taking into consideration the issues of cost and time, a mail survey method was selected. While not offering the opportunity to delve deeper into issues that arise from the research project, the mail survey provides a level of anonymity which is important in a commercially sensitive a topic as new product development (Luck and Rubin, 1987). This data collection method is also significantly less resource intensive, especially where respondents are spread over long distances and their administration can introduce bias into the study (Malhotra, 1996; Churchill, 1995; Oppenheim 1992).

This survey is in keeping with the majority of new product success studies (Table 2.6) where data are collected regarding project *successes* and *failures* via a detailed, structured, self-completion questionnaire (Calantone *et al.*, 1996, 1988; Song and Parry, 1996; Parry and Song, 1994; Cooper and Kleinschmidt, 1987a; Cooper, 1979a, 1979b).

Mail questionnaires are advantageous in that they offer rapid, anonymous responses while limiting the errors that can occur in unstructured responses. They have the greatest versatility of all the survey techniques and in the main avoid interviewer bias (Aaker *et al*, 1998; Churchill, 1995). One significant advantage that the self-completion mail survey has over other more personal styles of data collection is that they allow the respondent to take as much time as is required to answer the questions. This offers respondents the option to look up information that they were otherwise not aware of and/or consult colleagues in the completion of the questionnaire (Churchill, 1995). This could be a significant advantage in the current study. Given that NPD professionals are found in all functions within organisations, it is possible that they may not possess the full facts regarding new product decision making. Collaboration with colleagues in the completion of the questionnaire could enhance the validity of the responses received. However, mail surveys often produce low response rates that can produce bias (Aaker *et al*, 1998; Churchill, 1995; Luck and

Rubin, 1987; Malhotra, 1996). It is necessary, therefore, to undertake activities to improve the ultimate response rate of the survey (section 4.2.1). Mail surveys have no means of identifying reasons for incomplete response and have no opportunity to correct misunderstandings, nor do they provide data of any qualitative depth. They suffer from sequence bias as respondents are able to view the entire questionnaire as they respond (Aaker *et al*, 1998; Churchill, 1995; Malhotra, 1996;). Nevertheless, they are an effective tool in marketing research (Aaker *et al*, 1998).

4.1.3.3 Content of Individual Questions

The two previous sections will largely decide the content of individual questions within the overall questionnaire but the researcher should bear in mind several additional issues (Churchill, 1995).

1. Is the question necessary?
2. Are several questions needed instead of one?
3. Do respondents have the necessary information?
4. Will respondents give the information?

The questionnaire must keep a balance between the need for comprehensiveness and the need for as high a response rate as possible. It can be suggested that the two are inversely proportional to each other. Attention must also be paid to the types of information solicited and whether respondents would be in the position to answer questions even if they felt inclined to do so. Crawford (1979) suggested that asking company personnel to recall sets of new products over a five year period is too memory intensive, subjective and may vary between functions such as marketing and R&D. The design of this research project ensures that this type of bias is avoided by measuring projects in *real-time*. In response to the later issues of propensity to respond, Brown *et al* (1984) noted that the use of single informants is valid when the respondents possess unique process insights. Cooper and Kleinschmidt (1994) add that while variables measured retrospectively may product key informant after-the-fact rationalisation, objectively worded scales are common in this type of work and are thought to limit bias.

Each section of the questionnaire will now be addressed. The final research questionnaire can be seen in Appendix two.

4.1.3.3.1 New Product Project Overview

As has been noted previously (section 3.2.2), managers completing the first section of the questionnaire were required to provide information regarding two new product projects, one *accepted* and one *rejected.* They were provided with the following guidelines:

- Focus on two specific current or recent NPD projects that you have direct responsibility for, or are directly involved with (e.g. through project teams).
- One of these projects has proceeded through to the next stage of its development (*accepted* project), the other one has not (*rejected* project).

Respondents were then asked to indicate the type of projects they had chosen (e.g. new soap powder, new count-line) to further clarify the type of projects selected. They were asked to assign the projects they had selected to a measure of project classification. These classifications were borne from past research (Mathews, 1997; Booz *et al*, 1982) and were revised during pre-testing of the research instrument. Whilst it would have been easier to apply existing classification variables en-bloc, the industrial and cross-industry nature of past research meant that classifications had to be amended in order that they were relevant to the *fmcg* sector. The following classifications and guidelines were given:

- New products range from the radically innovative to those displaying incremental changes. For the projects you identified in the previous question, please indicate which classifications they fit into. Tick *one* box only for each project.

The specific categories of project were:

1. **Category innovation products** - New products/brands, true innovation in a category, creates categories.
2. **Equity transfer products** - Existing brand name extends to other products.
3. **Competitive market entry** - Very similar to existing products within category.
4. **Line extensions and improvements** - New flavours, forms, sizes, revitalises product or increases shelf space.
5. **Temporary and seasonal items** - Product use is date or season specific.

The information provided by respondents was specific to a particular stage of the new product development process. Respondents were, therefore, required to provided information regarding the stage of development the project was at, or had been screened out at. They were given the following guidelines:

- Please indicate the category that best represents the stage of the NPD process, which the *accepted* project is at, and the stage at which the *rejected* project was discontinued. Tick *one* box only for each project.

The stages of development were as shown in Figure 3.7. Managers were provided with the following short definitions in order to clarify what was meant by each specific stage:

1. **Concept/Idea stage** - Concept generation, idea screening, focus groups, initial consumer views.
2. **Evaluation stage** - Quantitative market evaluation, technical and production analysis, second screen.
3. **Development stage** - Product development, in-house prototype testing, consumer testing, test marketing.
4. **Pre-Launch stage** - Pilot production, pre-launch business analysis, market launch preparation.

4.1.3.3.2 Project Characteristics

The project characteristics section incorporates the major part of the research questionnaire, the screening characteristics. It is widely acknowledged that questionnaires should introduce the main issues of the investigation as soon as possible to maintain the interest of the respondent (discussed in more detail in section 4.1.3.6). In this section, 39 items of project characteristics were presented in 4 factor groupings; *Product differential advantage, Product promotion, Product - newness to the firm* and *Product characteristics.* A full breakdown of these questionnaire items can be seen in Table 3.3. Managers were given the following guidelines to aid them in their completion of the questionnaire:

- Please indicate the extent to which you agree or disagree with the following statements concerning the *accepted* project and the *rejected* project.

4.1.3.3.3 Synergies

The third section of the questionnaire also incorporates individual screening criteria and measures their relevance to the *accepted* and *rejected* projects. In this section, 22 items were presented in the factor groupings of *Corporate synergy* and *Trade synergy*. Again, a full breakdown of these questionnaire items can be seen in Table 3.3.

4.1.3.3.4 Market Characteristics

Section four of the questionnaire consists of 42 items in the factor groupings of *Nature of the market*, *Competitive and market intelligence*, *Financial potential* and *Market strategy*. A full breakdown of these questionnaire items can also be seen in Table 3.3.

4.1.3.3.5 Branding Characteristics

The fifth and final section of the questionnaire, follows the preceding sections by presenting 13 items relating to *Product branding*. A full breakdown of the questionnaire items in this final screening and evaluation item section can be seen in Table 3.3.

4.1.3.3.6 Additional Screening and Evaluation Criteria

The final part of the screening section of the questionnaire would identify any further screening and evaluation measures that may be specific to the products or company in question. Managers were given the following guidelines:

- Please note any evaluation criteria we didn't ask you about and rate them accordingly by circling the appropriate number for the *accepted* and *rejected* project.

This section was incorporated into the questionnaire for two reasons. Initially the omission (or inclusion) of extra items would address the validity of the measures incorporated in the questionnaire. Secondly, and perhaps more importantly, this section would offer a forum for those managers who felt that other screening evaluation measures were also important. This would allow the respondents to assist in the further development of scales used in subsequent research projects.

4.1.3.3.7 Background Information

Background information is split into two sections. The first asks the respondent to indicate their *functional responsibility* and *management level* in order that data were available on the types and seniority of respondent. Montoya-Weiss and Calantone (1994) in their meta-analysis, noted that the managerial level of respondents was given in only 36% of studies, whereas the functional role of the respondents was reported in 74.5% of the studies. Of these functional respondents, 40% were listed as managers, creating confusion about what 'manager' level actually is. Respondents were also required to indicate the type of markets that the identified products are or were being developed for. The categories given for *functional responsibility* were (Hultink and Robben, 1995):

1. Marketing
2. Sales
3. R&D/Design
4. Finance/Accounting
5. General Management

An 'other' category was also provided to allow respondents some freedom to offer their own opinion on their functional responsibility to ensure that all important alternatives had been listed (Malhotra, 1996; Oppenheim, 1992). The management level categories that were given were:

1. Director (including CEO)
2. Senior management
3. Middle management
4. Line management
5. No management responsibility

Respondents were also required to indicate the size of the markets that the identified products were being developed for launch into. The categories they were given were:

1. Global
2. Regional (e.g. Europe, North America etc.)
3. International (e.g. several national markets)
4. National

The second section uses firm-size measures to characterise responding organisations (Mishra *et al*, 1996). Several investigations have used measures of 'number of employees' (Hart *et al*, 1994; Bilkey, 1985; McConnell, 1979) and 'annual sales' (de Brentani, 1986, Booz *et al*, 1982; Pessemier, 1982; Wind, 1982, Cooper, 1980) as size indicators. The present study includes a question regarding the nationality of the parent company. The data provided will give an indication of ownership of the organisations present in the UK and offer some indication of the origin of NPD practises in the UK *fmcg* sector. The questionnaire also asks for data regarding the cycle time for a typical successful project (from conception to launch). This information will facilitate comparison with other investigations that indicate the cycle time for new industrial products. It will also go some way to refuting or verifying the widely held belief that new product cycle times in the *fmcg* sector are short and shortening (Dwek, 1996).

4.1.3.3.8 Follow-Up

The final section of the questionnaire gives the opportunity for respondents to provide further information for the *accepted* project they had selected, by measuring the same project at the next stage of the development process. This section asks respondents if they would be willing to participate in a follow-up to the original questionnaire they had just completed. They were given the following guidance:

- Thank you for completing the above questionnaire. It would be of great value to this study if the same questions could be applied to the successful project *later on in the development process* by completing the questionnaire again at the next stage of evaluation.

If they answered *yes* they were asked to provide information regarding the project name and further contact details. This would allow the researcher to process the follow-up questionnaire and to improve identification of the project concerned. They were assured that the information would only be used for the identified research purposes and would be treated in strict confidence. This survey follow-up will be dealt with in more detail in section 4.2.2.1.

4.1.3.3.9 Summary

Self-reported measures were used throughout the questionnaire to elicit information on all the sections identified above and their limitations and remedies were carefully considered (Gupta and Beehr, 1982). These self-reported measures were deemed appropriate for two major reasons. First, managers were not asked to provide any information regarding personal performance or self-appraisal (Campbell and Lee, 1988; Mabe and West, 1982). Second, although self-reported measures may show upward bias there was not to be any measure of the degree of new product performance. Therefore, there was a reduced probability of inflated correlation between success/failure and other variables (Churchill *et al*, 1985). Accordingly, as with many other NPD studies self-reported measures were adopted for this survey (Calantone *et al.*, 1988, 1996; Song and Parry, 1996; Parry and Song, 1994; Cooper and Kleinschmidt, 1987a; Cooper, 1979a, 1979b).

4.1.3.4 The Form of Response

Once the content of the individual questions is decided upon the researcher must select the appropriate form of the response, open-ended or closed ended response (Aaker *et al*, 1998, Churchill, 1995).

4.1.3.4.1 Open Ended Responses

Open-ended questions offer the researcher a wide range of responses which are achieved by the lack of influence in the responses from prespecified categories (Aaker *et al*, 1998). They do, however, give rise to wide variability in the clarity and depth of responses and also the resulting comparability. For this reason, open ended questions are only used for the descriptive questions regarding the types of products chosen (section 4.1.3.3.1), additional evaluation criteria that may be relevant (section 4.1.3.3.6) and some background information (section 4.1.3.3.7).

4.1.3.4.2 Closed Ended Responses

Closed-ended questions require the respondents to make on or more choices from a given list of responses (Aaker *et al*, 1998). These answers could be either multichotomous (fixed-alternative requiring respondents chose the alternative that most closely corresponds to their position), dichotomous (a fixed alternative with only two alternatives listed) or scaled answers (fixed alternative employing a nominal, ordinal, interval or ratio scale to assess the rating or ranking of a questionnaire item) (Aaker *et al*, 1998; Lehmann *et al*, 1998; Churchill, 1995).

Closed-ended questions are (1) easier to answer, (2) require less effort by the interviewer and (3) make tabulation and analysis easier (Aaker *et al*, 1998). There is reduced potential for error due to the way questions are asked and responses recorded. They are less time consuming to answer and respondents' answers are directly comparable (assuming comparable interpretation of questions by respondents) (Aaker *et al*, 1998; Malhotra, 1996). Aaker and Day (1990; p 242) suggested that;

"Comparability of respondents is an essential prelude to the use of any analytical methods".

The majority of the questions in this investigation are closed-ended. The questions regarding project classification and development stage use multichotomous answer options that can be seen in section 4.1.3.3.1. The individual questionnaire items (Table 3.3) all utilise interval Likert-type scaled responses, where the scale establishes an ordered relationship between items being measured. Numbers indicate whether the characteristic is given more or less of a characteristic than another respondent. This scale possess equality of intervals between adjacent scale values (Diamantopoulos and Schlegelmilch, 1997).

Single item measures are considered to be notoriously unreliable and imprecise. Scales are, therefore, often used to represent constructs (Spector, 1992; p 4);

"Which are broad in scope and not easily assessed with a single question".

Many methods are available to measure a sample of beliefs toward the attitude objects that are then combined into some form of average score. Three of the most commonly used scales are summated or Likert scales, semantic-differential scales and Stapel scales (Churchill, 1995; Luck and Rubin, 1987).

Likert type scales are most frequently used in NPD research and allow the respondent to indicate an expression of intensity or feeling towards an item (Aaker *et al*, 1998; Churchill, 1995). Subjects are asked to indicate their agreement or disagreement with each and every statement in a series by marking the appropriate category. These scales have several advantages in that they are easy to construct and administer, and the respondents have no problems in understanding them (Malhotra, 1996). Respondents have little problem finding opposite terms in the scale and there is only one, uniform set of response categories (Luck and Rubin, 1987). The scales also provide clarity with only one description for each item (Luck and Rubin, 1987) and assist continuity since the use of the same scale responses, both of which stimulate responses because they make the questionnaire easier to respond to.

The next consideration must be the number of response categories offered. Typical scales within industrial NPD studies utilise the 11 point Likert scale (Song and Parry, 1997; Calantone *et al*, 1996; Cooper and Kleinschmidt, 1995; Cooper, 1979a,b). It is suggested that the more scale categories there are, the more precise the responses will be. There is, however, reason to believe that respondents can get confused with too many categories to choose from (Aaker *et al*, 1998). A desirable quality of a measurement scale is variability. If a scale fails to discriminate differences in the underlying attribute, its correlations with other measures will be restricted and its utility limited (DeVellis, 1991). In pre-testing 11 point and seven point scales were found to be unnecessarily detailed (discussed in more detail in section 4.1.3.8.1). Respondents were asked to indicate the extent to which they *agree* or *disagree* with statements (items) concerning the *accepted* project and *rejected* project. They indicated this opinion on a five point Likert-type scale with anchor points *of one - disagree* and *five - agree.*

Questions regarding functional responsibility, management level and the market for which the products were being developed were provided with multichotomous answer options, the categories for which can be seen in section 4.1.3.3.7.

4.1.3.5 Question Wording

The wording of particular questions can have a significant effect on the way a respondent interprets them (Aaker *et al*, 1998). Poor wording of a question can cause a respondent to refuse to answer it (having already agreed to participate in the study) or to answer it incorrectly (either on purpose or due to misunderstanding) (Churchill, 1995). Researchers must be aware of some basic rules when asking questions (Aaker *et al*, 1998; Lehmann *et al*, 1998; Churchill, 1995). Use simple words, avoiding (academic) jargon that may be neither used nor understood by respondents. Avoid ambiguous words and questions or double barrelled questions. Questions should have clear and complete response options where respondents can express only a single view. Avoid leading questions that give respondents a clue as to how they should answer. By utilising questionnaire items that have been used in previous NPD research, the current project looks to avoid as many of these issues as possible. It must be stressed, however, that the sample of *fmcg* firms is significantly different to that of industrial product manufacturers. Care was taken, therefore, to ensure that all questions were screened for relevance, applicability and clarity within the *fmcg* sector. Pre-testing and pilot-testing played a large part in this process (section 4.1.3.8). The researcher also took precautions to ensure that the wording of each question was relevant to *both* the *accepted* and *rejected* projects.

4.1.3.6 Question Sequence

Having decided on the form of the response and the wording for each question the real task of putting the questionnaire takes place (Churchill, 1995). The order or sequence of questions will be determined initially by the need to gain and maintain the respondent's co-operation and make the questionnaire as easy as possible for the researcher to administer (Aaker *et al*, 1998). The current study used simple opening questions (Aaker *et al*, 1998; Churchill, 1995) to focus the mind of the respondent on the *accepted* and *rejected* projects they had selected for the research project (section 4.1.3.3.1). These questions asked for information concerning the selected projects, their project classification (degree of innovation) and the stage at which they are or were screened out.

The questionnaire then moved logically (McClendon and O'Brien, 1988; Krosnik and Alwin, 1987) on to those criteria used in the screening and evaluation process (sections 4.1.3.3.2 to 4.1.3.3.5). To improve the ease with which respondents could complete the questionnaire, individual questionnaire items were placed in 11 factor groupings under the four overall headings of *Project characteristics*, *Synergies*, *Market characteristics* and *Branding characteristics* (Table 3.4). This process also minimised the effects of order bias since it is accepted that (Aaker *et al*, 1998; p 322);

"The nature of the preceding questions establishes the frame of reference to be used by the respondent".

The background information section of the questionnaire asks for the majority of the classification information (Churchill, 1995). This follows proper questionnaire protocol by securing the basic information first and the classification information last (Churchill, 1995). The questionnaire concluded with a request for participation in a follow-up questionnaire. Completion of this section would compromise the anonymity of the respondent. Accordingly, this section was placed at the end of the questionnaire to allow respondents to leave the section blank having completed the prior questions.

4.1.3.7 Physical Characteristics of Questionnaire

The physical characteristics of a questionnaire can affect how respondents react to it and the ease with which the replies can be processed (Churchill, 1995). These characteristics assist the researcher in securing acceptance of the questionnaire where the style of the questionnaire should reflects it's importance. The questionnaire opened with a confidentiality statement after pre-testing showed that confidentiality of firm and respondent was a key issue (discussed in more detail in section 4.1.3.8).

Methodological research recommends the numbering of questions to aid completion, editing, coding and tabulation (Churchill, 1995; Malhotra, 1996). However, due to the comprehensive nature of the questionnaire and the large number of questions (133 including classification questions for both *accepted* and *rejected* projects) it was thought that this would make the questionnaire seem too cluttered and complex which hamper completion. Therefore, sections were numbered but individual questions not.

The use of a postal questionnaire requires that consideration be made for a number of other factors, including questionnaire length and the cover letter, both of which impact on the response rate (Diamantopoulos and Schlegelmilch, 1996). Literature on the length of a questionnaire offers conflicting advice. Jobber (1989) and Jobber and Saunders (1986) found that 58% of the mail surveys in an industrial setting were between four and ten pages. Yu and Cooper (1983; p 39) suggest that the length of the questionnaire is;

"Nearly uncorrelated with the weighted average response rate associated with that length".

However, while we may not be able to conclusively say that a short questionnaire will improve response rate, it is fair to suggest that a concise questionnaire will not hinder the response rate The questionnaire was copied back-to-back on A4 paper. This reduced the physical length of the questionnaire from eight to four sheets, which improved the perception of questionnaire length and halved the costs of copying. The final pre-tested questionnaire (single-sided) can be seen in Appendix two.

The covering letter is also considered to impact greatly on the level of acceptance of the questionnaire (Churchill, 1995). It is vital that the cover letter convinces the designated respondent to co-operate and includes all the important points identified by methodological literature (Diamantopoulos and Schlegelmilch, 1996; Churchill, 1995; Oppenheim, 1992; Diamantopoulos *et al*, 1991). This will be discussed in greater detail in section 4.1.3.8 when the mechanics of the pre and pilot-tests are discussed.

4.1.3.8 Questionnaire Pre-Test and Pilot-Test

The purpose of a pre-test is to ensure that the questionnaire meets the researcher's expectations in terms of the information that will be obtained (Aaker *et al*, 1998). It serves the same role in questionnaire design that test marketing serves in new product development (Churchill, 1995). It has also been found to be especially important to pre-test novel research projects (Peterson, 1988). This investigation with its new research sample, research methodology and framework, could be placed in such a category.

Several authors recommend the use of two stages of testing if the final survey is not going to be carried out using personal interviews (Churchill, 1995; Peterson, 1988). A distinction should, therefore, be made between a pre-test and a pilot survey (Green *et al*, 1988). The first pre-test stage should be undertaken by personal interview regardless of the method of administration (Churchill, 1995). This would be advantageous, enabling the interviewer to notice reactions, hesitations, and other cues by the respondent that could not be obtained via telephone or mail (Hunt *et al*, 1982). The second pilot-test stage would be (Churchill, 1995; p 438);

"To uncover problems unique to the mode of administration".

It should be a small scale test of the medium to be employed in the main study, including all activities that will go into the final study including coding and tabulation (Churchill, 1995). The sample, while remaining small, should mirror that of the main study and cover all subgroups of the target population (Tull and Hawkins, 1990).

The most appropriate respondents for pre-testing has also been the subject of much discussion. The use of 'expert' respondents such as academic researchers not directly involved with the research has been recommended (Green *et al*, 1988; Hague, 1987b). Diamantopoulos *et al* (1994) suggested that it would be a good strategy for enhancing error detection.

4.1.3.8.1 Pre-Test Stage

The pre-test stage was used to elicit views from both the academic and management community on a broad range of methodological, administrative and process issues. Several groups of issues were considered that broadly complied with those pre-test concerns noted by Aaker *et al* (1998);

- The broad objectives of the research project.
- The suitability and fit of the suggested development stages (Figure 3.7).
- The identified project classifications.
- The new product screening items (Table 3.3). Are they identifiable, relevant and applicable?
- Background questions. Are they relevant and are the response categories identifiable?

- General layout and style. Is the questionnaire appealing? Does the flow of questions hinder completion? Is the language used appropriate and clear?

Overall, it was necessary to understand whether the respondent could complete the questionnaire if it was presented in its current format and to identify any underlying methodological issues. Additional information was sought from managers concerning the most appropriate method of reaching the target person within the organisation i.e. who were the people within their organisations who were responsible for new product decision making?

The research questionnaire was pre-tested by eight academic experts, two new product development consultants and 10 brand and NPD managers from branded *fmcg* manufacturers. The pre-testing took place between May and June of 1998. Academic experts were the first group to pre-test the questionnaire to screen potential problems before presenting the questionnaire to managers in the field.

The two major methods for eliciting respondents' reactions to the questionnaire are (1) Protocol, where the respondent thinks out loud as they answer each question; and (2) Debriefing, where questions and associated problems are discussed after the questionnaire had been completed (Malhotra, 1996; Aaker *et al*, 1995; Hunt *et al*, 1982). Both methods have their problems. Protocol interviews can cause bias where the act of thinking consciously about decisions alters the decision and hence the response given. With the debriefing method, problems encountered near the beginning of the questionnaire may be forgotten or their importance diminished by other, later issues.

The researcher endeavoured to minimise the respective problems by utilising the best aspects of both methodologies. In all instances a questionnaire was sent out to the respondent with a two page summary of the research project and it's objectives (Appendix three). The salient discussion points (noted above) were outlined in a covering letter. The 10 managers who participated in this pre-testing stage were asked to complete the questionnaire. Ten face-to-face and 10 telephone interviews were conducted (telephone interviews were conducted when time pressures prevented face-to-face methods). In each interview, respondents went through the questionnaire highlighting issues that needed to be remedied and offering their views on the discussion points. Of the 10 *fmcg* managers that participated in this stage of the project, five completed questionnaires.

Responses from the academic 'experts' mainly covered areas of questionnaire design and the style and wording of questions. Incremental changes were incorporated into the questionnaire after each interview and before the next. Some of the concerns raised were;

- Need to stress confidentiality early on in the questionnaire.
- Remove detailed introductory paragraph and place in covering letter.
- The anchor points of *one - very important* and *seven - very unimportant* were considered to be incompatible with the wording of some questions and the required responses.
- Probably too long and complicated. Respondent fatigue is likely to be a problem.
- Need to improve the wording and clarity of measurement items.
- Ensure the response categories are exhaustive and relevant.
- Move personal information section to the end of the questionnaire.

Having made changes recommended by the academic 'experts', pre-test interviews were undertaken with the two new product consultants and 10 NPD managers. Again, incremental improvements were incorporated into the questionnaire as and when recommended. Responses from this group of interviewees tended to be more specific. Concerns included;

- The screening criteria do not really reflect the importance of the retailer. We cannot launch a new product without being certain that there is a category growth story.

- Generally the less open-ended questions the better. Brand managers are very worried about revealing more information than absolutely necessary (especially in NPD). Closed-ended questions are a very good way around this issue.
- It is important to make it clear from the outset that the response can be anonymous, not just for the individual but also for the company.
- You don't really need to measure the criteria on a scale of *one* to *seven*. This offers too much detail and makes the questionnaire look cluttered. *One* to *five* would be much better and more concise.

Having completed this detailed pre-testing stage of the research process, several key changes were made to the questionnaire (The final version can be seen in Appendix two). The major changes were as follows;

1. **Introduction page** - A large, comprehensive, confidentiality statement was incorporated into the front page to reassure respondents of their individual and organisational confidentiality. This statement noted that *"The data obtained by this questionnaire will only be used by Aston Business School for the purposes of academic research and no information provided will be attributed to persons in part or in full without their prior written consent"*. The detailed introductory paragraph was removed and placed in the covering letter, improving both the appearance and flow of the questionnaire.
2. **New product project overview** - The project classifications were adjusted to reflect the *fmcg* marketplace and their definitions were tightened. The definitions for the development process stages were similarly adjusted to make them clearer. The company characteristics section was placed at the end of the questionnaire along with the follow-up section.
3. **Screening and evaluation characteristics** - The anchor points for scale measures were changed to one = disagree, five = agree. Individual questionnaire items were adjusted to take consideration of this fact. Several screening and evaluation criteria were removed from the questionnaire after pre-testing to reduce repetition and purify the items included. The pre-test stage highlighted the need for

inclusion of several measures. Four items measuring *Trade synergy* were incorporated into the questionnaire;

a) "*It would be easy to get shelf space for this product*"
b) "*This product would have strong trade support*"
c) "*The firm has strong relationships with the trade*"
d) "*The company has important goodwill and reputation at the trade level*"

The items "*This product category would be important to the trade*" and "*This product would have a low risk of cannibalising other of own firms products*", were included in the *Nature of the Market* category. The items "*This product required significant financial investment*", "*This product would offer high profit margins*" and "*This would be a profitable category for the trade*" were included in the *Financial Potential category.* Finally the three items "*The product would be launched in response to competitor activity*", "*The product would be launched to make the market more difficult for competitors*" and "*The product would be launched to provide a range of product offering*" were incorporated into the *Market Strategy* category.

Whilst the length of the questionnaire had been noted as a possible problem, managerial pre-testing had highlighted the necessity of a comprehensive list of screening and evaluation measures. It was deemed necessary to include all the 116 final screening and evaluation measures. The updated questionnaire was used in the pilot-survey.

4.1.3.8.2 Pilot-Test Stage

The pilot-test, as suggested previously, is used to find out if there are any problems unique to the method of administration, in this case a mail survey. The results of this test allowed the researcher to tabulate responses to check on the conceptualisation of the problem and the data and the method of analysis necessary to answer it (Churchill, 1995). The required size of pilot-test samples is somewhat vague.

Zaltman and Burger (1975), suggest that sample sizes should generally be small, covering all subgroups of the target population (Green *et al*, 1988). Some researchers offer specific values (Boyd *et al*, 1989; Hague, 1987a; Kinnear and Taylor, 1987; Luck and Rubin, 1987), while others suggest that the sample should not be a fixed figure but should be a function of the instrument and the target population; the more sophisticated the target population the smaller the required sample (Hunt *et al*, 1982). Correspondingly, the longer and more complex the instrument the larger the test sample. The relevant sample size must always be considered in the light that this stage is the most inexpensive insurance the researcher can buy to ensure the success of the questionnaire and the research project (Churchill, 1995).

Given the length of the questionnaire and sophistication of the sample population, the updated questionnaire was sent out to 20 managers in branded *fmcg* firms from the total sample of 400 firms discussed earlier (section 4.1.2). In each case the firm was contacted by telephone and the manager responsible for the firms new product development programme contacted (section 4.2.1). Having introduced the research project the co-operation of the manager was requested. Of the 20 firms contacted, 18 managers agreed to take part in the study.

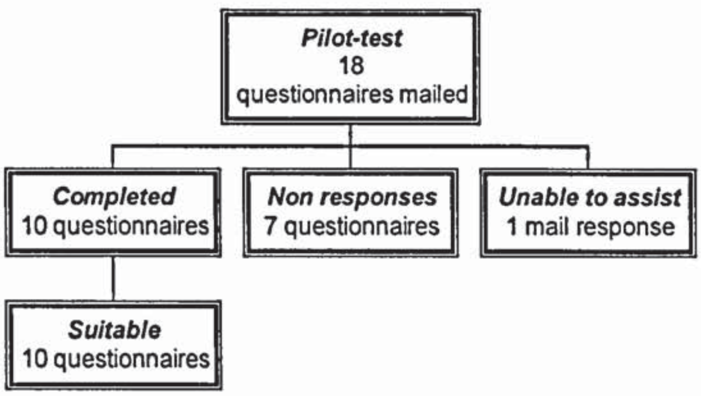
A questionnaire was sent out to each manager with a covering letter attached (Appendix one). This covering letter was printed on University headed notepaper and individually signed, which lends credibility to the study (Churchill, 1995). Each letter notified the respondent of the research objectives, the organisations supporting the project and the value to both researcher and respondent of completing the questionnaire (Diamantopoulos and Schlegelmilch, 1997, Churchill, 1995; Jobber, 1986). Assurances of confidentiality and anonymity were conspicuously noted (Diamantopoulos and Schlegelmilch, 1996; Churchill, 1995; Oppenheim, 1992; Diamantopoulos *et al*, 1991). Each questionnaire package also included a reply-paid envelope for the return of the completed questionnaire. It has been shown that by lowering the cost of participating in the project, the researcher can improve the response rate (Diamantopoulos and Schlegelmilch, 1996; Jobber, 1986; Herberlein and Baumgartner, 1978).

Respondents were given two weeks to reply to the initial mailing of the questionnaire. Where no response was received a reminder letter (Appendix four) and questionnaire pack was sent out to the respondent. An additional two week period was given for the respondent to reply to this mailing. Where no response was forthcoming a second and final reminder letter (Appendix five) was sent out, again with an additional questionnaire pack. The pilot-test questionnaires were sent out in July and August of 1998.

Of the 18 managers who agreed to participate in the survey, 10 responded with completed questionnaires. One of these managers also agreed to, and provided a follow-up questionnaire. Therefore, the final response was 11 completed questionnaires yielding data relevant to 11 *accepted* projects and 9 *rejected* projects. The effective response rate (Churchill, 1995; p 661) for the pilot-survey was 56 %.

Figure 4.2 Breakdown of Pilot-Test Questionnaires

Pilot-Test



Of the seven non-responses, three managers indicated that their firms did not participate in these type of surveys, while one manager was away on holiday and cited time pressures as a reason for non-response. The remaining two questionnaires remained unanswered. The section of the questionnaire that requested any additional questionnaire items yielded three responses with four additional items recommended;

1. "*The product was seen as unique by consumers*"
2. "*The product had an above average definite purchase interest*"
3. "*This product improves profit mix*"
4. "*Utilised spare production capacity*"

When these items were addressed in detail with those items already present in the questionnaire, they were deemed to have been sufficiently covered by other screening and evaluation criteria. They were not, therefore, included in the final questionnaire. The success of this pilot-test stage justified the movement of the project onto the main survey stage.

4.2 Main Survey

The administration of the main survey was exactly as was discussed in the pilot-test stage above. Of the 400 firm addresses collected for the sample frame, 350 managers were identified who were willing to participate in the survey and were subsequently sent out a questionnaire pack and covering letter. In a handful of cases, managers were identified by colleagues as the most appropriate person to complete the questionnaire but were not able to be contacted. In these instances (32) a letter was sent requesting the assistance of that person. In fewer still cases (26) questionnaires were sent out to brand managers for particular products. These instances occurred when organisations refused to give out information regarding employees names or responsibilities. It was felt that instead of ignoring these firms, speculative approaches would be made.

4.2.1 Research Administration

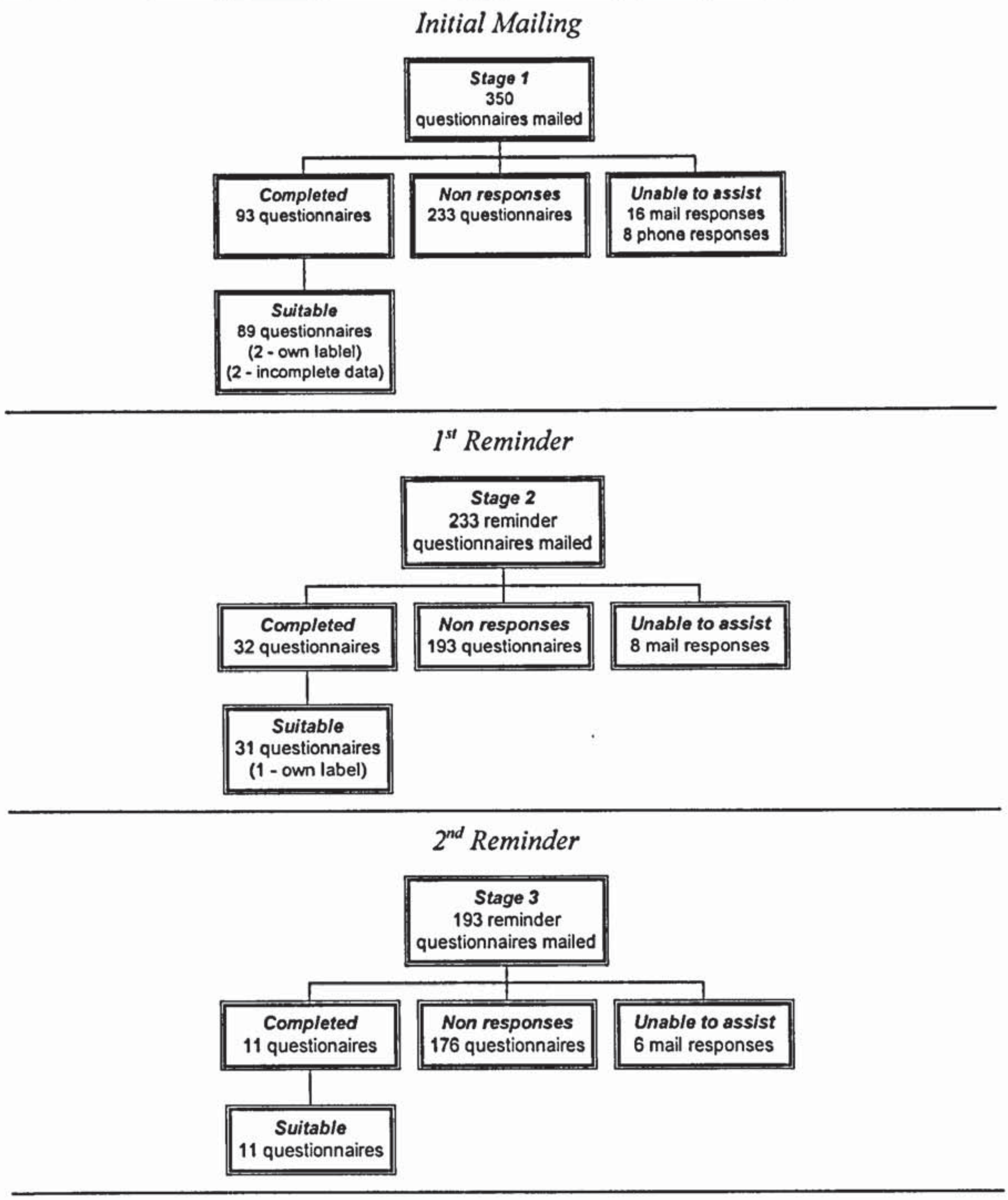
All other potential respondents were pre-notified by the researcher and their co-operation solicited. The research project was introduced as a major joint research initiative between Aston Business School and Warwick Business School investigating new product development within branded *fmcg* manufacturers. Respondents were made aware that the project was looking at the *criteria* managers use to screen new product projects and how the importance of these criteria may vary between different stages of the development process. Their responses would help identify those criteria that are critical to the successful movement of a project through the stages of the development process and assist management in the effective allocation of resources. Telephone pre-notification also allowed the researcher to identify whether the organisation were currently active in developing and marketing *branded fmcg* products. Personal, telephone pre-notification is also known to improve response rate (Hart *et al*, 1998; Mitchell and Nugent, 1991; O'Keefe and Homer, 1987; Jobber *et al*, 1985; Yu and Cooper, 1983; Kanuk and Berenson, 1975; Brunner and Carroll, 1969).

In the same manner as the pilot-test, two reminder letters were sent at two week intervals when a response had not been forthcoming. Mail reminders have been found to improve the survey response rate and are commonly used in the new product and marketing literature (Song and Parry, 1996). Reminders should be undertaken as frequently as is necessary for an acceptable response rate (Herberlein and Baumgartner, 1978), but not so frequent that there is the danger of annoying the respondents. Lambert and Harrington (1990) noted that in each mail survey there should be a provision for at least one reminder questionnaire so that any bias in the answers of original respondents can be partially corrected. They go on to say that some estimate of the probable answers of non-respondents can be made from the respective groups of respondents. The main survey was administered between September and December of 1998.

4.2.2 Survey Response Rate

Of 350 questionnaires sent out, 136 completed questionnaires were returned. The original 136 returned questionnaires yielded a response rate of 39% (Churchill, 1995). From this sample, three questionnaires contained data referring to own-label products and two questionnaires contained large amounts of missing data (section 4.2.2.3). These questionnaires were unsuitable for this research project. The remaining 131 questionnaires yielded a useable response rate of 37%. The number of projects for which data were collected in this investigation compares favourably with existing new product investigations, for example 102 successes and 93 failures (Cooper,1979a,b); 77 successes and 71 failures (Zirger and Maidique, 1990); 123 successes, 80 failures and 47 kills (Cooper and Kleinschmidt, 1990) (noted in more detail in Table 2.6). The response rate also compares favourably given the wide variation in reported response rates: Hart *et al* (1998), 23% in their UK sample; Cooper and de Brentani (1984), 58.1%; Cooper (1979a), 69%. These quoted response rates must, however be viewed with some caution. Yoon and Lilien (1985) note that their study represents a convenience sample drawn from a list of 500 industrial firms registered in France. Respondents were selected by telephone interview and contacted to elicit their support. The acceptance rate is quoted as 83% yet the final sample size was 112 products from 52 firms. Superficial comparisons with such reported response rates can present a misleading picture when differences in the calculation of values are not taken into consideration. The breakdown of returned questionnaires can be seen in Figure 4.3.

Figure 4.3 Breakdown of Main Survey Questionnaires

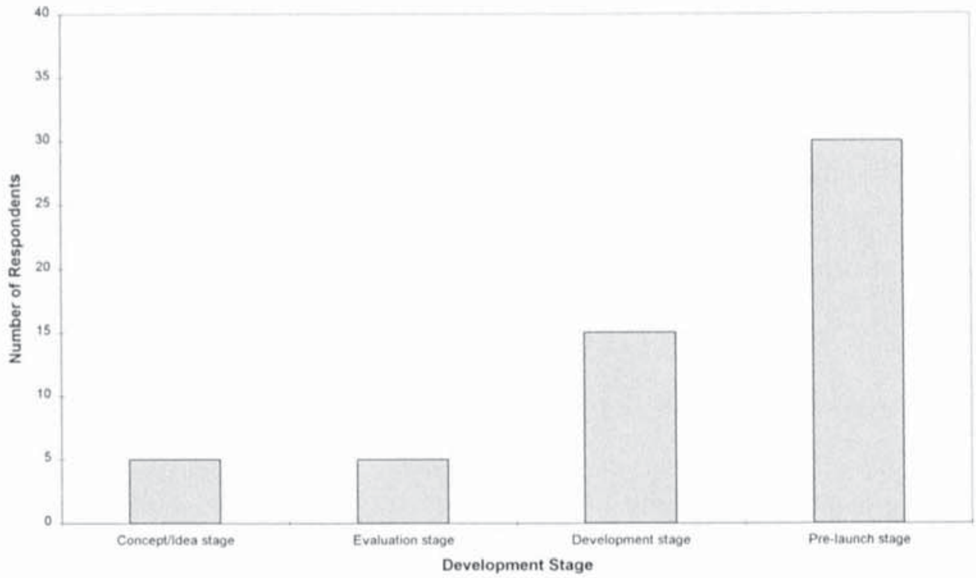


4.2.2.1 Survey Follow-Up

Earlier in this chapter (section 4.1.3.3.8), the opportunity for respondents to participate in a follow-up to their original questionnaire was discussed. This would consist of the respondent completing a second questionnaire for the *accepted* project when it had reached the next stage in its development cycle (the *rejected* project was screened out and removed from the firm's NPD portfolio). Where a respondent had indicated that they would be willing to participate in a follow-up questionnaire a second questionnaire pack was mailed. The timing of this mailing reflected the respondents indication of the length of a typical development cycle (section 4.1.3.3.7). This allowed an estimation to be made of the length of time needed before the project had reached the next stage of the development process. In contrast to the main survey, a reminder letter and questionnaire pack were sent out to respondents after four weeks in cases where a response had not been received. It was felt that a longer period was needed for respondents to reply to follow-up mailings. The response time could be much more to do with the length of the relevant development cycle rather than a propensity to respond. Copies of the follow-up and reminder letters can be seen in Appendix six and Appendix seven. A single reminder mailing was considered to be adequate to avoid harassing respondents who had already given a significant amount of time to the research project.

Of the 131 useable questionnaires, 55 respondents (42%) indicated that they would be willing to participate in a follow-up questionnaire. The overall survey response rate of 39% and percentage of 'would be' second-time respondents would seem to refute the suggestion made in pre-testing (section 4.1.3.8.1) that questionnaire length would hamper completion. Such a response also offer a degree of validation to the survey itself.

Figure 4.4 Follow-Up Responses by Project Development Stage

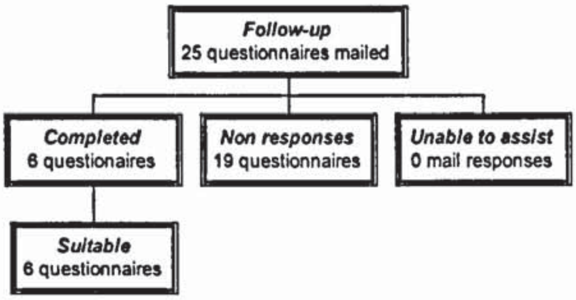


However, the breakdown of follow-up projects by development stage was somewhat disappointing. Of the 55 respondents that agreed to participate in the follow-up, only 25 respondents completed the questionnaire with respect to *accepted* projects at the Concept/Idea, Evaluation and Development stages of the process. A follow-up questionnaire would only be relevant at these stages since the next stage of development for a project at the Pre-Launch stage of the NPD process would be market launch, which is not relevant to this specific survey. Thirty of the 55 projects were at this Pre-launch stage where a follow-up would be inappropriate. The breakdown can be seen in Figure 4.4.

Follow-up questionnaires were sent to 25 respondents. Of these 25 questionnaires, six were returned (24%) with data from six *accepted* projects that could be included in the survey. The breakdown of this follow-up stage can be seen in Figure 4.5. These six questionnaires were included in the final data set. This yielded a final SPSS data file containing 137 questionnaires and 244 new product projects; 136 *accepted* projects and 108 *rejected* projects. These 244 projects will be discussed in greater detail in chapter five.

Table 4.5 Breakdown of Follow-Up Questionnaires

Follow-up



4.2.2.2 Survey Non-Response

The objective of sampling is to obtain a data set that is representative of the population as a whole. However, some sample members become non-respondents because they (1) refuse to respond, (2) lack the ability to respond, (3) are not available, or (4) are inaccessible (Aaker *et al*, 1998). Of the 213 questionnaires that remained unanswered, 38 responses were received that indicated an inability or unwillingness to complete the questionnaire. The breakdown of these responses can be seen in Table 4.1.

Table 4.1 Reasons for Questionnaire Non-Response

Reason	*Frequency*
Can not help	9
Cannot complete due to reasons of confidentiality	8
Not relevant to either the person or the company	8
No time to complete survey	7
Not a manufacturer of products	2
No UK new product development	2
Likely respondent has recently left the firm	1
Company is just an own label supplier	1

None of the above responses reflect a poor research design as the reason for non-response. In the eight cases where the survey was not relevant to the person or the company, the person contacted had been involved in NPD projects in the past but was not currently involved. This validates the research process and the checks put in place by the researcher to ensure that *only* current, *real-time* new products were surveyed and not projects that had been *accepted* or *rejected* in the past. Figure 4.6 shows the distribution of respondents and the time they took to respond.

Figure 4.6 Distribution of Responses by Return Date

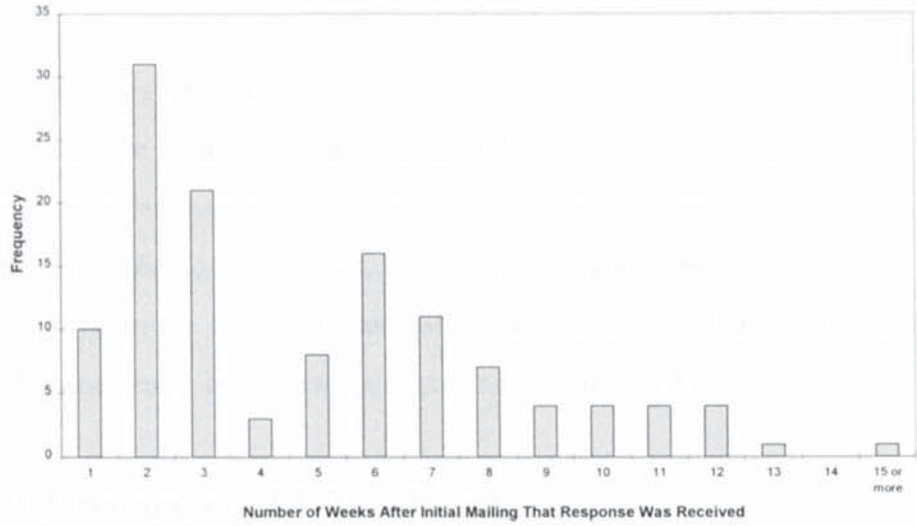


Figure 4.6 shows that a large proportion of respondents returned their questionnaire within the first few weeks of being mailed. The second peak could logically be explained by the reminder mailings that followed. The length of time taken to respond by the latter respondents (up to 13 weeks) must be viewed with some caution. The survey was administered up to and including the start of the Christmas holiday season. Some of the returned questionnaires were received after the holiday period. They may have been received earlier in a non-holiday period. The length of time it took managers to respond to follow-up mailings is not included in this chart since that may be much more to do with the length of development cycle than propensity to respond.

Questionnaire non-response only becomes of interest when the researcher finds a difference between respondents and non-respondents. If this is the case one can not be confident that the sample findings are representative and generalisable to the population. One method of estimating non-response bias that is common in the marketing and product development literature compares early and late respondents on selected variables (Song and Parry, 1996). This method of extrapolation compares respondents who reply readily against those respondents who take longer to reply (Armstrong and Overton, 1977). This method is based on a premise that late respondents or respondents to a later wave of mailing are more similar to non-respondents (Aaker and Day, 1990; Leslie, 1972). A *wave* refers to the generation of responses through the use of follow-up techniques (Armstrong and Overton, 1977).

To undertake this analysis, the first 20 questionnaires that were received were compared with the final 20 questionnaires collected to maximise separation. Using *t*-tests for independent samples the questionnaires were compared on the classification variables of *number of employees, sales turnover* and *length of a typical product development process*. No significant differences were found at the 95% confidence interval between early and late respondents as is shown in Table 4.2 below.

Table 4.2 Summary of T-Test Results

Variable	*Means*			
	Early Respondents	*Late Respondents*	*T statistic*	*Sig. 2 tailed*
Number of people employed in the SBU	361.24	704.90	-1.100	0.279
Sales turnover for the SBU in 1997 (£ mill)	59.83	134.26	-1.423	0.174
Typical length of NPD cycle for successful project	14.28	14.00	0.073	0.942

Analysis of early and late respondents on the classifications of managerial level and functional responsibility were considered but deemed inappropriate due to the methods used to select respondents (section 4.2.1). Respondents were selected by telephone pre-notification, rendering such a test of early and late respondents unsuitable.

4.2.2.3 Item Non-Response

Item non-response refers to specific questions in the questionnaire that a respondent has left unanswered or answered incorrectly. This could be as a deliberate act of non-completion or because of misunderstandings about the meaning of the question or its applicability. There are four broad reasons for item-non response and they can be seen to be similar to the reasons for sample non-response (Diamantopoulos and Schlegelmilch, 1997; Lehmann *et al*, 1998; Churchill, 1995):

1. The question did not apply to the respondent or respondent's organisation.
2. The respondent refused to answer the question.
3. The respondent did not know the answer to the question.
4. The respondent forgot to answer the question.

Non-response to particular items in a questionnaire may make interpretation of results difficult. When item non-response is truly random, it poses few major problems, however, when non-response occurs disproportionately in one or more categories, more serious problems arise (Lehmann *et al*, 1998). It is, however, up to the researcher to decide why the data is missing, whether the missing data is sufficient to warrant actions and how to deal with it (Diamantopoulos and Schlegelmilch, 1997; Hair *et al*, 1995).

The challenge for the researcher is to address the issues raised by missing data that affect the generalisability of the results (Hair *et al*, 1995). The analyst must determine whether the missing data is scattered randomly or whether distinct patterns are identifiable for either cases or variables (Hair *et al*, 1995).

Figure 4.7 Missing Data by Cases

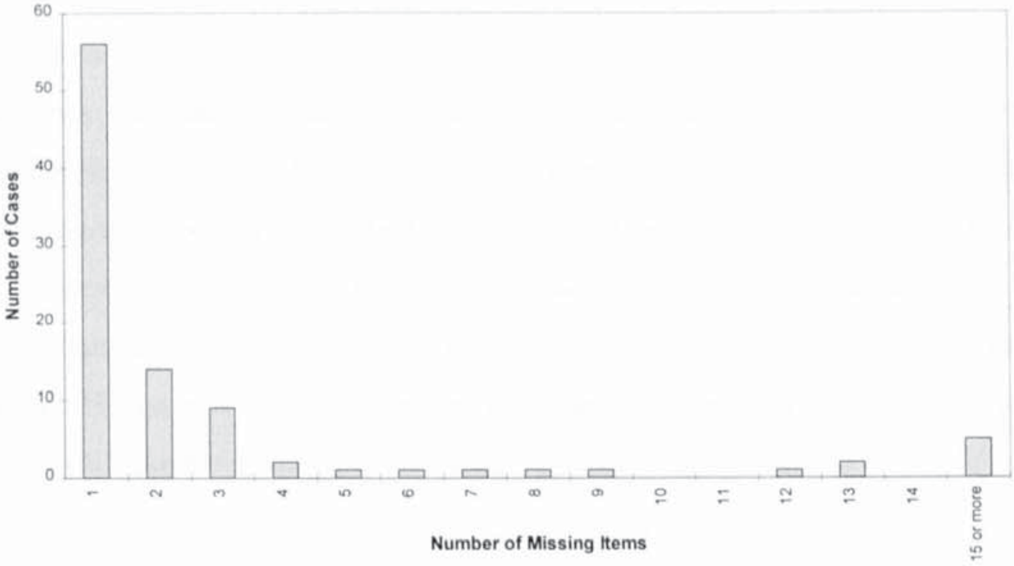


Figure 4.7 shows that there are five cases where 15 or more questionnaire items were not completed. These cases ranged from 16 missing items to 79 missing items. In each case the items missing spanned several sections of the questionnaire. Inclusion of these cases would hamper the subsequent analysis stages of this investigation. Accordingly, these five cases (numbers 25, 26, 60, 108, 174) were eliminated from the data set. Cases 118, 133 and 190 have 13, 12 and 13 incomplete items respectively. While this accounts for just over 10% of the items as missing, in these particular instances the missing data is confined to specific sections of the questionnaire. It was felt that to eliminate the whole case from the analysis would unnecessarily reduce the sample total, when the majority of items have been adequately completed. The omission of answers to a specific section of the questionnaire can be reasonably attributed to the question not applying to the respondent or respondent's institution rather than forgetfulness, refusal, or not knowing the answer as was suggested earlier (Lehmann *et al*, 1998; Diamantopoulos and Schlegelmilch, 1997; Churchill, 1995). In these cases the subsequent analysis and creation of summated scales will simply take cognisance of the omission of

answers from these specific cases. This will allow for the most appropriate utilisation of the data at our disposal.

This decision on how to deal with item non-response is partly determined by the statistical analysis that is to follow, as well as theoretical considerations. In this analysis we will be creating mean summated scales or composite measures of particular constructs (Hair *et al*, 1998). Therefore, problems associated with single missing items within a construct are reduced. The mean summated scale (discussed in more detail in section 5.2.1.6) will be calculated by summating the responses to questions in a scale and dividing this value by the number of items present in the scale. Hence, if a scale contains six items and has one item missing the summated scale will take the mean score across the remaining five items.

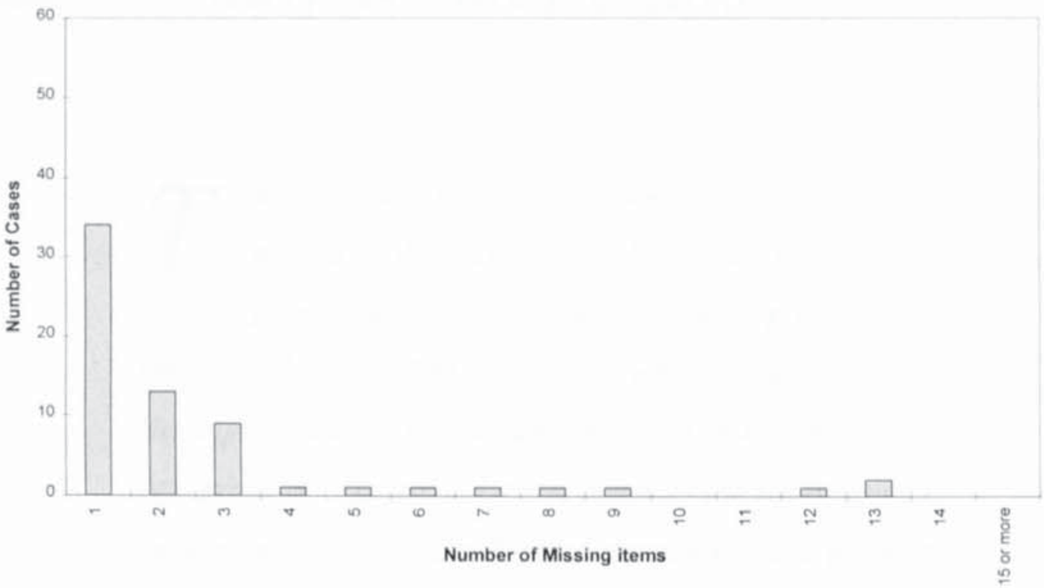
Aside from cases where missing data is prevalent, there are also instances where particular scale items were poorly completed. Only one scale item had more than 10% of cases where data were missing.

Product differential advantage (13 items)

- We will be the first to introduce this product type to market ***26 cases missing***

Preliminary principal component analysis showed that removal of this item would not reduce, but marginally increase, the variance explained by the factor structure (59.97% to 60.95%). Reliability estimates show only a slight decrease in the reliability of the scale items (0.84 to 0.81). Accordingly the item was removed from further analysis. Figure 4.8 shows the distribution of missing items by cases after removal of the above cases and item.

Figure 4.8 Missing Data by Cases After Case and Item Deletion



This figure shows a market reduction in the instances of missing data within the final SPSS data set. This allows the research project to move confidently on to the next stages of analysis.

4.3 Chapter Summary

This chapter has set out the framework from which the researcher can obtain data and set about answering the proposed hypotheses. It addresses how the theoretical framework was developed and how the population and sample to be investigated were identified. We have discussed how the research instrument was developed, rigorously pre-tested and pilot-tested and mailed to a sample of branded *fmcg* manufacturers. From this sample, 137 questionnaires were returned, yielding data on 136 *accepted* projects and *108 rejected* projects. Having assessed early and late respondents on a variety of classification variables there is no reason to suspect that there is any non-response bias. We shall now go on to discuss the findings from this sample of projects in chapter five.

5 Chapter Five
Analysis and Results

This chapter is split into three phases. These phases will detail the analysis and results that permit the testing of the hypotheses proposed in chapter three. The first analysis phase provides descriptive statistics regarding organisations, respondents and projects. The second phase provides the statistics and results necessary to identify the dimensions of new product screening within the fmcg sector. The third and final phase of analysis identifies which of these uncovered dimensions of screening are able to discriminate between accepted and rejected projects at four stages of the product development process.

Chapter Five - Analysis and Results

The discussion thus far has addressed: (1) The compelling theoretical justification for the study of new product screening at each stage of the development process; (2) The method by which this information will be sought; (3) The sample of firms to be studied and (4) The responses to the research questionnaire. We will now go on to discuss the findings of this research project. From the 137 useable questionnaires, data were obtained regarding 244 new product projects (136 *accepted* projects and 108 *rejected* projects).

The first phase of this chapter will discuss summary descriptive statistics that have been derived from this survey. These statistics will refer to firm size, product sector, project and respondent characteristics. The second phase of the analysis chapter will create a scale for the screening and evaluation of new products in the *fmcg* sector. The third phase will then utilise that screening scale by identifying those criteria that are important in discriminating between *accepted* and *rejected* projects at four stages of the development process. Analysis of the final data set for this investigation will follow the three broad stages outlined in Table 5.1.

The primary goal of this analysis is to provide managers with a framework of screening criteria that are crucial for the successful movement of a project onto the next stage of development. This will allow time and resources to be applied to the most appropriate screening criteria, in order that NPD managers may focus on their primary role of selecting those projects that will ultimately succeed in the marketplace rather than those who will fail.

Table 5.1 Overview of Steps in the Analysis

Phase	*Analysis*	*Purpose*	*Selected Sources*
1.	Assessment of summary statistics for the final data set	To understand the nature and characteristics of the final data set	Zirger & Maidique (1990); Johne & Snelson (1988); de Brentani (1986); Cooper (1979a)
2.	Individual item analysis	Determine any items that need to be eliminated from the scales	Coakes & Steed (1999); Sharma (1996); Spector (1992); DeVellis (1991)
	Principal component analysis	Investigation of the dimensionality of the 11 proposed factors groups	Churchill (1995); Zirger & Maidique (1990); Gerbing & Anderson (1988); Cooper (1979a)
	Chronbach's coefficient alpha	To assess the reliability of the uncovered measurement scales	Nunnally & Bernstein (1994); Spector (1992); DeVellis (1991); Cooper & de Brentani (1984)
	Form summated scales for screening dimensions	To overcome the inherent limitations of single item measures	Gerbing & Anderson (1988); Churchill (1979a)
3.	Mann-Whitney *U* test	To assess differences between the mean scores of *accepted* and *rejected* projects on the uncovered dimensions	Diamantopoulos & Schlegelmilch (1997)
	Two Group Discriminant Analysis	Identify the factors that discriminate between *accepted* and *rejected* projects at four stages of the NPD process	Balachandra *et al* (1995); Zirger & Maidique (1990); Cooper & de Brentani (1984); Cooper (1979a)

5.1 Phase 1 - Descriptive Analysis

5.1.1 Firm Size Characteristics

This research project utilised several measures of firm characteristic to gain an understanding of the profile of the responding firms. Two of the more important measures were the number of employees in the respondents strategic business unit (SBU) and the sales turnover for 1997. Table 5.2 and Figures 5.1 and 5.2 show the relevant statistics and distributions. These tables and figures only represent responses from the 131 first phase questionnaires and associated reminders. It excludes the responses to follow-up questionnaires, since these are second responses from the same firms. It must also be noted that the responses do not always total

131. In some instances respondents failed to complete some classification sections of the questionnaire.

Table 5.2 Summary Firm Level Statistics

	Mean	*Std. Deviation*	*Minimum*	*Maximum*
How many people are employed in your SBU?	785.7	1669.6	2.0	14,000
What was the sales turnover for your SBU in 1997? (£m)	176.2	305.8	0.7	2,110

Table 5.2 shows a wide variation in the responding firms according to number of employees from the very small (2) to the very large (14,000). This variability is also matched in the turnover of firms ranging from the small (£0.7m) to the very large (£2,110m). Both indicators of firm size show a similar distribution pattern with greater numbers of respondents at each of the extremes.

Figure 5.1 Distribution of Full Time Employees

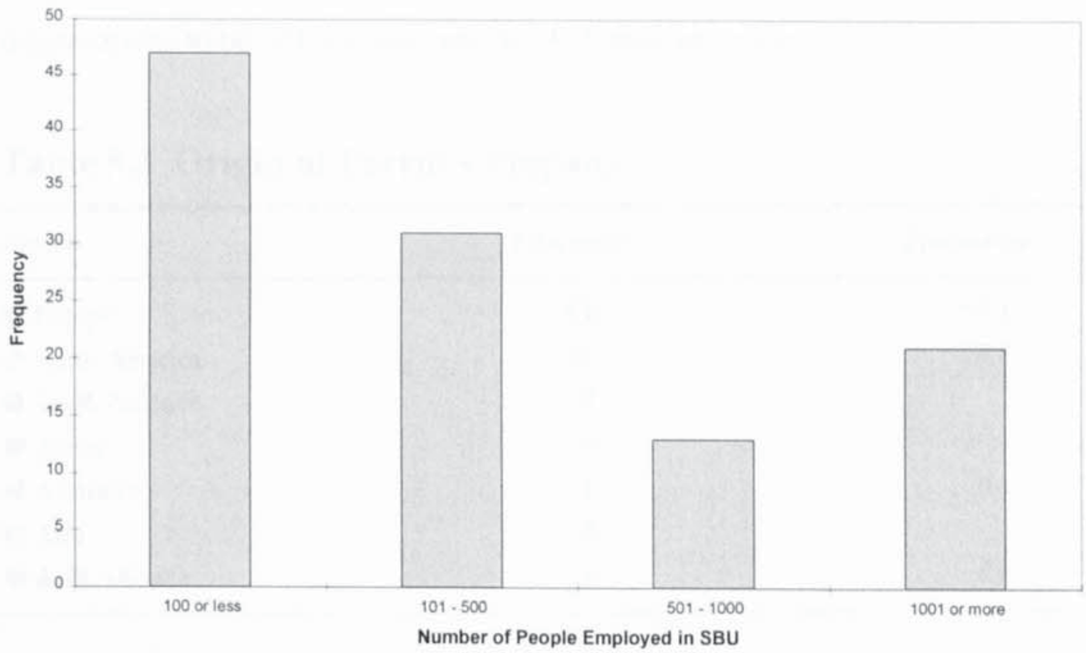
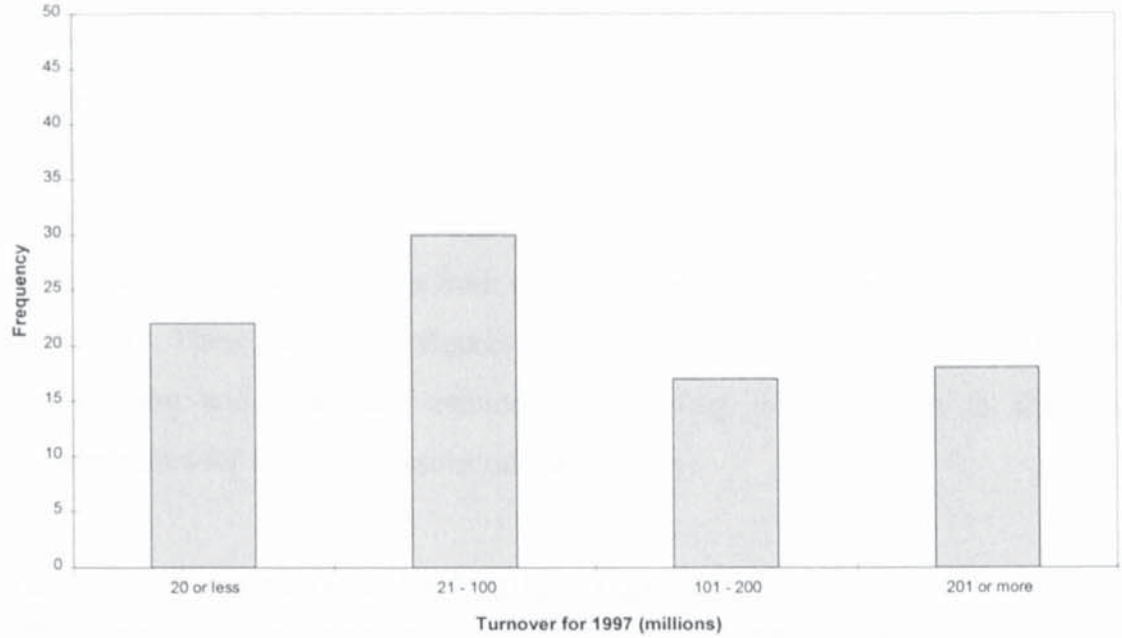


Figure 5.2 Distribution of Annual Sales Turnover for 1997



Data were collected regarding the country of ownership of the responding firms. This would give the researcher some idea of the distribution of participating firms across geographic boundaries. Table 5.3 shows the vast majority of participating organisations to be of European and North American origin.

Table 5.3 Origin of Parent Company

Region	*Frequency*	*Percentage*
❶ Europe	84	*69.4*
❷ North America	35	*26.7*
❸ South America	0	
❹ Africa	0	
❺ Australia	1	*0.8*
❻ Asia	0	
❶ & ❷ Alliance	1	*0.8*

5.1.2 Product Sector Characteristics

Responding firms were all active new product developers in the *fmcg* sector. Since the population could not be easily classified, the sample frame was a judgement sample. The surveyed firms were selected according to their ability to serve the research purposes (Churchill, 1995). They were, therefore, known to be active in product development and came from a range of product categories as can be seen in Table 5.4. These tables and figures also represent the 131 responses to the first questionnaire and associated reminders, excluding the responses to follow-up questionnaires for the same reasons outlined earlier.

Table 5.4 Respondents by Product Category

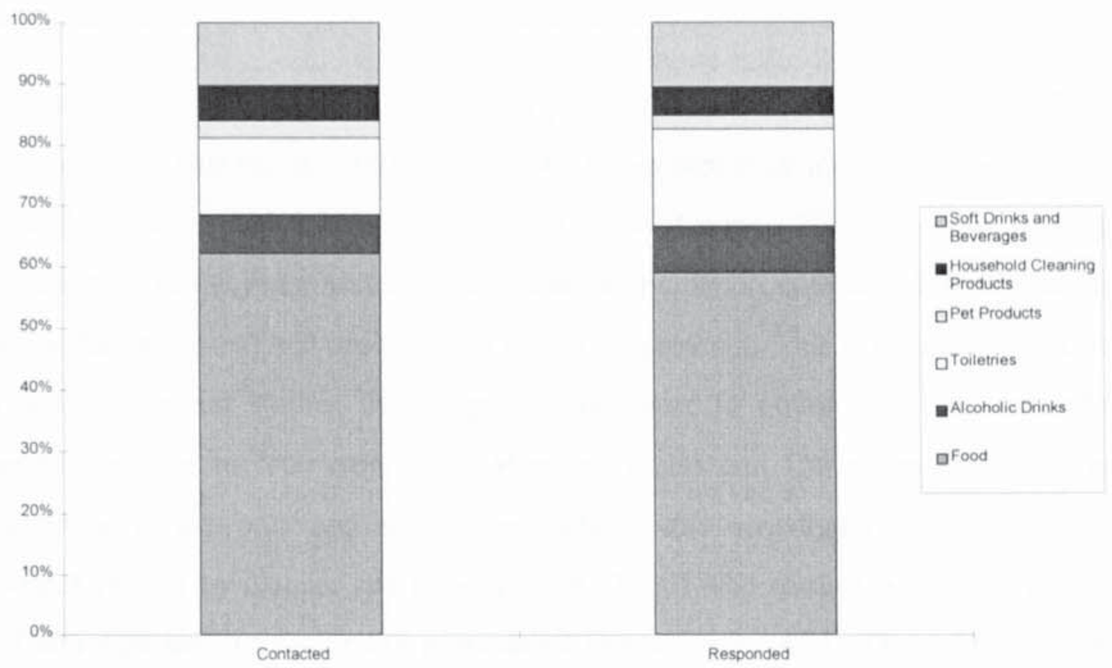
Category	*Total Category Sales**		*Contacted*		*Responded*		*Response Rate*
	(£m)	*%*	*No.*	*%*	*No.*	*%*	*%*
Food	4405	42.6	218	62.3	77	58.7	35.3
Alcoholic Drinks	1446	14.0	22	6.3	10	7.6	45.5
Toiletries	1139	11.0	44	12.6	21	16.0	47.7
Pet Products	544	5.3	10	2.9	3	2.3	30.0
Household Cleaning Products	410	4.0	20	5.7	6	4.6	30.0
Soft Drinks and Beverages	2399	23.2	36	10.3	14	10.7	38.9
Total	10343	100.0	350	100.0	131	100.0	

* Source - AC Nielsen, Meal, Marketing, 30 July, 1998, p25. Year to April 1998.

Since the sample is a judgement sample there is no suggestion that it is statistically representative of the population as a whole. The proportions of contacted and respondent product categories can be better represented using a 100% bar chart

(Figure 5.3). This provides an indication that the profile of the contacted managers is broadly the same as the profile of the respondent managers by product category.

Figure 5.3 Sample Frame by Product Category



5.1.3 Project Characteristics

5.1.3.1 Accepted and Rejected Projects

The research questionnaire included a series of questions designed to elicit information on the types of projects being studied. This would give the researcher greater insight into the types of projects within the sample and also provide background information during analysis. Projects were classified according to a dichotomous *Accept* (*Go*) and *Reject* (*No Go*) decision. Projects that had proceeded through to the next stage of their development were classified as *accepted* projects. Projects that had not moved on to the next stage of their development due to being terminated were classified as *rejected* projects. The proportion of these projects can be seen in Table 5.5 and are based on the *total* database of new product projects incorporating the first wave of questionnaires *and* follow-up questionnaires.

Table 5.5 Accepted and Rejected Projects

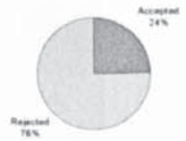
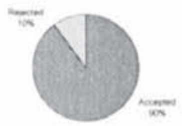
Project Type	*Frequency*	*Percentage*
❶ Accepted	136	*55.7*
❷ Rejected	108	*44.3*

The proportions of *accepted* and *rejected* projects in this investigation do not differ significantly. This result is in keeping with studies reporting matched pairs of 'post-launch' successes and failures (de Brentani, 1986; Cooper, 1979a,b). The findings indicate that in the *fmcg* sector there is little difficulty in obtaining information on successful (*accepted*) and unsuccessful (*rejected*) projects. This is in marked contrast to some industrial studies that suggest it is easier to obtain data on successful innovations due to 'survivor bias' (Montoya-Weiss and Calantone, 1994). The proportion of *accepted* and *rejected* projects in this investigation improves on a research project by Cooper and Kleinschmidt (1990) who studied *accepted*, *rejected* and *killed* projects (discussed in more detail in section 2.7.4.2). They obtained data on 123 (*49%*) *accepted* projects, 80 (*32%*) *rejected* projects and 47 (*19%*) *killed* projects. Since the current study only addresses projects during the development process and not success and failure 'post-launch' it offers a balanced data set of *accepted* and *rejected* projects during the development process.

5.1.3.2 Development Stage

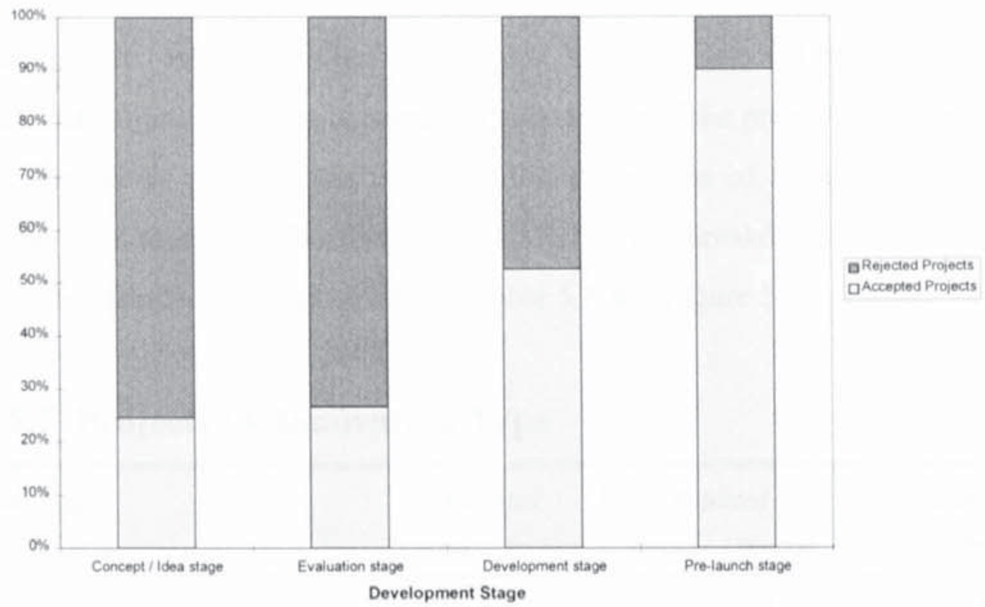
The central hypothesis within this research project is that the importance of screening criteria change according the stage of development the project is at. To this extent it is important to note that the data provided by respondents for the 244 projects reflect particular stages of the new product development process. The breakdown of projects across stages is as shown in Table 5.6 and Figure 5.4 below.

Table 5.6 Projects by Development Stage

	❶ Concept/Idea stage		❷ Evaluation stage		❸ Development stage		❹ Pre-Launch stage	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Accepted	11	*8.1*	13	*9.6*	32	*23.5*	80	*58.8*
Rejected	34	*31.5*	36	*33.3*	29	*26.9*	9	*8.3*
Total	45	*18.4*	49	*20.1*	61	*25.0*	89	*36.5*
								

It is reasonable to expect fewer projects to be terminated as the development process moves towards the launch stage. Likewise, in a phenomenon similar to survivor bias (Cooper, 1992; Crawford, 1986) respondents have concentrated on *accepted* projects at the latter stages of development. It is likely that respondents will be more heavily involved in these projects and, therefore, would feel they are in a better position to answer questions regarding them. Similarly it is likely that respondents will be involved with screening out more projects at the early stages of development, generating a large number of rejected projects early on in the process. When this feature was noticed the covering letter was amended to ask respondents for projects during the early stages of development.

Figure 5.4 Distribution of Projects by Development Stage



The pattern of project responses shown in Figure 5.4 is, to a certain degree, to be expected. It is broadly analogous with the patterns of project attrition (Rockwell and Particelli, 1982) that were noted in chapter two (section 2.2.1). The proportion of *accepted* projects as a percentage of total projects rises as the process moves towards commercialisation. Firms are less likely to reject projects as they near commercialisation. Indeed Edgett (1996) noted in his study that once the new product had gone through the development stage there was no incentive to question its feasibility. In other words, the new product had so much internal momentum it was going to be launched anyway due to the amount of money and time already invested in it. Conversely, the proportion of *rejected* projects is much higher during the early stages of development. Given that by focusing on the wrong selection criteria, managers may screen out potentially successful new products, there may be many successful new products that are removed at this stage.

5.1.3.3 Project Classification

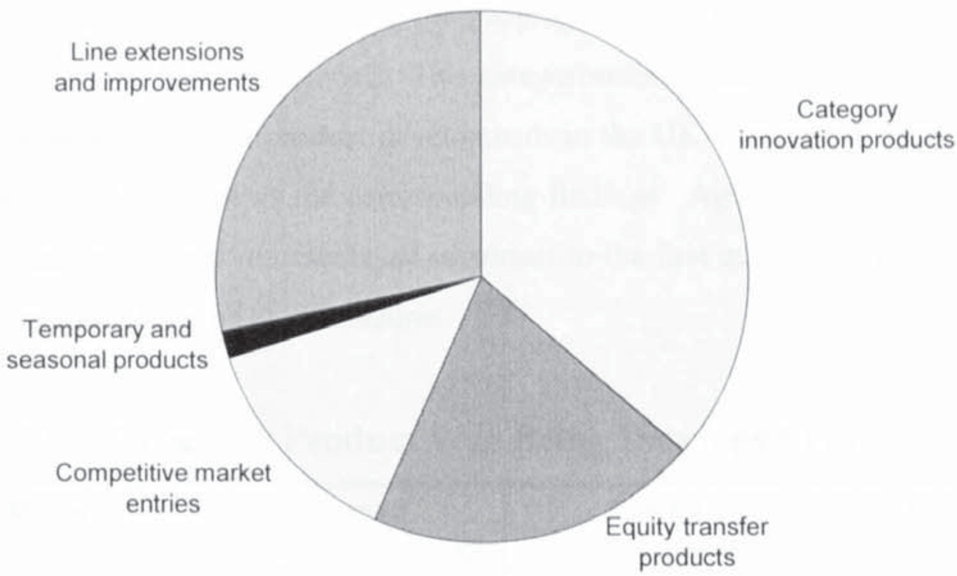
Respondents were asked to assign the projects they had selected to a measure of project classification. This would permit an assessment of the proportion of products being developed by project classification. For definitions of these classifications please refer back to chapter four (section 4.1.3.3.1). The breakdown and proportion of projects by classification can be seen in Table 5.7 and Figure 5.5.

Table 5.7 Projects by Innovation Type

Innovation Type	*Accepted*		*Rejected*		*Total*	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
❶ Category innovation products New products/brands, true innovation in a category, creates categories.	54	*39.7*	35	*32.4*	89	*36.5*
❷ Equity transfer products Existing brand name extends to other products.	29	*21.3*	20	*18.5*	49	*20.1*
❸ Competitive market entries Very similar to existing products within category.	16	*11.8*	17	*15.7*	33	*13.5*
❹ Line extensions & improvements New flavours, forms, sizes, revitalises product or increases shelf space.	35	*25.7*	34	*31.5*	69	*28.3*
❺ Temporary and seasonal products Product use is date or season specific.	2	*1.5*	2	*1.9*	4	*1.6*

This classification of projects by innovation type differs from the Booz, Allen and Hamilton study reported in Rockwell and Particelli (1982). The values they reported are discussed in chapter two (Figure 2.1). In their study of industrial *and* consumer new products they addressed products as *new to the organisation* and *changes within current product lines*. The respondents to this research project have indicated that a much larger proportion of their projects (56.6%) are *new to the organisation* (categories ❶ and ❷). They have indicated a correspondingly lower incidence of product (41.8%) which are *changes within current lines* (categories ❸ and ❹).

Figure 5.5 Proportion of Projects by Innovation Type



It is interesting to note the high proportion of *category innovation products* (36.5%) and low proportion of *competitive market entry* or 'me-too' products (13.5%) that have been included by respondents. These findings run counter to the large body of anecdotal evidence suggesting that the *fmcg* sector concentrates on minor line-extensions and clever revivals at the expense of genuinely new products and brands (Curtis, 1998). However, these findings do support the notion that a major driver of product development programmes is the desire to stretch brands into new categories as can be seen in the proportion of *equity transfer products* (20.1%). However, we advocate caution when drawing conclusions from this breakdown by project type, remembering that projects were self-selected by respondents and do not necessarily reflect *all* project developed in *all* firms. There may be an underlying agenda concerning the selection of projects by respondents. It is not unrealistic to imagine a manager wanting to best represent themselves and their organisation by selecting a particular type of project.

5.1.3.4 Scope of Future Market

Data were also collected concerning the geographic scope of the markets for which the products were being developed. This categorisation would give some indication of the importance of new product development in the UK in terms of wider market exposure. Table 5.8 shows the corresponding findings. Again the data recorded in these tables and figures represents *all* responses to the first questionnaire, associated reminders *and* follow-up questionnaires.

Table 5.8 Market the Product Was Being Developed For

Type of Market	*Accepted*		*Rejected*		*Total**	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
❶ Global	6	*4.5*	2	*1.9*	8	*3.4*
❷ Regional (e.g. Europe, North America)	16	*11.9*	12	*11.7*	28	*11.8*
❸ International (e.g. several national markets)	19	*14.2*	14	*13.6*	33	*13.9*
❹ National	93	*69.4*	75	*72.8*	168	*70.9*

* The total number of projects represented in Table 5.8 does not sum to the 244 projects included in the final data set since not all respondents provided information on market type.

Table 5.8 shows that the majority of completed questionnaires referred to projects that were destined for the consumption of home (UK) consumers (70.9%). However, the fact that nearly 30% of projects were being developed for International, Regional or even Global consumption bodes well for *fmcg* organisations in the UK. One manager representing a globally recognised *fmcg* firm indicated that they no longer developed products within the UK that had anything but global potential.

5.1.3.5 Product Development Cycle

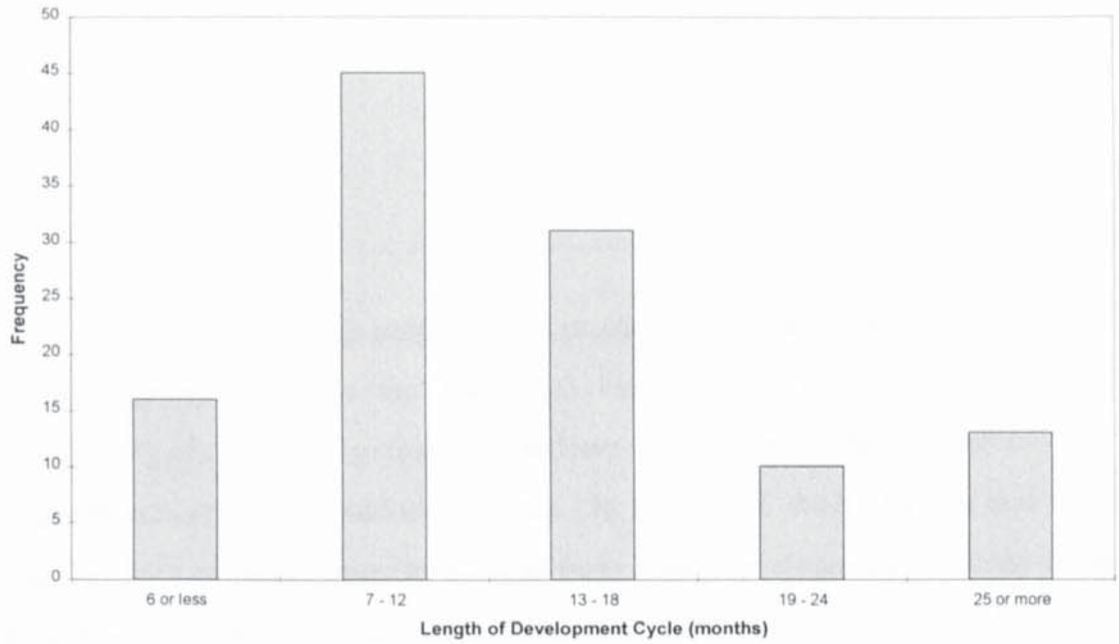
Finally respondents were asked to give an indication of the length of a typical development cycle from conception to launch for a new product within their organisations. Responses are shown in Table 5.9.

Table 5.9 Typical Length of Product Development Cycle (months)

	Mean	*Std. Dev*	*Min.*	*Max.*
What would be the length of a typical NPD cycle for a successful project?	15.92	11.72	3	60

A mean development cycle of 16 months helps validate the belief that a short or shortening product development cycle permits the measurement of NPD projects within the *fmcg* sector. This finding supports the view that many UK companies regard speed to market as *essential* and *unavoidable*, with an average time taken to develop a brand of a year or even less (Dwek, 1996). A mean product development cycle of just under 16 months is significantly shorter than those cycles normally associated with industrial new product development. Figure 5.6 shows the distribution of responses for the length of project cycle.

Figure 5.6 Distribution of Typical Successful New Product Cycle



5.1.4 Respondent Characteristics

5.1.4.1 Functional Responsibility

Respondents who completed questionnaires were asked to provide some background information regarding their major functional responsibility and also their management level. This provides some data on the background of new product decision makers within *fmcg* organisations and their position within the organisational hierarchy. Table 5.10 indicates the proportion of respondents by their main functional responsibility. Entries in these respondent characteristic tables are based on the 131 questionnaires received. Some totals do not sum to this value due to item non-response.

Table 5.10 Functional Responsibility

Function	*Frequency*	*Percentage*
❶ Marketing	90	*69.8*
❷ Sales	2	*1.6*
❸ R&D/Design	24	*18.6*
❹ Finance/Accounting	1	*0.8*
❺ General management	12	*9.3*

Table 5.10 shows that a large proportion of product development decisions are taken by those personnel within the traditional *customer-facing* roles of sales and marketing (71.4%). This functional breakdown contrasts with those found in more traditional industrial new product research. In their 1996 study, Griffin and Page found that 56% of their respondents came from R&D/Development functions while only 19% were from marketing. This is, however, supported by Hultink and Robben (1995) whose research had 74% of respondents come from marketing backgrounds and 11% from R&D/Development.

It is interesting that in this age where managers support decisions with increasingly rigorous financial analyses, so few new product decision makers have a finance or accounting role (0.8%). Recently the confectioner Cadbury's launched a *Managing for Value* programme where every potential new product must be assessed for profitability before the launch decision is sanctioned (Murphy, 1999). The implications of this initiative are that each decision maker will have to understand the cost equations and production considerations of the products they develop to a far greater degree than in the past. This may signal a shift in the functional priorities for new product decision makers.

5.1.4.2 Management Level

Respondents were also asked to indicate their level of managerial responsibility. Assessing this data will give an indication of the penetration of new product professionals within organisations in the *fmcg* sector. Table 5.11 shows the corresponding breakdown.

Table 5.11 Managerial Level

Level	*Frequency*	*Percentage*
❶ Director (including CEO)	14	*11.1*
❷ Senior management	45	*35.7*
❸ Middle management	59	*46.8*
❹ Line management	3	*2.4*
❺ No management responsibility	5	*4.0*

The large majority of new product decision making is taken at senior and middle management level (82.5%). The number of directors and senior managers who took the time to complete the questionnaire supports anecdotal evidence of the increasing importance of NPD within *fmcg* organisations. More often new product development is being highlighted as the most critical value-generating function within the *fmcg* sector as evidenced by its increasing representation at board-room level.

5.1.5 Summary of Analysis Phase 1

During this first phase of analysis we have addressed the profile of the respondents, their organisations and the 136 *accepted* projects and 108 *rejected* projects. The firms that are represented in the final data set exhibit a broad range of employees and turnover. The firms are broadly European and North American by ownership and come from a range of *fmcg* categories.

The profile of the responding firms fits the profile of the contacted firms. The data set contains a matched sample of *accepted* and *rejected* projects at different stages of the development process. The projects represent a broad spread of 'degrees of innovation' that are mainly developed for 'National' markets. The mean typical development cycle for a successful new product was 16 months, validating the relevance of the *fmcg* sector for this type of new product research (section 1.2). Respondents were mainly from the traditional customer facing roles of Sales and

Marketing. The majority of respondents were Middle and Senior managers signifying the increasing importance place on product development within the *fmcg* sector.

We will now go on to address the nature of new product screening and evaluation in the *fmcg* sector by addressing managers responses to the 116 screening and evaluation items presented in the research questionnaire.

5.2 Phase 2 - Screening Dimensions, Techniques

Having assessed the summary statistics in phase 1 of this chapter we now move on to the major analysis phases in this research project. The second phase addresses the purification of the research scales and measures reliability and validity of the items. This will determine the nature of screening and evaluation dimensions in the *fmcg* sector. This section utilises established procedures from the scale development literature to assess reliability, dimensionality and construct validity (Spector, 1992; DeVillis, 1991; Gerbing and Anderson, 1988; Churchill, 1979).

5.2.1 Statistical Techniques

5.2.1.1 Appropriate Statistical Techniques

We have already noted in chapter four that the research sample selection process was necessarily iterative in order to provide as representative and appropriate a sample as possible within time and cost constraints (section 4.1.2). We have shown that this judgement sample was necessary by the nature of the research design, since respondents were required to be active in product development. The sample frame is, therefore, a non-probability sample.

Parametric tests (such as those to be utilised in the second and third phases of analysis) rely on the assumption that there is a distribution with know parameters and characteristics. Almost all parametric statistical techniques assume that the data come from a multivariate normal distribution (Sharma, 1996). Although minor violations of the distributional assumptions of many parametric tests do not totally invalidate their results if the sample sizes are large enough, small samples coupled with substantial deviations from distributional assumptions and/or measurement requirements are a recipe for disaster (Diamantopoulos and Schlegelmilch, 1997).

However, the central limit theorem suggests that a random sample will approximate a normal distribution as sample size increases (Morse, 1993). It means that whatever the shape of the population, the distribution of sample means will be normal if the sample is large (Churchill, 1995). A normal distribution has known parameters. Parametric tests, therefore, can be computed on large non-random samples (Townsend, 1990). When parameters of a population are not known, non-parametric tests are used. However, through Monte Carlo simulations, parametric tests have been found to be relatively robust in that there is no evidence to suggest that parametric tests falsely detect significant results that non-parametric tests would not (Townsend and Ashby, 1984). Many parametric tests have been found to be robust to minor-to-moderate violations in their assumptions, although this robustness is test-specific (Diamantopoulos and Schlegelmilch, 1997). Parametric tests have, therefore, been deemed to be appropriate to use in this research project. Specific assumptions will be dealt with during the discussion of each individual technique.

5.2.1.2 Item Analysis

The screening measures used in this investigation (Table 3.3) were placed into 11 factor groupings (Table 3.4). Having generated data using the 116 items, the next task was to inspect the data. This would determine the extent to which any items may need to be eliminated from the scales, having already undertaken a missing data analysis in chapter four (section 4.2.2.3). While the scales were selected from past research and exploratory investigations, not all items will perform as expected and it is important to identify these items and remove them from the scale. The purpose of item analysis is (Spector, 1992; p 29);

"To find items that form an internally consistent scale and to eliminate those items that do not".

A scale is said to exhibit internal consistency if its items are highly correlated. Therefore, high correlations are sought between sets of items forming a scale (DeVellis, 1991). The first analysis takes the form of an examination of the correlations between individual items.

Since one purpose of item analysis is to assess the factorability of the correlation matrix as a whole (i.e. the appropriateness of factor analysis as an analysis technique) Bartlett's test of spherity and the Kaiser-Meyer-Olkin measure of sampling adequacy are employed (Coakes and Steed, 1999). If Bartlett's test of spherity is large and significant, and the Kaiser-Meyer-Olkin measure is greater than 0.6, then factorability is assumed. The Kaisers measure of sampling adequacy (Kaiser, 1970) is a popular diagnostic measure which provides a means to assess the extent to which the indicators of a construct belong together (Sharma, 1996). The following guidelines were suggested by Kaiser and Rice (1974).

Below 0.50	→	Unacceptable
0.50 - 0.60	→	Miserable
0.60 - 0.70	→	Mediocre
0.70 - 0.80	→	Middling
0.80 - 0.90	→	Meritorious
Greater than or equal to 0.90	→	Marvellous

There are also other assessments that should carried out for scale items, using histograms and the correlation matrix to identify 'poor' items (DeVellis, 1991; p 83);

"Items with non central mean, poor variability, negative correlations among items, low item-total correlations and weak inter-item correlations".

The corrected item-total correlation correlates the item being evaluated with all the scale items, excluding itself. Item's with higher values for this measure are more desirable than item's with lower values (DeVellis, 1991).

5.2.1.3 Reliability

Once items that are suitable for deletion have been identified, the reliability of the scale should be assessed. Reliability is broadly defined as the extent to which measurements are repeatable (Nunnally and Bernstein, 1994) or that results are similar from occasion to occasion (Churchill, 1995). While there are many methods for assessing reliability, Cronbach's coefficient alpha (Cronbach, 1951) is the measure that is most often adopted. Indeed Churchill (1995; p 542) suggests that;

"Coefficient alpha routinely should be calculated to assess the quality of a measure".

The coefficient alpha value is a measure of the internal consistency of a scale. It is a direct function of both the number of items and their magnitude of inter-correlation (Spector, 1992). Cronbach alpha scores have only recently been used in the NPD literature (Cooper and de Brentani, 1984) but have since been shown considerable support (Song *et al*, 1998; Song and Parry, 1997; Song and Parry, 1996; Rochford and Wotruba, 1996; Calantone *et al*, 1996; Cooper and Kleinschmidt, 1995d; Cooper and Kleinschmidt, 1995c; Cooper *et al*, 1994; Calantone *et al*, 1993; Cooper and de Brentani, 1991; Zirger and Maidique, 1990).

Coefficient alpha can take any value between 0.0 and 1.0, but Nunnally (1978) suggests a value of 0.70 as a lower acceptable boundary. Scales are published with lower alphas as will be discussed later. DeVellis (1991; p 85) offered the following guidelines for alpha values.

Below 0.60	→	Unacceptable
Between 0.60 and 0.65	→	Undesirable
Between 0.65 and 0.70	→	Minimally acceptable
Between 0.70 and 0.80	→	Respectable
Between 0.80 and 0.90	→	Very good
Much above 0.90	→	Consider shortening scale

Though some studies report alpha values less than 0.50 (Cooper and de Brentani, 1984; de Brentani, 1986) this is the minimum considered satisfactory (Cooper and de Brentani, 1991). However, according to Cooper (1985; p 35);

"The criteria used in the screening decision should reflect the corporation's overall objectives, and in particular, its goals for its new product programme. Not all of these criteria are quantifiable, nor are they necessarily internally consistent."

Factors with low variance and low Cronbach alpha scores are included in this investigation due the exploratory nature of screening research in the *fmcg* sector. Montoya-Weiss and Calantone (1994) highlight the need to publish results even if they are not significant, so that the knowledge of the principle drivers of new product performance may progress beyond an exploratory, descriptive nature.

Previous research studies have removed lower correlated variable constructs for the sake of parsimony and higher alpha scores. However, screening models produced from these highly correlated but narrow heterogeneous dimensions have not been adopted by practitioners (Montoya-Weiss and Calantone, 1994; Wind and Mahajan, 1988; de Brentani, 1986), which may provide a limited explanation as to why large numbers of new products are still failing (Urban and Hauser, 1993). A more comprehensive approach is warranted that includes those constructs with lower alpha values if they provide a more detailed explanation of the *accept/reject* decision.

Cortina (1993) noted another issue associated with assigning 'appropriate' alpha values. Most recent studies implied that a given level of alpha, usually greater than 0.70, was adequate, without comparing it with the number of items in the scale. An example is provided which compares the meaning of standardised alpha values of 0.80 for scales made up of three and 10 items. The three item scale exhibits an average inter-item correlation of 0.57 while the 10 item scale shows only 0.28. Research must base reliability decisions on: the actual alpha value, the number of items in the scale, and the decision that is to be made (Cortina, 1993). This decision is aided by looking at the corrected item-total correlations and the mean inter-item correlation. If an item has a correlation with the other items in the scale that is significantly lower than average, dropping it would raise the alpha value. If the average correlation with the other items is only slightly below (or equal too, or above) the overall average, then retaining the item would increase alpha (DeVellis, 1991).

There are many issues that would influence and reduce the alpha value including negative correlations, weak inter-item correlations, low item-scale correlations, lopsided means and low variances. Items that appear to decrease the coefficient alpha values are marked for *possible* deletion from the scale.

In addition to the conceptual reasons for including factors with lower alpha values, there are more fundamental theoretical justifications as to why some factors may exhibit poor alpha values as suggested by Bollen and Lennox (1991). The discussion above notes some of the beliefs about how valid and reliable items should behave. Some researchers suggest that low correlations between items means that they are measuring different things (Nunnally, 1978; p 102). Others argue that high correlations are better than low ones (Horst, 1966; p 147) while others still contend that moderate correlations are best (Cattell, 1965; p 88). Guidelines are often contradictory. Bollen and Lennox suggest that this state of affairs is largely due to researchers not noting whether their models treat indicators (items) as 'effects' of a construct or as 'influences' of a construct. They say that this relationship between item and latent construct will determine whether alpha scores and measures of correlation are relevant for particular scales. Researchers relying on factor analysis or the examination of correlation matrices for selecting indicators may be overlooking valid measures of a construct if the indicators determine the latent variable. Consequently, always using internal consistency as a criterion can have dire consequences. However, this investigation has followed the traditional method of establishing a construct's dimensionality and then addressing internal consistency (alpha) and correlations. Dimensions have not been removed nor excluded from further analyses on the basis of these internal consistency measures nor their relevant correlations. Individual cases where these measures of internal consistency may not be relevant will be dealt with in more detail in the discussions of chapter six.

5.2.1.4 Dimensionality

Unidimensionality is an assumption underlying the calculation of reliability and is demonstrated when the indicators of a construct have acceptable fit on a single-factor (one-dimensional) model (Hair *et al*, 1998). The underlying assumption is that each scale measures one, and only one, underlying concept. Gerbing and Anderson (1988; p 186) state that;

"The scale development process must include an assessment of whether the multiple measures that define a scale can be acceptably regarded as alternative indicators of the same construct".

Some authors fail to distinguish between an internally consistent scale and a homogeneous one since multi-dimensionality is irrelevant if a test has a good alpha (because it is free of error associated with the use of different items). Cortina (1993) notes that this does not mean that the scale has a straightforward or unambiguous interpretation. It does not refer to the extent to which dimensions are measuring the construct that they are intended to measure, i.e. the test would be known to measure something consistently, but what that was would still be unknown. Therefore, prior to assessing the reliability of the scales the unidimensionality of the scale must be established using factor analysis (Gerbing and Anderson, 1988).

5.2.1.5 Principal Component Analysis

The purpose of this assessment is to assess whether the 11 factor groupings are composed of a larger set of underlying dimensions. Thus, following from the recommendations of Germain *et al* (1994), each of the 11 factor groupings (constructs) were subjected to separate principal components analyses. This technique aims to transform a set of interrelated variables into a set of unrelated linear combinations of these variables (Churchill, 1995; Cortina, 1993). This factor analytic approach aids scale development by quantifying how much of the total variation in the entire set of items can be accounted for by each of the items found (DeVellis, 1991).

Researchers use factor analytic procedures for two purposes. The first is to identify underlying constructs in the data. The second is simply to reduce the number of variables to a more manageable set (Aaker *et al*, 1998). Principal component analysis is, along with factor analysis, one of two common data reduction techniques. While factor analysis assumes that some common factors are responsible for the covariation among the observed variables (Kim and Mueller, 1978), no such assumptions are made in principal component analysis. The selection of one technique over another is based on two criteria: (1) the objectives of the factor analysis and (2) the amount of prior knowledge about the variance in the variables (Hair *et al*, 1998). When the objective is to summarise information in a larger set of variables into fewer factors, as is the case in this investigation, principal components is used. However, the complications of common factor analysis have contributed to the wide-spread use of principal component analysis (Hair *et al*, 1998). Overall, however, the results of common factor analysis do not seem to vary from those of principal component analysis (Aaker *et al*, 1998).

Principal component analysis, is a widely utilised factor analytic technique within NPD literature as can be seen in the Table 2.4. It has been utilised in the early work of Shocker, Gensch and Simon (1969), Rothwell (1972) and Cooper (1981), in the screening research of Cooper and de Brentani (1984) and de Brentani (1986), and continues in prominence today with recent work such as Zirger and Maidique (1990), Rochford and Wotruba (1996) and Li and Calantone (1998).

The critical assumptions underlying factor analytic techniques are more conceptual than statistical. From the statistical standpoint, the departures from normality, homoscedasticity and linearity apply only to the extent that they diminish the observed correlations (Hair *et al*, 1998). The researcher must ensure that the data matrix has sufficient correlations to justify the application of such techniques (Hair *et al*, 1998). The conceptual assumptions underlying factor analysis relate to the set of variables selected and the sample chosen. A basic assumption of factor analysis is that some underlying structure does exist in a set of variables. It is, therefore, the responsibility of the researcher to ensure that the observed patterns are conceptually valid and appropriate to study with factor analysis. The technique has no means of determining appropriateness other than the correlations among variables (Hair *et al*, 1998).

Since principal component analysis is designed to reduce many variables into a smaller number of underlying constructs a central question is *how many factors are involved in the model?* (Aaker *et al*, 1998). There are many guidelines to assist the researcher in this choice ranging from the latent root criterion (eigen-value), scree plot and percentage of variance test.

5.2.1.5.1 Latent Root Criterion

The most commonly used factor selection technique is the latent-root or eigen-value criterion. Here, only the factors with an eigen-value greater than 1.0 are retained. The rationale for this method is that a factor with an eigen-value less than 1.0 is no better than a single variable, since, due to standardisation, each variable has a variance of 1.0. Therefore, a factor should explain at least the amount of variance in one variable; otherwise it is better to have the original variable (Aaker *et al*, 1998).

5.2.1.5.2 Scree Plot

Cattell's (1965) scree test is a plot of the eigen-values against the number of factors. It is in the shape of the plot that the most appropriate number of factors is determined. Typically the plot has a distinct break between the steep slope of factors with large eigen-values and a gradual tailing off associated with the rest of the factors (Aaker *et al*, 1998). The plot is considered to resemble the sharp drop of a mountain face and the horizontal pile of stable rocks or scree. The last real factor is considered to be the point before the first *scree* begins (Churchill, 1995).

5.2.1.5.3 Percentage of Variance

In this approach, factors are extracted until a satisfactory level of cumulative variance is reached (Aaker *et al*, 1998). No absolute threshold has been adopted across disciplines and research areas, but it is not uncommon to consider a solution that accounts for 60% of the total variance as satisfactory in the social sciences (Hair *et al*, 1998).

5.2.1.5.4 Composite Factor Selection Techniques

Rather than using any single technique to judge the most appropriate number of factors, a composite selection method was adopted. Initially the latent-roots criterion was applied to the factor solutions. Where this decision left some uncertainty about the appropriateness of additional factors in the final solutions, the other two techniques were consulted to produce an iterative method of factor selection.

Sometimes, once the appropriate number of factors has been selected, the interpretation of the factor solution can be difficult. This is intensified when variables load on more than one factor. Rotating the factor matrix attempts to *clean up* the factors in the factor loading table (Churchill, 1995). Varimax rotation maximises the variance of squared loadings and is the most common orthogonal rotation method (Churchill, 1995; DeVellis, 1991). The empirical evidence indicates that the varimax rotation tends to produce loadings that are most easily interpretable except where there is a general factor present in the data (Churchill, 1995).

This project utilised principal component analysis with varimax rotation which is consistent with past research (Li and Calantone, 1998; Rochford and Wotruba, 1996; Zirger and Maidique, 1990; de Brentani, 1986; Cooper and de Brentani, 1984; Cooper, 1981; Rothwell, 1972; Schocker *et al*, 1969).

5.2.1.6 Creating Composite Scores

Principal components analysis was adopted to transform a set of interrelated variables into a set of unrelated linear combinations of these variables (Churchill, 1995; Cortina, 1993). Put simply, a smaller number of variables than questionnaire items were required with which to summarise the data present. However, it is important to address the method by which a set of composite scores was created for this reduced set of variables.

The two common techniques for doing this are computing factor scores and creating summated scales. Factor scores represent the degree to which each individual item scores highly on the group of items that have high loadings on a factor (Hair *et al*, 1998). Therefore, higher scores on the variables with higher loadings on the factor will result in a higher factor score. Factor scores guarantee truly uncorrelated variables (Lehmann *et al*, 1998). The one key difference between the factor score and the summated scale is that a factor score is determined by all the variables that have a loading on a factor. The summated scale is calculated by only selecting those variables that load highly on the factor.

In deciding which method to use, the researcher must weigh up several options. Factor scores have the advantage of representing a composite of all variables loading on the factor. However, this is a potential disadvantage in that all variables have some degree of influence in computing factor scores and may make interpretation difficult (Hair *et al*, 1998). The summated scale is a composite measure that reduces measurement error and represents multiple facets of a factor (Hair *et al*, 1998). This type of measure also improves the ease with which replication of studies can take place since it is not based on a factor matrix.

Hair *et al* (1998) suggested that the decision rule should be that if data are only used in the original study or orthogonality is required, then factor scores are best. If, however, generalisability or transferability is desired, then summated scales are more appropriate. If the summated scale is well constructed and shows evidence of reliability and validity, then it is probably the best alternative (Hair *et al*, 1998; Lehmann *et al*, 1998).

This study seeks to open up empirical research into the screening and evaluation of new *fmcg* products. Accordingly, the transferability of a well constructed, valid and reliable summated scale is a major attraction. The ability of the summated sale to overcome some of the difficulties associated with missing data is also an advantage. The construction of such a numeric average for scale items is a common procedure in NPD research. Zirger and Maidique (1990) utilised such an approach to construct summated scales for inclusion in a linear discriminant analysis as did Calantone *et al* (1996). This overcomes the inherent weakness of single item measures (Gerbing and Anderson, 1988). Accordingly the summated scale method of data composition is utilised in this study.

5.2.1.7 The Order of Analyses

We have already noted (section 5.2.1.3) that this study will follow traditional NPD research in assuming that individual screening items are 'dependent' on the latent construct or dimension. Accordingly we will use traditional measures of internal consistency to assess each uncovered dimension of screening in the *fmcg* sector. However, it is important that we understand the steps to be taken to ensure reliability and unidimensionality but also the order in which the steps must undertaken to ensure compliance. There are two schools of thought concerning the most appropriate method for addressing reliability and unidimensionality. Churchill (1979) argued that unidimensionality should be addressed only after the scale has been examined for internal consistency and purified. Gerbing and Anderson (1988) argue that one would assess a scales reliability after the unidimensionality has been acceptably established.

Due to the developmental nature of this investigation in the *fmcg* sector it is necessary to first assess the dimensionality of the scale before addressing the reliability of the items. Churchill (1979) stated that some researchers performed factor analysis on the data before doing anything else in the hope of determining the number of dimensions underlying the construct. This assumes that when performing principal component analysis the measures employed may not be unidimensional. This is indeed the case in this research project. We have already established that the screening items in this survey were pooled from a wide variety of empirical, anecdotal and journalistic literature and added to during exploratory interviews with product development professionals (section 3.2.3). Items were assigned to factors based on empirical literature that surveyed new *industrial* products. New scale items were assigned to the most appropriate factors. Their content validity was established during pre-testing and pilot-testing of the research instrument with knowledgeable respondents (section 4.1.3.8) as suggested by Li and Calantone (1998).

To this extent, principal component analysis would be the most appropriate assessment to assess the dimensionality of items within the 11 proposed factor groups. To recap, the factor groupings identified were: (1) *Product differential advantage*, (2) *Product promotion*, (3) *Product - newness to the firm*, (4) *Product characteristics*, (5) *Corporate synergy*, (6) *Trade synergy*, (7) *Nature of the market*, (8) *Competitive and market intelligence*, (9) *Financial potential*, (10) *Market strategy*, (11) *Product branding*.

This procedure would be advantageous for two reasons. First, this type of procedure involves an assessment of whether the individual scale items could be summarised by a smaller number of variables. Thus, underlying dimensions of existing constructs could be uncovered for the purposes of improving the power of subsequent analyses. Second, it is reasonable to suggest that there are sub-dimensions of the factor groupings. Identification of these dimensions would add to our understanding of the nature of new product screening in this branded product sector. This would improve screening decisions and provide decision criteria that are more amenable to management action. It is only after the unidimensionality of *these* constructs has been established that measures of scale reliability and validity can take place.

5.2.1.8 Construct Validity

Having ensured that a scale (1) conforms to its conceptual definition, (2) is unidimensional, and (3) meets the necessary levels of reliability, the researcher must make one final assessment: scale validity (Hair *et al*, 1998). Validity is a term that is used to describe the extent to which differences in scores on the measurement reflect true differences among individuals, groups or situations in the characteristic that it seeks to measure, or reflect true differences in the same individual, group or situation from occasion to another, rather than constant or random errors (Churchill, 1995). Whilst reliability and unidimensionality are prerequisites for scales which exhibit construct validity (Churchill, 1979), they can only provide negative evidence of the construct validity of a measure: if it is not reliable, it is not valid (Churchill, 1995). The three most widely accepted forms of validity are convergent, discriminant and nomological validity (Hair *et al*, 1998).

Convergent validity assesses the degree to which two measures of the same concept are correlated (Hair *et al*, 1998). To have convergent validity, the scale of each uncovered sub-construct should correlate highly with each other. Although the items are distinct, they are still measuring the same construct. Items that inter-correlate highly are assumed to reflect the same construct (Spector, 1992). Discriminant validity is the degree to which two conceptually similar concepts are distinct (Hair *et al*, 1998). To ensure discriminant validity, a scale should not load on the same factor as another scale, i.e. the scale of each sub-construct should be unidimensional (Nunnally and Bernstein, 1994). The items that inter-correlate poorly reflect different constructs (Spector, 1992). Nomological validity refers to the degree that the summated scale makes accurate predictions of other concepts in a theoretically based model (Hair *et al*, 1998). A variable has nomological validity if (Churchill, 1995; p 538);

"It behaves as expected with respect to some other constructs to which it is theoretically related".

Having addressed the methodological and statistical techniques to be used in this second analysis phase we now go on to discuss the results of these techniques.

5.3 Phase 2 - Screening Dimensions, Results

The previous section has outlined the techniques by which the measurement items, identified in chapter three, can be assessed for dimensionality, reliability and validity. We must bear in mind the nature of and objectives for the research project before undertaking this analysis. The objectives for this study (section 3.2.5) make clear that one of the fundamental goals of this investigation is to gain an understanding of new product screening in the *fmcg* sector. The lack of any identified literature in this *specific* field indicates that this research project is, to a certain extent, *exploratory* in nature. As a result, the selection of research measures has affected the order in which some of these analyses can take place.

We have already noted that the screening items were drawn from many sources. These items were assigned to factor groupings in accordance with the literature and the conceptual framework. Whilst every effort was made to assign these items to the most appropriate factors, they were drawn from industrial NPD literature. There is, therefore, a need to validate the factor structure put in place. This is also the case for factor groupings such as *Trade Synergy* that were new developments in this research project and placed for reasons of conceptual fit.

For this reason the dimensionality of the scales is a vital assessment. Individual item analysis will be used to 'flag' items that may be suitable for elimination from the scales and will not be the sole arbiter of an items inclusion or exclusion. Items may have been placed in the wrong factor groupings and it may be necessary to assess whether they would be conceptually better placed in another factor grouping before eliminating them from the subsequent analyses. It may also be the case, as noted above, that items within a factor grouping (such as *Product Differential Advantage*) may actually form part of several dimensions, or sub-constructs (of *Differential Advantage*). Addressing this issue is of considerable interest in the present study. To this extent an iterative process of (1) measurement → (2) item inclusion/replacement/removal → (3) re-measurement, was undertaken during principal component analysis. This offered the most comprehensive assessment of those items deemed useful in the study and those to be marked for elimination from the scales. The following section will address each factor grouping in turn for issues of item analysis, dimensionality and reliability.

5.3.1 Product Differential Advantage

5.3.1.1 Item Analysis

The initial item analysis for the *Product Differential Advantage* scale contained only 12 items since item number (1) *We will be the first to introduce this product type to market*, was removed from the analysis due to a non-response problem (section 4.2.2.3). In addition to these 12 items, questions (96) *The product would represent a technological enhancement* and (100) *The new product would have lower costs than existing products*, were added from the *Market Strategy* factor grouping for conceptual reasons that will be addressed later (section 5.3.10). This provides a 14 item *Product Differential Advantage* scale to assess.

Assessment of the correlation matrix noted that item (10) *Product is priced lower than competing products*, was not behaving as intended since it was correlating negatively with 11 of the 13 other items in the scale. Conceptually, however, this could be expected. With many of the other scale items referring to technological enhancements, revolutionary innovations and patentability, it is likely that these items will be negatively correlated with an item indicating a lower unit cost. In a similar fashion item (100) *The new product would have lower costs than existing products*, was negatively correlated with four items of the remaining 13 in the scale.

These items were not removed from the principal component analysis (consistent with section 5.3), but were 'flagged' for further monitoring during the next stages of analysis. Negative loadings on any factors would give cause for concern and require possible reverse scoring of the variables. The factorability of the correlation matrix was confirmed with a large and significant Bartlett's test of sphericity (χ^2 977.5, df. 66, Sig. 0.000) and a Kaiser-Meyer-Olkin value of 0.804, as was recommended in section 5.2.1.2. Table 5.12 displays the mean ratings and standard deviations for each of the 14 items pertaining to *Product Differential Advantage*.

Table 5.12 Item Analysis – *Product Differential Advantage*

(1 = "disagree"), (5 = "agree")	Mean	St. Dev.
(2) This product would be a revolutionary innovation	2.64	1.37
(3) This product would be clearly differentiated from competitors' products	3.79	1.21
(4) This product would achieve important technological strengths	2.82	1.35
(5) This product would make the firm a major entity in the category	3.28	1.34
(6) This product would be patentable	1.94	1.35
(7) This product would be of higher quality than what is on offer in the category	3.78	1.11
(8) This product would have different applications to competitors' products	2.77	1.43
(9) This product would be clearly superior to competing products in terms of meeting customers' needs	3.64	1.12
(10) This product would be priced lower than competing products	2.02	1.06
(11) This product would clearly satisfy identified customer needs	3.88	1.04
(12) This product would respond to changes in customer needs and wants	3.83	1.08
(13) This product would be highly consistent with existing consumer values	3.98	0.99
(96) The product would represent a technological enhancement	2.71	1.50
(100) The new product would have lower costs than existing products	1.93	1.05

5.3.1.2 Dimensionality

The 14 items from the *Product Differential Advantage* scale were analysed according to the process outlined in sections 5.2.1.4 and 5.2.1.5. Specifically, the items were factor analysed using principal components analysis with varimax rotation.

The first attempted analysis resulted in a three factor solution explaining 56.7% of the cumulative variance using the latent-root method of factor selection outlined in section 5.2.1.5.1. An examination of the rotated factor matrix noted that the items (5) *This product would make the firm a major entity in the category*, and (8) *This product would have different applications to competitors' products*, were loading strongly on more than one factor.

These two items were looked at in more detail. Item (5) displayed a fairly central mean value and reasonable variability. It does not, however, reflect a measure of differential advantage *per se*, but a possible outcome of differential advantage, i.e. category strength. This item would fit conceptually in the *Nature of the Market* factor, but it was felt that the item closely resembled item (62) *We are the dominant organisation in this category* and was, therefore, marked for elimination from the scale. Item (8) also displayed an adequately central mean and variance. However, it too did not measure a *driver*, but also reflected an *outcome* of differential advantage. These items were not aiding the factor structure in it's explanation of the variance in the data. Leaving these items in the analysis would also increase the likelihood of multicollinearity within the factor structures. Both items were, therefore, removed and the analysis performed again.

A second principle analysis was performed with the 12 remaining scale items. This uncovered a three factor solution explaining 61% of the cumulative variance in the data. Rotating the matrix produced three distinct and uniquely loading factors that can be seen in Table 5.13.

5.3.1.2.1 Factor 1

Table 5.13 shows that factor 1 was made up of five scale items which accounted for 33.35% of the variance among the items. These five items display unique and large rotated factor loadings, ranging from 0.603 to 0.837. This scale exhibits a good level of internal consistency with a coefficient alpha score of 0.81 (DeVellis, 1991). The corrected item-total correlations are all reasonably high and greater than the mean inter-item correlation value, supporting the inclusion of the items in the scale. The internal consistency of the scales could not be improved by removing any of the items from the scale.

The items within this scale broadly represent the technical nature of product differential advantage. It is for this reason that this factor is labelled *Tangible Technological Advantage*. The composition of this dimension will be addressed in detail in chapter six.

5.3.1.2.2 Factor 2

Table 5.13 shows that factor 2 was also made up of five scale items which accounted for 16.77% of the variance among the items. These five items displayed similarly large and unique rotated factor loadings ranging from 0.577 to 0.843. This scale exhibits a similarly high degree of internal consistency with an alpha score of 0.82. The item-total correlations and mean inter-item correlation value also support the inclusion of the items in the scale. The internal consistency of the scales could not be improved by removing any of the items from within the scale.

The items in this scale were addressing the extent to which the advantage or superiority of the product was derived from a good level of fit with consumers values and needs. As a result this factor is labelled *Superior Consumer Fit*. The composition of this dimension will be addressed in detail in chapter six.

Table 5.13 Principal Components of *Product Differential Advantage*

	Eigen-Value	Variance %	Cumulative Variance %	Scale Items	Rotated Factor Loading	Scale α	Corrected Item-Total Correlation	Mean Inter-Item Correlation
1 *Tangible*	4.00	33.35	33.35	(4) This product would achieve important technological strengths	0.837	0.81	0.74	0.46
Technological				(2) This product would be a revolutionary innovation	0.804		0.68	
Advantage				(6) This product would be patentable	0.764		0.57	
				(96) The product would represent a technological enhancement	0.654		0.51	
				(3) This product would be clearly differentiated from competitors' products	0.603		0.49	
2 *Superior*	2.01	16.77	50.12	(11) This product would clearly satisfy identified customer needs	0.843	0.82	0.72	0.48
Consumer Fit				(13) This product would be highly consistent with existing consumer values	0.818		0.61	
				(12) This product would respond to changes in customer needs and wants	0.795		0.63	
				(9) This product would be clearly superior to competing products in terms of meeting customers' needs	0.688		0.62	
				(7) This product would be of higher quality than what is on offer in the category	0.577		0.49	
3 *Value*	1.31	10.87	60.99	(100) The new product would have lower costs than existing products	0.809	0.45	0.29	0.29
Advantage				(10) This product would be priced lower than competing products	0.768		0.29	

5.3.1.2.3 Factor 3

The last factor to be uncovered, factor 3, explained 10.87% of the variance in the data and consisted of two scale items. These two items were highly loaded onto factor 3 with rotated loadings of 0.768 and 0.809. However, this dimension exhibited a much lower level of internal consistency than the first two factors, with an alpha score of 0.45. The item-total correlations and mean inter-item correlations were also lower than the two earlier factors.

The alpha value of 0.45 is outside the lower acceptable boundary of 0.7 as was recommended by Nunnally (1978) and noted in section 5.2.1.3. However, as was also suggested, the alpha value is directly correlated to the number of scale items. In this case, the lower alpha value can partly be attributed to there being only two scale items. There is also a need to publish less significant, as well as non significant results to aid the development of research (Montoya-Weiss and Calantone, 1994). In this case in terms of identified dimensions of new product screening.

For this reason, those factors with alpha values on, or around, the lower accepted boundary of 0.50 will be included in the further analysis stages. Cooper and de Brentani (1984) and de Brentani (1986) included factors with alpha values of 0.46, 0.47 and 0.49.

For the sake of future scale development, it is possible to calculate the number of scale items that would be required to reach a satisfactory level of alpha and, therefore, level of internal consistency. This procedure is known as the Spearman-Brown prophesy formula. Given the coefficient alpha for a specified number of items, the prophesy formula indicates the effects on alpha of increasing or decreasing the number of items (Spector, 1992).

The prophesy formula is;

$$\alpha_n = \frac{(F \times \alpha_0)}{1 + [(F - 1) \times \alpha_0]}$$

where: α_0 = original alpha value

α_n = future alpha value

F = the factor by which the scale is being increased or decreased (e.g. if the scale contains two items and you wish to assess the alpha score for a four item scale, $F = 2$)

In this instance, if the scale was increased to three items, the alpha value would increase to 0.55 and be within the minimum acceptable boundary according to Cooper and de Brentani (1984).

An alternative view to this poor alpha value could be that this dimension conforms to the 'causal' indicator suggested by Bollen and Lennox (1991), where measures of reliability and correlation are inappropriate (proposed in section 5.2.1.3). This will be discussed in greater detail in chapter six (sections 6.1 and 6.2).

The scale items were addressing the extent to which 'value' was a factor in the attainment of differential advantage. This element of value could be in terms of lower costs for the producer, which could be translated into lower prices for the consumer. As a result this factor is labelled *Value Advantage*. The composition of this dimension will be addressed in detail in chapter six.

5.3.2 Product Promotion

5.3.2.1 Item Analysis

The item analysis for the *Product Promotion* scale included all five of the original scale items. Assessment of the correlation matrix shows a range of positive, significant correlations. The factorability of the correlation matrix was confirmed with a large and significant Bartlett's test of spherity (χ^2 208.0, df. 10, Sig. 0.000) and a Kaiser-Meyer-Olkin value of 0.702. Table 5.14 displays the mean ratings and standard deviations for each of the five items pertaining to *Product Promotion.*

Table 5.14 Item Analysis - *Product Promotion*

(1 = "disagree"), (5 = "agree")	Mean	St. Dev.
(14) This product would have a clear USP (unique selling proposition)	3.90	1.16
(15) This product would have consistent advertising support	2.92	1.37
(16) This product would have constant brand development	3.45	1.15
(17) This product would have attractive packaging	4.33	0.84
(18) This product would have functional packaging	3.85	1.16

5.3.2.2 Dimensionality

The five items from the *Product Promotion* scale were analysed using principal components analysis with varimax rotation. The first analysis returned a single factor solution (using the latent-root criterion) which explained 46% of the variance in the data. Although the variance explained by this factor is moderately low, an exploratory analysis fixing the factors for extraction at two produced a second factor that made little conceptual sense. The SPSS package was trying to force another factor (the original analysis produced a second factor with an eigen-value of 0.88, which explained an additional 17.6% of the variance). As a result, the original single factor solution was retained, highlighting the unidimensionality of the original scale.

The unrotated factor solution can be seen in Table 5.15 (only one factor was extracted).

5.3.2.2.1 Factor 1

The five items that comprise the scale loaded highly and uniquely on the single uncovered factor with unrotated loadings ranging from 0.513 to 0.722. This dimension exhibits a fairly good level of internal consistency with a coefficient alpha score of 0.69. The corrected item-total correlations are reasonable and greater than the mean inter-item correlation value, supporting the inclusion of the five items in the scale. The internal consistency of the scales could not be enhanced by removing any of the items from the scale.

The scale, as one would expect, reflects those items concerned with the clarity and consistency of the product's promotional efforts. The scale is, accordingly, re-labelled *Clearly Defined Promotion Plan*. The composition of this dimension will be addressed in detail in chapter six.

Table 5.15 Principal Components of *Product Promotion*

	Eigen-Value	Variance %	Cumulative Variance %	Scale Items	Factor Loading*	Scale α	Corrected Item-Total Correlation	Mean Inter-Item Correlation
1 *Clearly*	2.30	45.96	45.96	(17) This product would have attractive packaging	0.718	0.69	0.50	0.32
Defined				(14) This product would have a clear USP (unique selling proposition)	0.699		0.48	
Promotion Plan				(15) This product would have consistent advertising support	0.713		0.50	
				(16) This product would have constant brand development	0.722		0.50	
				(18) This product would have functional packaging	0.513		0.31	

*Un-rotated matrix, only one component extracted

5.3.3 Product Newness to the Firm

5.3.3.1 Item Analysis

The analysis for the *Product - Newness to the Firm* scale contained all six of the original scale items. Assessment of the correlation matrix noted a range of positive, highly significant correlations between scale items. The factorability of the correlation matrix was confirmed with a large and significant Bartlett's test of sphericity (χ^2 507.7, df. 10, Sig. 0.000) and a Kaiser-Meyer-Olkin value of 0.673. Table 5.16 displays the mean ratings and standard deviations for each of the six items pertaining to *Product - Newness to the Firm.*

Table 5.16 Item Analysis - *Product Newness to the Firm*

(1 = "disagree"), (5 = "agree")	Mean	St. Dev.
(19) This product would be a new product class to company	2.78	1.66
(20) This product would serve new types of users' needs	3.15	1.46
(21) This product would require technologies that are new to the firm	2.74	1.56
(22) This product would require production process that are new to the firm	2.71	1.62
(23) This product would place the firm in new competitive environments	3.11	1.49
(24) This product would use new customer service and technical support	2.15	1.30

5.3.3.2 Dimensionality

The six items from this scale were analysed using principal component analysis with varimax rotation. The first analysis returned a two factor solution explaining 71.3% of the variance in the data. However, examination of the rotated factor matrix noted that item (24) *This product would use new customer service and technical support,* loaded highly on both factors.

Closer inspection of this item noted that whilst it displayed a reasonable variance, it had a fairly non-central mean (2.15) indicating 'disagreement' with the statement. It was also clear that whilst it may reflect an element of newness to the firm, it may not be entirely appropriate to firms within the *fmcg* sector. The nature of industrial product success is such that technical and customer support for often complex products is critical and a common part of the product 'bundle'. However, technical support in the *fmcg* sector, for example, may be confined to categories such as vending. Customer support may form part of the post-launch marketing effort (section 1.2) and not be important enough as a screening item. To this extent, moving the item to another factor would have been inappropriate. The item was also deemed to be close in content to item (50) *This product would utilise current consumer support resources*, within the *Corporate Synergy* factor grouping. This item was removed and the analysis performed again.

A second principal component analysis was performed with the remaining five items. This uncovered a two factor solution that explained 79% of the total variance in the data. Rotating the matrix produced two distinct and uniquely loading factors that can be seen in Table 5.17.

5.3.3.2.1 Factor 1

Table 5.17 shows that factor 1 comprised of three items and explained 53.07% of the variance within the data. The rotated factor loadings for the three items were large and unique and ranged from 0.784 to 0.847. This scale displays a high degree of internal consistency with a coefficient alpha score of 0.79. The corrected item-total correlations and mean inter-item correlation value, support the inclusion of the three items in the scale. The internal consistency of the scales could not be improved by removing any of the items from the scale.

Table 5.17 Principal Components of *Product - Newness to the Firm*

	Eigen-Value	Variance %	Cumulative Variance %	Scale Items	Rotated Factor Loading	Scale α	Corrected Item-Total Correlation	Mean Inter-Item Correlation
1 *Incremental*	2.65	53.07	53.07	(23) This product would place the firm in new competitive environments	0.847	0.79	0.64	0.55
Growth				(20) This product would serve new types of users' needs	0.835		0.61	
Opportunity				(19) This product would be a new product class to company	0.784		0.64	
2 *Sizeable New*	1.29	25.78	78.85	(22) This product would require production process that are new to the firm	0.939	0.89	0.81	0.81
Technology Requirement				(21) This product would require technologies that are new to the firm	0.931		0.81	

The items that were included in this factor reflected the newness of the actual product to the firm in terms of marketplace and consumer needs. Accordingly this factor is labelled *Incremental Growth Opportunity*. The composition of this dimension will be addressed in detail in chapter six.

5.3.3.2.2 Factor 2

Table 5.17 shows that factor 2, made up of two scale items, explained 25.78% of the variance in the data. Both rotated factor loadings were unique and high at 0.931 and 0.939. This scale exhibits very high degree of internal consistency (α = 0.89) considering the scale comprises of only two items. The corrected item-total correlations and mean inter-item correlation support the inclusion of the two items in the scale. Since the scale contained two items, the internal consistency could not be improved by removing either of the items from the scale.

The items that form the scale are concerned with the newness of the product in terms of the necessity for new technologies and processes. As a result, this factor is labelled *Sizeable New Technology Requirement*. The composition of this dimension will be addressed in detail in chapter six.

5.3.4 Product Characteristics

5.3.4.1 Item Analysis

The item analysis for the *Product Characteristics* factor grouping included all 15 of the original scale items. Assessment of the correlation matrix noted that item number (38) *This product would cause little damage to the company's reputation through* failure, was not behaving as expected since it was correlating negatively with seven of the 14 items in the scale. Item number (27) *This product is subject to political and social influences*, was also negatively correlating with four of the 14 items in the scale. Although the negative correlations were small, these items would be carefully observed during the next stages of analysis. The factorability of the correlation matrix was confirmed with a large and significant Bartlett's test of spherity (χ^2 814.2, df. 55, Sig. 0.000) and a Kaiser-Meyer-Olkin value of 0.769. Table 5.18 displays the mean ratings and standard deviations for each of the 15 items pertaining to *Product Characteristics.*

Table 5.18 Item Analysis - *Product Characteristics*

(1 = "disagree"), (5 = "agree")	Mean	St. Dev.
(25) The product idea came to us from the marketplace	3.04	1.48
(26) Product specifications were very clear from the start of the project	3.10	1.40
(27) This product is subject to political and social influences	2.14	1.31
(28) This product would have clearly defined target markets	4.14	0.98
(29) This product would have consumer benefits that were clearly defined	4.03	1.12
(30) This product would have a positioning strategy that was clearly defined	4.05	1.11
(31) This product would have features that were clearly defined	4.12	1.04
(32) This product would have features that would not change for a long time	3.54	1.14
(33) This product would have predictable development patterns	3.03	1.08
(34) This product would have long term relevance to consumers	3.61	1.13
(35) This product would have production facilities that were geared up for launch	3.86	1.21
(36) This product would have production volume that would meet predicted demand	3.98	1.05
(37) This product would have low cost of reclaiming stocks in the event of failure	2.63	1.23
(38) This product would cause little damage to the company's reputation through failure	3.05	1.32
(39) This product would have a variety of applications	2.41	1.27

5.3.4.2 Dimensionality

The 15 original scale items were entered into a principal component analysis. The first analysis returned a six factor solution explaining 69% of the variance in the data. However, examination of the rotated factor matrix showed that items (25) *The product idea came to us from the marketplace*, (27) *This product is subject to political and social influences* and (34) *This product would have long term relevance to consumers*, loaded heavily on more than one factor.

Closer inspection of these items noted that two of the items (27) and (34) had non-central means, while all of the items showed reasonable variation. Closer inspection of item (25) highlighted the strategic nature of this question in terms of consumer driven NPD. Conceptually, this item would seem better placed in the *Market Strategy* scale. Accordingly, this item was removed from this analysis and will be entered into the *Market Strategy* analysis to be discussed later. Item (27) offered respondents a wide variety of possible response options that could be contradictory. A product could be affected by political issues (food additive laws for example) but not social factors. It could be affected by societal issues (such as the adverse publicity surrounding 'Alcopops') but not necessarily direct political influence. The question also raises questions about *how* the political and social factors are involved in the screening decision. The question is, therefore, found to be ambiguous and is removed from the analysis. Item (34) could also be considered to be unclear with respect to the precise meaning of long-term relevance. The question could be seen to have been covered by several other questions within the questionnaire, for example, (12) *This product would respond to changes in customer needs and wants*; (32) *This product would have features that would not change for a long time*; (33) *This product would have predictable development patterns*. Accordingly these two items was removed from the analysis.

This second principal component analysis containing 13 of the original 15 items returned a four factor solution that explained 63% of the total variance in the data. However, examination of the rotated factor matrix showed that item (39) *This product would have a variety of applications*, loaded highly on three of the four uncovered factors. Examination of this item noted that it was failing to provide any differentiation between the uncovered dimensions of Product Characteristics. This could be attributed to the industrial origin of this item (section 3.2.3). The item was, therefore, removed from the analysis.

A third principal component analysis of the remaining 11 scale items uncovered a four factor solution explaining 68% of the variation in the data. Rotating the matrix produced four distinct and uniquely loading factors that can be seen in Table 5.19.

5.3.4.2.1 Factor 1

Table 5.19 shows that factor 1 is made up of four scale items and accounts for 32.51% of the variance in the data. The rotated factor loadings are high and unique, ranging from 0.763 to 0.890. The scale exhibits a high level of internal consistency with an alpha score of 0.88. The corrected item-total correlations and mean inter-item correlation support the inclusion of the four items in the scale. The internal consistency of the scale could not be improved by removing any of the items.

This four item scale is comprised of items that broadly reflect a clearly defined product in terms of strategy, product benefit, features and identified market. As a result, this dimension is labelled *Clear Product Definition*. The composition of this dimension will be addressed in detail in chapter six.

5.3.4.2.2 Factor 2

Table 5.19 shows that factor 2, made up of two scale items, explains a further 13.97% of the variance in the data. Both rotated factor loadings are high and unique (0.852 and 0.858). This scale also shows a good level of internal consistency with an alpha value of 0.73. The corrected item-total correlations and mean inter-item correlation support the inclusion of the two scale items. Since there are only two items the internal consistency of the scale could not be improved by removing either item.

This second scale reflects the ability of the organisations production facilities to react to the demands of the product launch and meet predicted demand. For this reason this factor is labelled *Production Readiness*. The composition of this dimension will be addressed in detail in chapter six.

Table 5.19 Principal Components of *Product Characteristics*

	Eigen-Value	Variance %	Cumulative Variance %	Scale Items	Rotated Factor Loading	Scale α	Corrected Item-Total Correlation	Mean Inter-Item Correlation
1 *Clear Product Definition*	3.58	32.51	32.51	(30) This product would have a positioning strategy that was clearly defined	0.890	0.88	0.82	0.65
				(29) This product would have consumer benefits that were clearly defined	0.884		0.81	
				(31) This product would have features that were clearly defined	0.817		0.74	
				(28) This product would have clearly defined target markets	0.763		0.62	
2 *Production Readiness*	1.54	13.97	46.48	(35) This product would have production facilities that were geared up for launch	0.858	0.73	0.57	0.57
				(36) This product would have production volume that would meet predicted demand	0.852		0.57	
3 *Predictable Development Pattern*	1.30	11.81	58.29	(32) This product would have features that would not change for a long time	0.727	0.47	0.28	0.24
				(33) This product would have predictable development patterns	0.721		0.36	
				(26) Product specifications were very clear from the start of the project	0.607		0.26	
4 *Low Risk of Failure*	1.07	9.72	68.01	(38) This product would cause little damage to the company's reputation through failure	0.874	0.54	0.37	0.37
				(37) This product would have low cost of reclaiming stocks in the event of failure	0.758		0.37	

5.3.4.2.3 Factor 3

Table 5.19 shows that factor 3, made up of three scale items accounts for a further 11.81% of the explained variance in the data. The rotated factor loadings were high and unique ranging from 0.607 to 0.727. The level of internal consistency is, however, poor with an alpha value of 0.47. This low alpha could be attributed to the low number of items in the scale, as was found with the *Value Advantage* dimension of *Product Differential Advantage* (section 5.3.1.2.3). Since the scale alpha is only just below the minimum accepted level of alpha as suggested by Cooper and de Brentani (1984) it is also included in further analyses. The corrected item-total correlations and mean inter-item correlation are lower than is desirable but support the inclusion of the three items in the scale. The internal consistency of the scale could not be improved by removing any of the items from the scale.

For the benefit of future investigations and analyses the Spearman-Brown prophesy formula suggests that increasing the number of scale items to four would resulted in a scale alpha of 0.54, which is within the acceptable lower limit of alpha (Cooper and de Brentani, 1984).

As with the *Value Advantage* dimension of *Product Differential Advantage* (section 5.3.1.2.3) an alternative view to this poor alpha value could be that this dimension conforms to the 'causal' indicator suggested by Bollen and Lennox (1991), where measures of reliability and correlation are inappropriate (section 5.2.1.3). This will also, be discussed in greater detail in chapter six (sections 6.1 and 6.2).

The items within this scale broadly represent the clear, stable and predictable nature of the product and it's future development pattern. For this reason this dimension is termed *Predictable Development Pattern*. The composition of this dimension will be addressed in detail in chapter six.

5.3.4.2.4 Factor 4

Table 5.19 shows that the final *Product Characteristics* factor contains two items and explains 9.72% of the variance in the data. Both rotated factor loadings were high and unique (0.758 and 0.874). The scale exhibits a low, but acceptable, alpha value of 0.54, while the corrected item-total correlations and mean inter-item correlation support the inclusion of the two items in the scale. Improvement of the internal consistency of the scale is not possible by removing either of the items from the scale.

The items in this dimension reflect the disruption that would be caused by the new product failing in the marketplace. To this extent, this dimension is labelled *Low Risk of Failure*. The composition of this dimension will be addressed in chapter six.

5.3.5 Corporate Synergy

5.3.5.1 Item Analysis

The initial item analysis for the *Corporate Synergy* factor grouping contained all 18 of the original scale items. Assessment of the correlation matrix identified a range of positive, and high correlations between scale items. The factorability of the correlation matrix was confirmed with a large and significant Bartlett's test of sphericity (χ^2 1949.3, df. 136, Sig. 0.000) and a Kaiser-Meyer-Olkin value of 0.843. Table 5.20 displays the mean ratings and standard deviations for each of the 18 items pertaining to *Corporate Synergy*.

Table 5.20 Item Analysis - *Corporate Synergy*

(1 = "disagree"), (5 = "agree")	Mean	St. Dev.
(40) This product would fit firm's present business	4.28	1.09
(41) This product would fit the firm's organisational set-up	4.28	1.02
(42) This product would fit the firm's managerial capabilities	4.45	0.81
(43) This product would fit top management's preferences	3.90	1.14
(44) This product would be aimed at firm's current consumers	3.72	1.28
(45) This product would have competitors who are known and understood	4.14	1.11
(46) This product would use current sales and distribution channels	4.54	0.94
(47) This product would use current marketing research techniques	4.39	0.97
(48) This product would use current advertising	2.68	1.54
(49) This product would use current sales promotion techniques	3.95	1.16
(50) This product would utilise current consumer support resources	4.13	1.09
(51) This product would utilise current engineering and design resources	3.81	1.32
(52) This product would utilise current R&D resources	4.31	0.95
(53) This product would utilise current manufacturing experience	4.00	1.24
(54) This product would uses current manufacturing plant and equipment	3.74	1.44
(55) This product would be strongly supported by senior management	3.92	1.18
(56) This product would have an internal company champion	4.15	1.16
(57) This product would have minimal 'line start-up' production problems	3.39	1.37

5.3.5.2 Dimensionality

The 18 scale items were entered into a principal component analysis which resulted in a five factor solution explaining 69% of the variance in the data. Examination of the rotated factor matrix highlighted that item (52) *This product would utilise current R&D resources*, loaded highly on three of the five factors. Examination of this item noted that the term 'R&D resources' might be ambiguous. Accordingly this may have caused confusion for the respondent and inhibited a clear response. The term 'R&D' is often interchangeable with other design, development and manufacturing activities. For this reason this item may lack differentiation with respect to other questions in the scale, namely; (51) *This product would utilise current engineering and design resources*, (53) *This product would utilise current manufacturing experience*, (54) *This product would uses current manufacturing plant and equipment*. The item was duly removed from the analysis.

A second principal component analysis returned a five factor solution that accounted for 70% of the variance in the data. Rotating the matrix produced five distinct and uniquely loading factors that can be seen in Table 5.21.

5.3.5.2.1 Factor 1

Table 5.21 shows that the first underlying dimension of *Corporate Synergy* contains five items and explains 34.44% of the variance in the data. The rotated factor loadings were high and unique ranging from 0.599 to 0.803. It exhibits a high level of internal consistency with an alpha value of 0.87. The corrected item-total correlations and mean inter-item correlation support the inclusion of the five scale items. Internal consistency could not be improved by removing any items.

This scale reflects how well the new product would fit the commercial activities of the business in terms of the current organisational set-up, selling channels, personnel capabilities and so on. To this extent this dimension is labelled *Commercial Fit*. The composition of this dimension will be addressed in detail in chapter six.

5.3.5.2.2 Factor 2

The second dimension contains four items and explains 13.78% of the variance in the data. It too showed high and unique rotated factor loadings ranging from 0.755 to 0.904. This scale exhibits a high degree of internal consistency with an alpha value of 0.88. Again, the corrected item-total correlations and mean inter-item correlation support the inclusion of the four scale items. The internal consistency of the dimension could not be improved by removing any of the items.

This dimension is concerned with how easily the new product would fit the manufacturing and production capabilities of the organisation in terms of current plant and equipment, experience and resources. This dimension, therefore, is labelled *Production Fit.* The composition of this dimension will be addressed in detail in chapter six.

5.3.5.2.3 Factor 3

Table 5.21 shows that factor 3 contains two items, has a high alpha value of 0.77 and corrected item-total correlations and a mean inter-item correlation value that supports the inclusion of the two items in the scale. Both rotated factor loadings were high and unique (0.789 and 0.863). With only two items, the internal consistency of the scale could not be improved by removing either of the items from the scale.

This dimension reflects the fit of the new product with the desires and preferences of the organisations senior management. For this reason this dimension is termed *Senior Management Endorsement.* The composition of this dimension will be addressed in detail in chapter six.

5.3.5.2.4 Factor 4

The fourth dimension contained three items, had an alpha value of 0.65 and corrected item-total correlations and a mean inter-item correlation value that supports the inclusion of the three items in the scale. The rotated factor loadings ranged from 0.633 to 0.826. The internal consistency of the scale could not be improved by removing any of the items from the scale.

This dimension reflected the extent to which the new product would fit the organisations current consumers and current methods of communicating with those consumers. This dimension was, therefore, labelled *Communication Channel Fit.* The composition of this dimension will be addressed in detail in chapter six.

Table 5.21 Principal Components of *Corporate Synergy*

	Eigen-Value	Variance %	Cumulative Variance %	Scale Items	Rotated Factor Loading	Scale α	Corrected Item-Total Correlation	Mean Inter-Item Correlation
1 *Commercial Fit*	5.86	34.44	34.44	(41) This product would fit the firm's organisational set-up	0.803	0.87	0.82	0.57
				(46) This product would use current sales and distribution channels	0.781		0.57	
				(42) This product would fit the firm's managerial capabilities	0.712		0.74	
				(40) This product would fit firm's present business	0.700		0.72	
				(45) This product would have competitors who are known and understood	0.599		0.63	
2 *Production Fit*	2.34	13.78	48.22	(54) This product would uses current manufacturing plant and equipment	0.904	0.88	0.82	0.64
				(53) This product would utilise current manufacturing experience	0.866		0.80	
				(57) This product would have minimal 'line start-up' production problems	0.799		0.67	
				(51) This product would utilise current engineering and design resources	0.755		0.67	
3 *Senior Management Endorsement*	1.53	9.00	57.22	(55) This product would be strongly supported by senior management	0.863	0.77	0.63	0.63
				(43) This product would fit top management's preferences	0.789		0.63	

4 *Communication*	1.20	7.05	64.27	(48) This product would use current advertising	0.826	0.65	0.46	0.39
Channel Fit				(44) This product would be aimed at firm's current consumers	0.673		0.45	
				(49) This product would use current sales promotion techniques	0.633		0.49	
5 *Support*	1.04	6.12	70.39	(56) This product would have an internal company champion	0.727	0.64	0.36	0.38
Resource Fit				(50) This product would utilise current consumer support resources	0.697		0.54	
				(47) This product would use current marketing research techniques	0.664		0.46	

5.3.5.2.5 Factor 5

The final dimension of Corporate Synergy contains three items and explains 6.12% of the remaining variance in the data. It showed high and unique rotated factor loadings ranging from 0.664 to 0.727. The scale exhibits a reasonable degree of internal consistency with an alpha value of 0.64. The corrected item-total correlations and mean inter-item correlation support the inclusion of the three scale items. The internal consistency of the dimension could not be improved significantly by removing any of the items.

This final dimension reflects the support facilities that are necessary for the successful launch of a new product, including consumer support, marketing research and the driving of a company champion. This final dimension is, therefore, labelled *Support Resource Fit*. The composition of this dimension will be addressed in detail in chapter six.

5.3.6 Trade Synergy

5.3.6.1 Item Analysis

Initial item analysis contained all four of the original *Trade Synergy* measures. Analysis of the correlation matrix highlighted a range of positive, highly significant correlations. The factorability of the correlation matrix was confirmed with a large and significant Bartlett's test of spherity (χ^2 485.4, df. 6, Sig. 0.000). However, a Kaiser-Meyer-Olkin value of 0.572 is slightly lower than the 0.6 recommended by Coakes and Steed (1999). It is, however, above the unacceptable level as indicated by Kaiser and Rice (1974). Table 5.22 displays the mean ratings and standard deviations for each of the 18 items pertaining to *Trade Synergy*.

Table 5.22 Item Analysis - *Trade Synergy*

(1 = "disagree"), (5 = "agree")	Mean	St. Dev.
(58) It would be easy to get shelf space for this product	3.31	1.17
(59) The product would have strong trade support	3.51	1.06
(60) The firm has strong relationships with the trade	4.26	0.83
(61) The company has important goodwill and reputation at the trade level	4.22	0.82

5.3.6.2 Dimensionality

The four item scale was analysed using principal components resulting in a two factor solution explaining 89% of the variance in the data. Examination of the rotated factor matrix highlighted two distinct and uniquely loading factors that can be seen in Table 5.23.

5.3.6.2.1 Factor 1

The first dimension of *Trade Synergy* contains two items and explains 58.45% of the variance in the data. Both rotated factor loadings were high and unique (0.944 and 0.950). The scale shows a very high degree of internal consistency with an alpha value of 0.92, particularly high for a scale containing only two items. The corrected item-total correlations and mean inter-item correlation support the inclusion of the two items. Internal consistency could not be improved by removing either of the items.

This dimension reflects the strength of the organisations relationship at the trade level. Accordingly this dimension is labelled *Strong Trade Support*. The composition of this dimension will be addressed in detail in chapter six.

Table 5.23 Principal Components of *Trade Synergy*

	Eigen-Value	Variance %	Cumulative Variance %	Scale Items	Rotated Factor Loading	Scale α	Corrected Item-Total Correlation	Mean Inter-Item Correlation
1 *Strong Trade*	2.34	58.45	58.45	(61) The company has important goodwill and reputation at the trade level	0.950	0.92	0.84	0.84
Support				(60) The firm has strong relationships with the trade	0.944		0.84	
2 *Likely Trade*	1.20	30.05	88.50	(58) It would be easy to get shelf space for this product	0.925	0.81	0.69	0.69
Adoption				(59) The product would have strong trade support	0.886		0.69	

5.3.6.2.2 Factor 2

The second dimension of Trade Synergy also contains two items and explains a further 30.05% of the variance in the data. Again, both rotated factor loadings were high and unique (0.886 and 0.925). This scale also shows a very high degree of internal consistency with an alpha value of 0.81. The corrected item-total correlations and mean inter-item correlation support the inclusion of the two items. Internal consistency could not be improved by removing either of the items.

This dimension is concerned more with the acceptance of this particular new product at the trade level. Accordingly is labelled *Likely Trade Adoption.* The composition of this dimension will be addressed in detail in chapter six.

5.3.7 Nature of the Market

5.3.7.1 Item Analysis

The initial item analysis included all 18 of the original scale items. Assessment of the correlation matrix showed that items (76) *The product would have weak competitors in this market*, (66) *Users' needs change quickly in this category*, (65) *Competitors launch new products frequently in this category*, (62) *We are the dominant organisation in this category*, (68) *Competing products are not strategically important to owners*, (78) *The product would have consumers who were amenable to trying new products*, loaded negatively on four or more of the remaining scale items. These items were noted for more careful scrutiny during the next stages of analysis. The remaining items showed a range of positive and significant correlations. The factorability of the correlation matrix was confirmed with a large and significant Bartlett's test of spherity (χ^2 571.7, df. 66, Sig. 0.000) and a Kaiser-Meyer-Olkin value of 0.655. Table 5.24 displays the mean ratings and standard deviations for each of the 18 items pertaining to *Nature of the Market*.

Table 5.24 Item Analysis - *Nature of the Market*

(1 = "disagree"), (5 = "agree")	Mean	St. Dev.
(62) We are the dominant organisation in this category	3.03	1.49
(63) Consumers are loyal to competitors' products	3.00	1.20
(64) Potential consumers are very satisfied with the competitors products they are using	2.85	0.97
(65) Competitors launch new products frequently in this category	2.91	1.40
(66) Users' needs change quickly in this category	2.46	1.14
(67) This product category would be important to the trade	3.63	1.07
(68) Competing products are not strategically important to owners	2.22	1.19
(69) The product would have a mass market	3.56	1.21
(70) The product would have a geographically large market	4.04	1.04
(71) The product would have aggressive competition	3.77	1.19
(72) The product would have competing products that were very similar to each other	3.19	1.27
(73) The product would have an intensely price competitive market	3.41	1.34
(74) The product would have many competitors in this market	3.27	1.26
(75) The product would have legislation influencing design and testing	2.74	1.47
(76) The product would have weak competitors in this market	2.19	1.12
(77) The product would have stable demand	3.25	1.11
(78) The product would have consumers who were amenable to trying new products	3.94	0.88
(79) The product would have low risk of cannibalising other of own firms products	3.66	1.26

5.3.7.2 Dimensionality

The 18 measures of *Nature of the Market* were factor analysed in the same manner as the previous scales using principal components with varimax rotation. The first analysis resulted in a six factor solution explaining 61% of the variance in the data. However, items (71) *The product would have aggressive competition*, and (78) *The product would have consumers who were amenable to trying new products*, were loading highly on three and four factors respectively.

Closer examination of item (71) showed possible ambiguity in the term 'aggressive'. Respondents may have had a specific perception of 'aggressive' that was not universally applied. Taking this into account with the fact that respondents had already completed questions (63) *Consumers are loyal to competitors' products*, (65) *Competitors launch new products frequently in this category* and (68) *Competing products are not strategically important to owners*, it was felt that this item was not aiding the descriptive power of the uncovered factor structure. It was, therefore removed from the analysis. Item (78) may fit conceptually with the *Competitive and Market Intelligence* scale but was felt to have been covered by items (80) *We understand the consumer's behaviour*, (81) *We know what the consumer will pay for the product*, and (83) *Consumer requirements can be predicted.* This item was duly removed and the principal components assessed again.

The second analysis uncovered a six factor structure explaining 63% of the variance in the data. However, item (62) *We are the dominant organisation in this category*, loaded on three of the six factors while item (77) *The product would have stable demand*, loaded poorly on two of the six factors. Since these two items were conceptually best placed within this factor and they were now not aiding the uncovered factor structure, they were removed from the analysis.

A third components analysis resulted in a five factor solution explaining 60% of the variance in the data. Another item (79) *The product would have low risk of cannibalising other of own firms products*, loaded poorly on two of the five factors, while item number (75) *The product would have legislation influencing design and testing*, loaded highly on two of the five factors. As with the second components analysis, the two items were removed and the analysis run once more.

This final principal component analysis contained 12 of the original 18 scale items and resulted in a five factor solution explaining 68% of the variance in the data. On this occasion, examination of the rotated factor matrix highlighted that the analysis yielded five distinct and uniquely loading factors that can be seen in Table 5.25.

5.3.7.2.1 Factor 1

The first factor to be uncovered from Nature of the Market contained three items and explained 24.51% of the variance in the data. The rotated factor loadings for this dimension were high and unique, ranging from 0.692 to 0.803. This dimension exhibited a good level of internal consistency with an alpha value of 0.71. The corrected item-total correlations and a mean inter-item correlation value that supports the inclusion of the three items in the scale. The internal consistency of the scale could not be improved by removing any of the items from the scale.

This scale was broadly describing the intensity of the market place in terms of product similarity, extent of competition and price competitiveness. As a result this dimension is labelled *Intensely Competitive Market*. The composition of this dimension will be addressed in detail in chapter six.

5.3.7.2.2 Factor 2

The second dimension also contained three items that explained 13.40% of the variance in the data. The rotated factor loadings for this dimension were also high and unique, ranging from 0.704 to 0.799. These three items displayed a fair level of internal consistency with an alpha value of 0.63. The corrected item-total correlations and mean inter-item correlation support the inclusion of the three scale items. The internal consistency of the dimension could not be improved significantly by removing any of the items.

This dimension reflects the size and importance of the marketplace for the potential new product. For this reason this dimension is labelled *Compelling Market Size Potential*. The composition of this dimension will be addressed in chapter six.

Table 5.25 Principal Components of *Nature of the Market*

	Eigen-Value	Variance %	Cumulative Variance %	Scale Items	Rotated Factor Loading	Scale α	Corrected Item-Total Correlation	Mean Inter-Item Correlation
1 *Intensely*	2.94	24.51	24.51	(72) The product would have competing products that were very similar to each other	0.803	0.71	0.48	0.45
Competitive				(74) The product would have many competitors in this market	0.737		0.57	
Market				(73) The product would have an intensely price competitive market	0.692		0.53	
2 *Compelling*	1.61	13.40	37.91	(69) The product would have a mass market	0.799	0.63	0.55	0.36
Market Size				(67) This product category would be important to the trade	0.705		0.32	
Potential				(70) The product would have a geographically large market	0.704		0.47	
3 *Resistance*	1.40	11.68	49.59	(63) Consumers are loyal to competitors' products	0.856	0.70	0.55	0.55
to Brand Switching				(64) Potential consumers are very satisfied with the competitors products they are using	0.825		0.55	
4 *Rapid Market*	1.21	10.09	59.68	(66) Users' needs change quickly in this category	0.865	0.60	0.43	0.43
Changeability				(65) Competitors launch new products frequently in this category	0.769		0.43	
5 *Low Barriers*	1.03	8.54	68.22	(76) The product would have weak competitors in this market	0.768	0.41	0.26	0.26
to Market Entry				(68) Competing products are not strategically important to owners	0.767		0.26	

5.3.7.2.3 Factor 3

Factor 3 contains two scale items and explains 11.68% of the variance in the data. Both the rotated factor loadings for this dimension were high and unique (0.825 and 0.856). The two items have a good alpha value of 0.70. Corrected item-total correlations and a mean inter-item correlation value supports the inclusion of the two items in the scale. With only two items, the internal consistency of the scale could not be improved by removing either of the items from the scale.

This third dimension is concerned with the allegiance that prospective consumers' feel for the products that they are currently using. To this extent this dimension is labelled *Resistance to Brand Switching*. The composition of this dimension will be addressed in detail in chapter six.

5.3.7.2.4 Factor 4

Factor 4 also contains two items and explains a further 10.09% of the variance in the data. Again both the rotated factor loadings for this dimension were high and unique (0.769 and 0.865). These two items exhibit a reasonable level of internal consistency with an alpha value of 0.60. The corrected item-total correlations and mean inter-item correlation support the inclusion of the two items in the scale. With only two items, the internal consistency of the scale could not be improved by removing either of the items from the scale.

This dimension reflects the dynamic nature of the marketplace in terms of changing user needs and frequency of product introduction. This dimension is, therefore, labelled *Rapid Market Changeability*. The composition of this dimension will be addressed in detail in chapter six.

5.3.7.2.5 Factor 5

The final uncovered dimension of Nature of the Market also contains two items and explains the final 8.54% of the variance in the data. The final two rotated factor loadings for this dimension were high and unique (0.767 and 0.768). However, these two items exhibit poor internal consistency with a low alpha value of 0.41. In a similar fashion to the *Value Advantage* dimension of *Product Differential Advantage* (section 5.3.1.2.3) and the *Predictable Development Pattern* dimension of *Product Characteristics* (section 5.3.4.2.3), this low alpha could be attributed to the number of scale items. The alpha is, however, only just below the minimum accepted level of alpha as suggested by Cooper and de Brentani (1984). It is, therefore, also included in the further analysis stages. We must bear in mind the need to identify results even if they are not significant so that the principle drivers of new product performance may progress beyond an exploratory stage (Montoya-Weiss and Calantone, 1994). The corrected item-total correlations and mean inter-item correlation are lower than is desirable but support the inclusion of the two items in the scale. Accordingly this dimension is included in the ensuing stages of analysis.

Using the Spearman-Brown prophesy formula, we find that increasing the number of scale items to three, would have resulted in a scale alpha of 0.51, which is within the acceptable lower limit of alpha (Cooper and de Brentani, 1984).

As in the case of the *Value Advantage* dimension of *Product Differential Advantage* (section 5.3.1.2.3) and the *Predictable Development Pattern* dimension of *Product Characteristics* (section 5.3.4.2.3), an alternative view to this poor alpha value could be that this dimension conforms to the 'causal' indicator suggested by Bollen and Lennox (1991), where measures of reliability and correlation are inappropriate (section 5.2.1.3). This will be discussed in chapter six (sections 6.1 and 6.2).

The two items in this dimension reflect the strength of the competitive arena in terms of competitor strength and the importance of these competing products to their owners. Accordingly this dimension is labelled *Low Barriers to Market Entry.* The composition of this dimension will be addressed in detail in chapter six.

5.3.8 Competitive and Market Intelligence

5.3.8.1 Item Analysis

All five of the original scale items were assessed in this item analysis stage. Assessment of the correlation matrix showed a range of positive and significant correlations. The factorability of the correlation matrix was confirmed with a large and significant Bartlett's test of sphericity (χ^2 356.3, df. 10, Sig. 0.000) and a Kaiser-Meyer-Olkin value of 0.726. Table 5.26 displays the mean ratings and standard deviations for each of the five items pertaining to *Competitive and Market Intelligence.*

Table 5.26 Item Analysis - *Competitive and Market Intelligence*

(1 = "disagree"), (5 = "agree")	Mean	St. Dev.
(80) We understand the consumer's behaviour	4.03	0.91
(81) We know what the consumer will pay for the product	3.96	0.93
(82) We know how competitors will react to this product launch	3.36	1.13
(83) Consumer requirements can be predicted	3.23	1.07
(84) Demand would be easy to forecast	2.68	1.01

5.3.8.2 Dimensionality

Principal component analysis was performed on the five items. This resulted in a single factor solution, explaining 53% of the variance in the data. Rotating the factor matrix is not possible since only one factor was extracted. This highlighted the unidimensionality of the original scale. The resulting unrotated solution can be seen in Table 5.27.

Table 5.27 Principal Components of *Competitive and Market Intelligence*

	Eigen-Value	Variance %	Cumulative Variance %	Scale Items	Factor Loading*	Scale α	Corrected Item-Total Correlation	Mean Inter-Item Correlation
1 *Reliable Market*	2.65	53.00	53.00	(83) Consumer requirements can be predicted	0.822	0.77	0.50	0.41
Intelligence				(80) We understand the consumer's behaviour	0.752		0.57	
				(81) We know what the consumer will pay for the product	0.704		0.51	
				(82) We know how competitors will react to this product launch	0.679		0.68	
				(84) Demand would be easy to forecast	0.672		0.49	

*Un-rotated matrix, only one component extracted

The single dimension of Competitive and Market Intelligence contained five items and explained 53% of the variance in the data. The five items had high and unique unrotated loadings on this single factor ranging from 0.672 to 0.822. This factor exhibits a high degree of internal consistency with an alpha value of 0.77. The corrected item-total correlations are reasonable and greater than the mean inter-item correlation value, supporting the inclusion of the five items in the scale. The internal consistency of the scales could not be enhanced by removing any of the scale items.

As one would expect, this scale reflects the firm's understanding of the marketplace that the proposed new product is intended for. This is clear in the focus of the scale items on understanding consumer requirements, behaviour, price sensitivity and market demand and competitive reaction. Accordingly this scale is re-labelled *Reliable Market Intelligence*. The composition of this dimension will be addressed in detail in chapter six.

5.3.9 Financial Potential

5.3.9.1 Item Analysis

Item analysis for the *Financial Potential* scale included all eight of the original scale items. Assessment of the correlation matrix shows a range of positive significant correlations. The factorability of the correlation matrix was confirmed with a large and significant Bartlett's test of spherity (χ^2 734.8, df. 28, Sig. 0.000) and a Kaiser-Meyer-Olkin value of 0.820. Table 5.28 displays the mean ratings and standard deviations for each of the eight items pertaining to *Financial Potential*.

Table 5.28 Item Analysis - *Financial Potential*

(1 = "disagree"), (5 = "agree")	Mean	St. Dev.
(85) ROI potential would be high	3.52	1.06
(86) Sales growth potential would be high	3.59	1.02
(87) Market share potential would be high	3.47	1.10
(88) There would be a positive economic climate in this market	3.41	0.96
(89) This product would require significant financial investment	2.90	1.37
(90) This product would offer high profit margins	3.51	1.05
(91) This would be a profitable category for the trade	3.93	0.86
(92) This product has a high probability of commercial success	3.47	1.09

5.3.9.2 Dimensionality

The eight items were analysed using principle component analysis yielding a two factor solution explaining 60% of the variance in the data. The rotated factor matrix uncovered factors that were both distinct and uniquely loading and the solution can be seen in Table 5.29.

5.3.9.2.1 Factor 1

The first uncovered dimension of *Financial Potential* contains seven items and accounts for 47.67% of the explained variance in the data. The rotated factor loadings for this scale are high and unique ranging from 0.504 to 0.794. The scale exhibits a high degree of internal consistency with an alpha value of 0.85. The corrected item-total correlations and the mean inter-item correlation value support the inclusion of the seven items in the scale. The internal consistency of the scales could not be enhanced by removing any of the items from the scale.

This dimension of *Financial Potential* is concerned with how the proposed new product will perform in the marketplace. The products performance is reflected in potential sales, profit, market share an so on as well as incorporating the potential for future growth in these areas. This dimension also incorporates measures of likely market success. Accordingly this dimension is labelled *Lucrative Potential Market*. The composition of this dimension will be addressed in detail in chapter six.

5.3.9.2.2 Factor 2

The second uncovered dimension of Financial Potential is a single item factor that accounts for 12.71% of the variance in the data. This item, as would be expected, has a high rotated loading of 0.947 and since it is a single item factor, it has no reliability measure.

Single item factors are fairly common in NPD research. Zirger and Maidique (1990) identified a single item factor representing *General Management Support*. Other research has also incorporated single items factors (Song and Parry, 1994; Cooper, 1985b; Cooper, 1984). Cooper (1984) published five factors and Cooper (1985b) published four factors comprising only one variable construct. These factors were accepted in the factor analysis solutions because they aided the interpretation of the factor structure and had eigen-values greater than 1.0. Cooper (1985b; 1984) termed them 'univariate dimensions'.

This second uncovered dimension of *Financial Potential* reflects the extent to which the potential new product requires a significant level of financial investment. It has already been noted that adequate product investment is directly correlated with potential product profitability (Saunders, 1993) (section 2.5). Therefore, the inclusion of a factor relating to the degree of investment required adds conceptually to this research project. This decision is sported by the high percentage of variance explained by the factor (12.71%) and the eigen-value greater than 1.0 (1.02). Accordingly this dimension is labelled *Requires Significant Financial Investment*. The composition of this dimension will be addressed in detail in chapter six.

Table 5.29 Principal Components of *Financial Potential*

	Eigen-Value	Variance %	Cumulative Variance %	Scale Items	Rotated Factor Loading	Scale α	Corrected Item-Total Correlation	Mean Inter-Item Correlation
1 *Lucrative*	3.81	47.67	47.67	(85) ROI potential would be high	0.794	0.85	0.62	0.45
Potential Market				(92) This product has a high probability of commercial success	0.789		0.68	
				(87) Market share potential would be high	0.783		0.72	
				(86) Sales growth potential would be high	0.774		0.72	
				(90) This product would offer high profit margins	0.689		0.56	
				(91) This would be a profitable category for the trade	0.642		0.57	
				(88) There would be a positive economic climate in this market	0.504		0.42	
2 *Requires Significant Financial Investment*	1.02	12.71	60.38	(89) This product would require significant financial investment	0.947	N/A	N/A	N/A

5.3.10 Market Strategy

5.3.10.1 Item Analysis

A closer inspection of the 11 items forming the *Market Strategy* scale, noted that questions (96) *The product would represent a technological enhancement* and (100) *The new product would have lower costs than existing products*, would fit better, conceptually, within the *Product Differential Advantage* scale (section 5.3.1). They both reflect facets of differential advantage rather than new product strategy. As a result, these items were removed from this scale and placed in the *Product Differential Advantage* scale.

The initial item analysis incorporated the nine remaining original scale items and also item number (25) *The product idea came to us from the marketplace*. This item was found to load heavily on more than one of the uncovered factors within *Product Characteristics* (section 5.3.4.2) and was considered to be conceptually better placed within the *Market Strategy* factor. It was, therefore, included in the final 10 item scale.

Analysis of the correlation matrix shows a range of positive and significant correlations. The factorability of the correlation matrix was confirmed with a large and significant Bartlett's test of spherity (χ^2 339.2, df. 45, Sig. 0.000) and a Kaiser-Meyer-Olkin value of 0.631. Table 5.30 displays the mean ratings and standard deviations for each of the 10 items pertaining to *Market Strategy*.

Table 5.30 Item Analysis - *Market Strategy*

(1 = "disagree"), (5 = "agree")	Mean	St. Dev.
(93) The product would be launched to hold category share	2.44	1.34
(94) The product would represent a survival strategy	1.75	1.08
(95) The product would replace a current product	1.93	1.42
(97) The product would help increase the firm's category share	4.05	1.08
(98) The product would be launched in response to competitor activity	2.17	1.29
(99) The product would be launched to make the market more difficult for competitors	2.92	1.41
(101) The new product would improve the firm's reputation in society	2.89	1.27
(102) The product would be launched to create a range of product offering	3.68	1.28
(103) The new product would appease consumers demanding innovation	3.27	1.27
(25) The product idea came to us from the marketplace	3.04	1.48

5.3.10.2 Dimensionality

The principal component analysis performed on the 10 item scale yielded a four factor solution explaining 63% of the variance in the data. Inspection of the rotated factor matrix shows four distinct and uniquely loading factors that can be seen in Table 5.31.

5.3.10.2.1 Factor 1

The first underlying dimension of *Market Strategy* comprises of four scale items and accounts for 21.94% of the variance in the data. The rotated factor loadings for this scale are all high and unique, ranging from 0.591 to 0.782. The scale exhibits a reasonable level of internal consistency with an alpha value of 0.62. The corrected item-total correlations and the mean inter-item correlation value support the inclusion of the four items in the scale. The internal consistency of the scales could not be enhanced by removing any of the items from the scale.

The items within this scale reflect a reactionary nature to the development of the potential new product. The scale items refer to survival, holding share, launching in response to competitor activity and so on. To this extent, this dimension is labelled *Direct Response Strategy*. The composition of this dimension will be addressed in detail in chapter six.

5.3.10.2.2 Factor 2

The second uncovered dimension contains three scale items and explains 19.06% of the variance in the data. The three items display large and unique rotated factor loadings ranging from 0.707 to 0.730. The scale exhibits a reasonable degree of internal consistency with an alpha value of 0.60. The corrected item-total correlations and the mean inter-item correlation value support the inclusion of the three items in the scale. The internal consistency of the scales could not be enhanced by removing any of the items from the scale.

This dimension of *Market Strategy* reflects the product-led nature of the proposed new product. Scale items address issues such as creating a range of product offering, improving the firm's reputation through the new product and using the new product to appease those demanding innovation. As a result this dimension is labelled *Product-Led Strategy*. The composition of this dimension will be addressed in detail in chapter six.

5.3.10.2.3 Factor 3

Factor 3 is made up of two scale items and accounts for 11.97% of the variance in the data. Both rotated factor loadings are large and unique (0.771 and 0.838). the scale exhibits a reasonable degree of internal consistency with an alpha value of 0.57. The corrected item-total correlations and the mean inter-item correlation value support the inclusion of the two items in the scale. The internal consistency of the scales could not be enhanced by removing either of the items from the scale.

Table 5.31 Principal Components of *Market Strategy*

	Eigen-Value	Variance %	Cumulative Variance %	Scale Items	Rotated Factor Loading	Scale α	Corrected Item-Total Correlation	Mean Inter-Item Correlation
1 *Direct Response Strategy*	2.19	21.94	21.94	(94) The product would represent a survival strategy	0.782	0.62	0.47	0.30
				(93) The product would be launched to hold category share	0.722		0.41	
				(98) The product would be launched in response to competitor activity	0.610		0.41	
				(95) The product would replace a current product	0.591		0.35	
2 *Product-Led Strategy*	1.91	19.06	41.00	(102) The product would be launched to create a range of product offering	0.730	0.60	0.39	0.33
				(101) The new product would improve the firm's reputation in society	0.709		0.41	
				(103) The new product would appease consumers demanding innovation	0.707		0.42	
3 *Market Attack Strategy*	1.20	11.97	52.97	(99) The product would be launched to make the market more difficult for competitors	0.838	0.57	0.41	0.41
				(97) The product would help increase the firm's category share	0.771		0.41	
4 *Market-Led Strategy*	1.02	10.23	63.20	(25) The product idea came to us from the marketplace	0.924	N/A	N/A	N/A

This dimension reflects an aggressive, but organisation driven, strategy for the potential new product. Items refer to increasing the competitive intensity of a market and attacking category share. As a result this dimension is labelled *Market Attack Strategy*. The composition of this dimension will be addressed in detail in chapter six.

5.3.10.2.4 Factor 4

The final uncovered dimension of *Market Strategy* is a single item factor similar to the dimension *Requires Significant Financial Investment* from the *Financial Potential* factor grouping (section 5.3.9.2.2). This fourth dimension explains 10.23% of the remaining variance in the data and has an eigen-value of 1.02. The rotated factor loading for the item is high at 0.924. The single item has no reliability measure.

This single item clearly reflects a market-led approach to the potential new product. As a result this dimension is labelled *Market-Led Strategy*. The composition of this dimension will be addressed in detail in chapter six.

5.3.11 Product Branding

5.3.11.1 Item Analysis

The item analysis for this final *Product Branding* factor grouping incorporated the 13 original scale items. Assessment of the correlation matrix noted that item (104) *An existing brand would be used for the product*, was loading negatively on six of the remaining 12 items in the scale. This was 'flagged' for further assessment. The remaining items showed a range of positive and significant correlations. The factorability of the correlation matrix was confirmed with a large and significant Bartlett's test of sphericity (χ^2 976.7, df. 66, Sig. 0.000) and a Kaiser-Meyer-Olkin value of 0.764. Table 5.32 displays the mean ratings and standard deviations for each of the 13 items pertaining to *Product Branding.*

Table 5.32 Item Analysis - *Product Branding*

(1 = "disagree"), (5 = "agree")	Mean	St. Dev.
(104) An existing brand would be used for the product	4.02	1.55
(105) The brand name for the new product is a leading brand	3.65	1.61
(106) The new product fits well with products of the same brand	3.99	1.35
(107) The branded product would be differentiated from other products in the firm's portfolio	4.04	1.25
(108) The branded product would fit well with other products in the company portfolio	4.28	1.01
(109) The branded product would convey differentiation from competitors	4.19	1.01
(110) The branded product would establish a distinct segment to target	3.82	1.20
(111) The branded product would be easily registered as a trademark	3.32	1.54
(112) The branded product would be relevant within the product category	4.35	0.88
(113) The branded product would be easily recognised	4.24	0.98
(114) The branded product would ensure easy product recall by consumers	4.08	0.98
(115) The branded product would carry across to other markets	3.14	1.40
(116) The branded product would carry across to other languages	3.37	1.41

5.3.11.2 Dimensionality

The final set of principal component analyses was undertaken on the original 13 item scale. The analysis yielded a three factor solution that explained 59% of the variance in the data. However, item number (108) *The branded product would fit well with other products in the company portfolio*, was found to be loading highly on two of the three factors. This item was conceptually in the correct factor but it was felt that question was adequately represented by items (106) *The new product fits well with products of the same brand*, and the opposing nature of the construct was reflected by item (107) *The branded product would be differentiated from other products in the firm's portfolio*. It was also not aiding in the explanation of the underlying factor structure and was, therefore, removed and the analysis performed again.

A second principal component analysis was performed on the 12 remaining items. A three factor solution was uncovered that accounted for 62% of the variance in the data. Inspection of the rotated factor matrix shows three distinct and uniquely loading factors that can be seen in Table 5.33.

5.3.11.2.1 Factor 1

The first uncovered dimension of *Product Branding* contains seven items and explains 31.16% of the variance in the data. The items show large and unique rotated factor loadings ranging from 0.544 to 0.791. This scale exhibits a high degree of internal consistency with an alpha value of 0.80. The corrected item-total correlations are reasonable and greater than the mean inter-item correlation value, supporting the inclusion of the seven items in the scale. The internal consistency of the scales could not be enhanced by removing any of the items from the scale.

The items within this dimension broadly represent the extent to which the branding strategy is clearly defined. The items reflect brand relevance, differentiation, recognition, recall and so on. To this extent, this dimension is labelled *Clearly Identified Brand Strategy*. The composition of this dimension will be addressed in detail in chapter six.

5.3.11.2.2 Factor 2

Factor 2 contains three scale items and explains 18.60% of the variance in the data. The items display high and unique rotated factor loadings ranging from 0.836 to 0.879. The scale exhibits a high degree of internal consistency with an alpha value of 0.82. The corrected item-total correlations and the mean inter-item correlation value support the inclusion of the three items in the scale. The internal consistency of the scales could not be enhanced by removing any of the items from the scale.

The items within this second dimension reflect the fit of the potential new product with the organisations current brand portfolio. Items such as whether the brand name for the proposed new product is an existing one, a leading one and whether the product fits with other products of the same brand refer to the nature of this brand fit. As a result this dimension is labelled *Brand Fit.* The composition of this dimension will be addressed in detail in chapter six.

5.3.11.2.3 Factor 3

The final dimension of Product branding contains two scale items and explains 11.89% of the remaining variance in the data. Both rotated factor loadings are high and unique (0.836 and 0.857). The two item scale shows a reasonable level of internal consistency with an alpha value of 0.69. The corrected item-total correlations and the mean inter-item correlation value are reasonable, supporting the inclusion of the two items in the scale. The internal consistency of the scales could not be enhanced by removing any of the items from the scale.

These two remaining items reflected the capability of the new branded product to be launched in markets other than those for which it as been expressly developed. This 'global' dimension to the screening decision was attested to during pre-testing when one *fmcg* manager suggested that they did not develop new products that did not have the capability to be launched globally. As a result, this dimension is labelled *Global Product Compatibility.* The composition of this dimension will be addressed in chapter six.

Table 5.33 Principal Components of *Product Branding*

	Eigen-Value	Variance %	Cumulative Variance %	Scale Items	Rotated Factor Loading	Scale α	Corrected Item-Total Correlation	Mean Inter-Item Correlation
1 *Clearly Identified Brand Strategy*	3.74	31.16	31.16	(112) The branded product would be relevant within the product category	0.791	0.80	0.70	0.41
				(109) The branded product would convey differentiation from competitors	0.781		0.69	
				(113) The branded product would be easily recognised	0.725		0.62	
				(110) The branded product would establish a distinct segment to target	0.707		0.54	
				(114) The branded product would ensure easy product recall by consumers	0.669		0.59	
				(107) The branded product would be differentiated from other products in the firm's portfolio	0.614		0.41	
				(111) The branded product would be easily registered as a trademark	0.544		0.40	
2 *Brand Fit*	2.23	18.60	49.76	(104) An existing brand would be used for the product	0.879	0.82	0.70	0.61
				(105) The brand name for the new product is a leading brand	0.854		0.69	
				(106) The new product fits well with products of the same brand	0.836		0.66	
3 *Global Product Compatibility*	1.43	11.89	61.65	(115) The branded product would carry across to other markets	0.857	0.69	0.52	0.52
				(116) The branded product would carry across to other languages	0.836		0.52	

5.3.12 Summary of Analysis Phase 2

The purpose of this section of the chapter was to construct and purify screening and evaluation measures for new products within the *fmcg* sector. Of the original 116 scale items, 101 were utilised and 15 items were removed from the final principal component analyses. These 101 scale items formed 32 dimensions that were uncovered from 11 original factor groupings.

We believe that this principle component analysis stage provides a good description of the underlying constructs for the following reasons (Zirger and Maidique, 1990): (1) the factor loadings averaged 0.765, (2) the amount of common variance among the 11 original factor groupings explained by the 32 factor solutions averaged 65%, (3) different factoring and rotation techniques gave us largely the same variable groupings for each factor, and (4) the variable groupings matched our intuitive conceptualisation of the hypothesised constructs. The make-up and nature of these 32 uncovered dimensions of screening for new *fmcg* products will be discussed in more detail in chapter six.

Summated scales were constructed for the uncovered factors in accordance with the procedure outlined in section 5.2.1.6. These summated scales were used in subsequent stages of analysis as has been suggested by past research (Lehmann *et al*, 1998; Hair *et al*, 1998; Calantone *et al*, 1996; Zirger and Maidique, 1990; Gerbing and Anderson, 1988).

The third and final phase of analysis takes the uncovered dimensions of screening and assesses how important they are in discriminating between *accepted* and *rejected* projects at each stage of the development process.

5.4 Phase 3 - Screening Across Development Stages

The central thesis to this research project is that screening criteria may change in importance at different stages of the product development process. Questionnaires were completed with respect to specific NPD projects that managers were involved in. These responses were *specific* to stages of the NPD process. Managers indicated the extent to which they agreed or disagreed with a series of screening criteria concerning *accepted* and *rejected* projects at those *specific stages* of development.

The stated objectives of this analysis phase are to measure any changes in the importance of these evaluation criteria across the NPD process and, therefore, their importance in *Go/No Go* decision making. A subsequent objective, therefore, is to construct a 'best-practices' model. Such a model will guide NPD decision making by focusing attention and resources on the screening criteria that are crucial for a successful *Go* decision at particular stages of the NPD process.

The previous scale development section highlighted that not all of the groups of screening criteria were unidimensional. The 11 factor groupings were found to consist of 32 internally consistent, unidimensional and valid sub-dimensions. These sub-dimensions make good conceptual sense in their relevance to screening in the *fmcg* sector. Mean scores (summated scales) were calculated for each dimension in the final data set by averaging scores across each item in the dimension.

If we refer back to Table 5.6, we can see that the sample sizes of *accepted* and *rejected* projects are not equal across the four identified development stages. In addition to this inequality, some groups have relatively modest sample sizes. This may cause problems when using discriminant analysis to determine the weights of screening criteria in discriminating between *accepted* and *rejected* projects. The number of predictor variables (32) when combined with modest sample sizes may violate some of the assumptions regarding the minimum acceptable sample size (discussed in more detail in section 5.4.2.1). Accordingly, an interim stage is used to identify those dimensions that exhibit significant differences between the groups of *accepted* and *rejected* projects. By identifying the dimensions where such differences exist, we can reduce the number of dimensions that need to be entered into the discriminant function. Only those dimensions that exhibit significant differences are used in the discriminant function to ascertain the relative power of the dimensions in discriminating between *accepted* and *rejected* projects. We will now go on to address the issue of significant differences between project groups.

5.4.1 Differences Between Accepted and Rejected Projects

The first stage of this analysis is to assess the differences between the means of the 32 screening dimensions for *accepted* and *rejected* projects at each stage of the development process. This investigation used Likert-type interval scales to elicit information from respondents. One method by which the means of two groups of interval data can be compared is the two independent samples *t*-test (Diamantopoulos and Schlegelmilch, 1997). Two sample *t*-tests are commonly used in NPD research to find the differences between successful and unsuccessful new products (Cooper and Kleinschmidt, 1995a; Parry and Song, 1994; Edgett, 1994; Cooper *et al*, 1994; Cooper and Kleinschmidt, 1993c&d; Yoon and Lilien, 1985). A glance at Table 2.4 highlights this popularity. However, the independent samples *t*-test has some underlying assumptions (Coakes and Steed, 1999). Data must be measured at an interval or ratio level. The scores should be randomly sampled from the population of interest and should be normally distributed. The data should display independence of groups with subjects only appearing in one group. Finally, the independent samples test assumes homogeneity of variance i.e. the groups should come from populations with equal variances. This parametric test is, however, unstable when utilising modest sample sizes (a feature of this research project).

The Mann-Whitney *U* test is a useful alternative to a parametric location test (such as the *t*-test) when assumptions about normality are violated and the sample sizes are small (Diamantopoulos and Schlegelmilch, 1997). The null hypothesis tested by the Mann-Whitney *U*-test is that there is no difference between the two groups in terms of location, focusing on the mean as a measure of central tendency. In the case of symmetrical distributions and given interval data the test can also be used to draw conclusions about means. We are already aware that group sizes are unequal and that some are relatively modest. Accordingly the Mann-Whitney *U* test is adopted for this stage of the analysis.

The 32 uncovered screening dimensions were assessed to compute means and standard deviations for *accepted* and *rejected* projects. These statistics can be seen in Tables 5.34 to 5.37. The next stage was to assess the null hypothesis that there is no difference between the groups of *accepted* and *rejected* projects in terms of the means and locations of the 32 screening dimensions at each stage of the NPD process. The results of this assessment can be seen in Table 5.38 with the exact significance level (corrected for ties) reported. The notation (+) or (-) reflects whether the *accepted* projects had a higher (+) or lower (-) mean rank than did the *rejected* projects (where 1 = 'disagree', 5 = 'agree'). The 'mean rank' score for each group is the sum of the ranks divided by the number of cases. If there were no differences in the populations, we would expect similar ranks in the two groups; if either group has more of its share of either large or small ranks, then it would be unlikely that the respective populations would be the same (Diamantopoulos and Schlegelmilch, 1997).

Table 5.38 shows instances where there *are* significant differences between the means and location of *accepted* and *rejected* projects (at a 0.05 level). The dimensions that exhibit significant differences *are* specific to each stage of the NPD process. This demonstrates that the screening dimensions that differentiate between *accepted* and *rejected* projects *do* differ according to the stage of the projects development. Some dimensions can be seen to be relevant to the screening decision at several consecutive stages of the process while others are relevant only to single stages. Others still, are not found to discriminate between *accepted* and *rejected* projects at all. These findings will be discussed in more detail in chapter six.

The final part of this analysis uses two-group discriminant analysis to determine the 'power' of the dimensions in differentiating between *accepted* and *rejected* projects.

Table 5.34 Summary Statistics - *Concept/Idea Stage*

		Accepted Projects		*Rejected Projects*	
Group	***Uncovered Dimension***	Mean	St. Dev.	Mean	St. Dev.
PDA	**1** *Tangible Technological Advantage*	3.00	0.57	2.77	0.99
	2 *Superior Consumer Fit*	4.00	0.45	3.41	0.99
	3 *Value Advantage*	2.09	0.94	1.90	0.68
PP	**1** *Clearly Defined Promotion Plan*	3.60	0.64	3.39	0.77
PNTF	**1** *Incremental Growth Opportunity*	3.12	1.12	3.13	1.34
	2 *Sizeable New Technology Requirement*	3.18	1.31	2.79	1.65
PC	**1** *Clear Product Definition*	3.96	0.81	3.57	1.22
	2 *Production Readiness*	3.91	1.26	3.39	1.11
	3 *Predictable Development Pattern*	3.32	1.01	2.85	0.99
	4 *Low Risk of Failure*	3.05	1.04	2.77	0.80
CS	**1** *Commercial Fit*	4.15	0.96	3.81	1.14
	2 *Production Fit*	3.84	0.79	3.28	1.44
	3 *Senior Management Endorsement*	3.46	1.35	3.04	1.08
	4 *Communication Channel Fit*	3.39	1.20	3.16	1.11
	5 *Support Resource Fit*	4.09	0.69	3.87	0.97
TS	**1** *Strong Trade Support*	4.41	0.83	3.85	1.07
	2 *Likely Trade Adoption*	3.27	0.96	2.82	0.73
NOTM	**1** *Intensely Competitive Market*	3.30	1.30	2.96	0.93
	2 *Compelling Market Size Potential*	3.88	0.65	3.18	0.90
	3 *Resistance to Brand Switching*	2.59	0.77	2.97	0.91
	4 *Rapid Market Changeability*	2.36	0.75	2.53	1.02
	5 *Low Barriers to Market Entry*	2.59	1.00	2.03	0.77
CAMI	**1** *Reliable Market Intelligence*	3.26	0.52	2.90	0.70
FP	**1** *Lucrative Potential Market*	3.75	0.55	3.10	0.77
	2 *Requires Significant Financial Investment*	2.82	1.40	2.82	1.40
MS	**1** *Direct Response Strategy*	1.89	0.68	1.91	0.70
	2 *Product-Led Strategy*	3.15	1.13	3.01	0.91
	3 *Market Attack Strategy*	3.18	1.33	3.21	1.19
	4 *Market-Led Strategy*	3.09	1.30	2.82	1.38
PB	**1** *Clearly Identified Brand Strategy*	4.00	0.59	3.67	0.82
	2 *Brand Fit*	3.94	1.28	3.57	1.39
	3 *Global Product Compatibility*	3.82	1.06	3.21	1.23

(1 = 'disagree'), (5 = 'agree') Shaded: Significant differences at $p < 0.05$

Table 5.35 Summary Statistics - *Evaluation Stage*

		Accepted Projects		*Rejected Projects*	
Group	*Uncovered Dimension*	Mean	St. Dev.	Mean	St. Dev.
PDA	**1** *Tangible Technological Advantage*	3.28	1.01	2.58	1.18
	2 *Superior Consumer Fit*	4.48	0.50	3.60	0.89
	3 *Value Advantage*	1.46	0.59	1.86	0.79
PP	**1** *Clearly Defined Promotion Plan*	4.15	0.50	3.46	0.69
PNTF	**1** *Incremental Growth Opportunity*	3.46	1.20	3.03	1.44
	2 *Sizeable New Technology Requirement*	2.85	1.31	2.78	1.59
PC	**1** *Clear Product Definition*	4.52	0.48	3.99	1.01
	2 *Production Readiness*	4.04	0.88	3.67	1.20
	3 *Predictable Development Pattern*	3.13	0.01	3.19	0.86
	4 *Low Risk of Failure*	2.73	1.01	2.74	1.12
CS	**1** *Commercial Fit*	4.40	0.54	4.23	0.98
	2 *Production Fit*	3.87	1.14	3.47	1.33
	3 *Senior Management Endorsement*	4.54	0.52	3.38	1.13
	4 *Communication Channel Fit*	3.39	0.88	3.63	0.94
	5 *Support Resource Fit*	4.59	0.47	4.38	0.82
TS	**1** *Strong Trade Support*	4.58	0.57	4.21	0.82
	2 *Likely Trade Adoption*	3.92	0.67	3.14	1.13
NOTM	**1** *Intensely Competitive Market*	3.08	0.86	3.43	1.14
	2 *Compelling Market Size Potential*	4.13	0.65	3.65	0.84
	3 *Resistance to Brand Switching*	2.73	0.73	3.29	0.95
	4 *Rapid Market Changeability*	2.46	0.99	2.64	1.13
	5 *Low Barriers to Market Entry*	1.96	0.75	2.25	0.99
CAMI	**1** *Reliable Market Intelligence*	3.46	0.54	3.22	0.86
FP	**1** *Lucrative Potential Market*	3.99	0.48	3.22	0.76
	2 *Requires Significant Financial Investment*	3.31	1.18	3.14	1.48
MS	**1** *Direct Response Strategy*	1.83	0.64	2.28	1.16
	2 *Product-Led Strategy*	3.87	0.87	2.96	0.91
	3 *Market Attack Strategy*	4.08	0.61	3.11	1.07
	4 *Market-Led Strategy*	3.46	1.45	3.28	1.60
PB	**1** *Clearly Identified Brand Strategy*	4.40	0.60	3.74	0.85
	2 *Brand Fit*	3.15	1.68	3.96	1.07
	3 *Global Product Compatibility*	2.96	1.01	3.00	1.31

(1 = 'disagree'), (5 = 'agree')

Significant differences at $p < 0.05$ (shaded rows)

Table 5.36 Summary Statistics - *Development Stage*

		Accepted Projects		*Rejected Projects*	
Group	***Uncovered Dimension***	Mean	St. Dev.	Mean	St. Dev.
PDA	**1** *Tangible Technological Advantage*	2.64	0.97	2.46	1.10
	2 *Superior Consumer Fit*	3.95	0.81	3.31	0.90
	3 *Value Advantage*	2.02	0.92	2.14	0.78
PP	**1** *Clearly Defined Promotion Plan*	3.88	0.81	3.30	0.93
PNTF	**1** *Incremental Growth Opportunity*	2.84	1.20	2.78	1.28
	2 *Sizeable New Technology Requirement*	2.45	1.56	2.69	1.39
PC	**1** *Clear Product Definition*	4.28	0.87	3.61	0.84
	2 *Production Readiness*	4.08	0.82	3.64	1.05
	3 *Predictable Development Pattern*	3.25	0.84	3.07	0.66
	4 *Low Risk of Failure*	3.02	1.15	2.86	1.24
CS	**1** *Commercial Fit*	4.48	0.69	4.31	0.76
	2 *Production Fit*	4.13	1.00	3.77	1.04
	3 *Senior Management Endorsement*	4.23	0.81	3.48	0.99
	4 *Communication Channel Fit*	3.56	0.88	3.58	0.91
	5 *Support Resource Fit*	4.49	0.53	3.92	0.85
TS	**1** *Strong Trade Support*	4.28	0.76	4.31	0.70
	2 *Likely Trade Adoption*	3.69	0.77	2.74	0.95
NOTM	**1** *Intensely Competitive Market*	3.33	1.02	3.78	0.91
	2 *Compelling Market Size Potential*	3.99	0.76	3.49	0.81
	3 *Resistance to Brand Switching*	2.81	1.18	3.13	0.86
	4 *Rapid Market Changeability*	3.09	1.11	2.52	1.01
	5 *Low Barriers to Market Entry*	2.23	0.97	2.19	1.00
CAMI	**1** *Reliable Market Intelligence*	3.62	0.79	3.32	0.69
FP	**1** *Lucrative Potential Market*	3.83	0.73	3.12	0.53
	2 *Requires Significant Financial Investment*	2.84	1.42	2.35	1.29
MS	**1** *Direct Response Strategy*	2.16	0.82	1.93	0.88
	2 *Product-Led Strategy*	3.50	0.90	3.06	0.75
	3 *Market Attack Strategy*	3.77	0.94	2.95	1.01
	4 *Market-Led Strategy*	3.53	1.37	2.72	1.60
PB	**1** *Clearly Identified Brand Strategy*	4.20	0.67	3.56	0.73
	2 *Brand Fit*	3.95	1.31	3.82	1.32
	3 *Global Product Compatibility*	3.55	1.31	2.83	1.14

(1 = 'disagree'), (5 = 'agree') — Shaded: Significant differences at $p < 0.05$

Table 5.37 Summary Statistics - *Pre-Launch Stage*

		Accepted Projects		Rejected Projects	
Group	Uncovered Dimension	Mean	St. Dev.	Mean	St. Dev.
PDA	1 *Tangible Technological Advantage*	2.98	0.98	2.36	0.90
	2 *Superior Consumer Fit*	4.14	0.53	3.47	0.45
	3 *Value Advantage*	2.06	0.95	1.89	0.74
PP	1 *Clearly Defined Promotion Plan*	3.98	0.61	3.13	0.55
PNTF	1 *Incremental Growth Opportunity*	3.08	1.27	2.41	1.22
	2 *Sizeable New Technology Requirement*	2.81	0.52	1.78	1.18
PC	1 *Clear Product Definition*	4.46	0.60	3.42	0.71
	2 *Production Readiness*	4.25	0.81	3.78	0.87
	3 *Predictable Development Pattern*	3.45	0.76	3.33	0.60
	4 *Low Risk of Failure*	2.82	1.05	2.67	1.44
CS	1 *Commercial Fit*	4.57	0.50	4.31	0.63
	2 *Production Fit*	3.80	1.02	3.94	1.01
	3 *Senior Management Endorsement*	4.51	0.53	3.89	1.05
	4 *Communication Channel Fit*	3.44	1.11	3.37	1.02
	5 *Support Resource Fit*	4.29	0.80	4.00	0.99
TS	1 *Strong Trade Support*	4.33	0.65	4.00	0.87
	2 *Likely Trade Adoption*	3.99	0.78	2.22	1.39
NOTM	1 *Intensely Competitive Market*	3.17	1.00	3.56	1.08
	2 *Compelling Market Size Potential*	3.96	0.81	3.43	0.47
	3 *Resistance to Brand Switching*	2.78	0.89	2.83	1.46
	4 *Rapid Market Changeability*	2.69	1.12	3.00	1.30
	5 *Low Barriers to Market Entry*	2.25	0.93	2.17	1.00
CAMI	1 *Reliable Market Intelligence*	3.80	0.54	3.44	0.62
FP	1 *Lucrative Potential Market*	3.94	0.53	2.75	0.58
	2 *Requires Significant Financial Investment*	3.00	1.31	2.89	1.62
MS	1 *Direct Response Strategy*	2.02	0.83	3.16	0.90
	2 *Product-Led Strategy*	3.48	0.97	2.88	0.98
	3 *Market Attack Strategy*	3.78	0.92	3.50	1.17
	4 *Market-Led Strategy*	2.85	1.48	3.22	1.48
PB	1 *Clearly Identified Brand Strategy*	4.36	0.54	3.40	1.00
	2 *Brand Fit*	4.09	1.33	3.82	0.84
	3 *Global Product Compatibility*	3.46	1.17	2.61	1.17

(1 = 'disagree'), (5 = 'agree') — Significant differences at $p < 0.05$

Table 5.38 Mann-Whitney *U* Test: Differences Between Means

Group	*Uncovered Dimension*	*Differences Between Means by NPD Stage Significance Levels* ❶ Concept Stage	❷ Evaluation Stage	❸ Development Stage	❹ Pre-Launch Stage
PDA	1 *Tangible Technological Advantage*	0.360 (+)	0.041 (+)	0.451 (+)	0.058 (+)
	2 *Superior Consumer Fit*	0.087 (+)	0.001 (+)	0.002 (+)	0.001 (+)
	3 *Value Advantage*	0.663 (+)	0.114 (-)	0.470 (-)	0.739 (+)
PP	1 *Clearly Defined Promotion Plan*	0.433 (+)	0.002 (+)	0.018 (+)	0.001 (+)
PNTF	1 *Incremental Growth Opportunity*	0.863 (-)	0.400 (+)	0.879 (+)	0.130 (+)
	2 *Sizeable New Technology Requirement*	0.543 (+)	0.739 (+)	0.389 (-)	0.034 (+)
PC	1 *Clear Product Definition*	0.457 (+)	0.187 (+)	0.001 (+)	0.000 (+)
	2 *Production Readiness*	0.124 (+)	0.426 (+)	0.129 (+)	0.088 (+)
	3 *Predictable Development Pattern*	0.227 (+)	0.918 (+)	0.267 (+)	0.478 (+)
	4 *Low Risk of Failure*	0.279 (+)	0.783 (-)	0.569 (+)	0.700 (+)
CS	1 *Commercial Fit*	0.487 (+)	0.907 (-)	0.262 (+)	0.247 (+)
	2 *Production Fit*	0.319 (+)	0.431 (+)	0.146 (+)	0.676 (-)
	3 *Senior Management Endorsement*	0.303 (+)	0.001 (+)	0.002 (+)	0.062 (+)
	4 *Communication Channel Fit*	0.614 (+)	0.272 (-)	0.936 (-)	0.607 (+)
	5 *Support Resource Fit*	0.622 (+)	0.742 (+)	0.004 (+)	0.322 (+)
TS	1 *Strong Trade Support*	0.118 (+)	0.157 (+)	0.921 (-)	0.264 (+)
	2 *Likely Trade Adoption*	0.192 (+)	0.017 (+)	0.000 (+)	0.001 (+)
NOTM	1 *Intensely Competitive Market*	0.381 (+)	0.300 (-)	0.064 (-)	0.321 (-)
	2 *Compelling Market Size Potential*	0.018 (+)	0.062 (+)	0.017 (+)	0.026 (+)
	3 *Resistance to Brand Switching*	0.068 (-)	0.049 (-)	0.218 (-)	0.874 (-)
	4 *Rapid Market Changeability*	0.808 (-)	0.551 (-)	0.043 (+)	0.433 (-)
	5 *Low Barriers to Market Entry*	0.073 (+)	0.389 (-)	0.887 (+)	0.857 (+)
CAMI	1 *Reliable Market Intelligence*	0.127 (+)	0.399 (+)	0.100 (+)	0.113 (+)
FP	1 *Lucrative Potential Market*	0.014 (+)	0.001 (+)	0.000 (+)	0.000 (+)
	2 *Requires Significant Financial Investment*	0.989 (+)	0.772 (+)	0.168 (+)	0.759 (+)
MS	1 *Direct Response Strategy*	1.000 (=)	0.360 (-)	0.252 (+)	0.002 (-)
	2 *Product-Led Strategy*	0.372 (+)	0.004 (+)	0.038 (+)	0.082 (+)
	3 *Market Attack Strategy*	0.989 (+)	0.002 (+)	0.003 (+)	0.456 (+)
	4 *Market-Led Strategy*	0.580 (+)	0.788 (+)	0.046 (+)	0.448 (-)
PB	1 *Clearly Identified Brand Strategy*	0.255 (+)	0.010 (+)	0.001 (+)	0.003 (+)
	2 *Brand Fit*	0.403 (+)	0.127 (-)	0.655 (+)	0.125 (+)
	3 *Global Product Compatibility*	0.165 (+)	0.887 (-)	0.018 (+)	0.038 (+)

The notation (+) or (-) refers to whether the *accepted* projects had a higher (+) or lower (-) mean rank than did the *rejected* projects (where 1 = 'disagree', 5 = 'agree').

5.4.2 Addressing the Power of Discriminating Dimensions

The prior stage of analysis highlighted those screening dimensions that exhibit significant differences between the groups of *accepted* and *rejected* projects. This provides us with some substantive theory upon which to base our discriminant analysis. Accordingly, this final stage of the analysis chapter uses those dimensions with significant differences to identify the relative *power* of each dimension in predicting the likely project outcome at each stage of the development process.

5.4.2.1 Discriminant Analysis, Techniques

Discriminant analysis techniques are used to classify individuals into one of two or more groups on the basis of a set of measurements (Aaker *et al*, 1998). The populations are known to be distinct and each individual belongs to one of them. The techniques also identify which variables contribute to making the classification. Thus prediction and description are the two key applications of discriminant analysis (Aaker *et al*, 1998). Discriminant analysis has four major objectives (Hair *et al*, 1998; Hustad *et al*, 1975):

1. Determining linear combinations of the predictor variables to separate the groups by maximising between-group variation relative to within-group variation (objects in different groups are maximally separated).
2. Developing procedures for assigning new objects, firms, or individuals, whose profiles but not group identity are known, to one of the two groups.
3. Determining whether significant differences exist between average score profiles on a set of two (or more) *a priori* defined groups, based on the group centroids.
4. Determining which variables count most in explaining intergroup differences.

The basic purpose of discriminant analysis is to estimate the relationship between a single nonmetric (categorical) dependent variable and a set of metric independent variables. The linear combination for a discriminant analysis, also known as the discriminant function, is derived from an equation that takes the following form (Hair *et al*, 1998):

$$Z_{jk} = a + W_1X_{1k} + W_2X_{2k} + \dots + W_nX_{nk}$$

Where	Z_{jk}	= discriminant Z score of discriminant function *j* for object *k*
	a	= intercept
	W_I	= discriminant weight for independent variable *I*
	X_{ik}	= independent variable *i* for object *k*

Discriminant analysis is the appropriate technique for testing the hypothesis that the group means of a set of independent variables for two or more groups are equal (in this case *accepted* and *rejected* projects). By averaging the discriminant scores for all the individuals within a particular group, we arrive at the group mean. This group mean is referred to as the group *centroid*. When there are two groups there are two centroids, which indicate the most typical location of any individual from a particular group, and a comparison of the group centroids shows how far apart the groups are along the dimension being tested (Hair *et al*, 1998).

It is desirable to meet certain conditions for the proper application of discriminant analysis. However, the views of researchers on the importance of, and the consequences of, violating prior analysis assumptions are conflicting.

The key assumptions for deriving the discriminant function are multivariate normality of the independent variables and unknown (but equal) dispersion and covariance matrices for the groups as defined by the dependent variable (Harris, 1975; Green, 1978). Hair *et al* (1998) suggest that data not meeting the multivariate normality assumption can cause problems in the estimation of the discriminant function. Unequal covariance matrices can negatively affect the classification process. If the sample sizes are small and the covariance matrices unequal, then the statistical significance of the estimation process is adversely affected. However, Sharma (1996) suggested that generally research has found that for multivariate techniques such as discriminant analysis, violation of the normality assumption does not have an appreciable effect on the Type I errors. Violation of the normality assumption does, however, have an effect on the classification rates and the power of the test statistic (Sharma, 1996). Violation of the assumptions of equality of covariance matrices and normality affects the statistical significance tests and classification results. As indicated, however, it has been shown that discriminant analysis is quite robust to the violations of these assumptions. Nevertheless, when interpreting results the researcher should be aware of the possible effects due to violation of these assumptions (Sharma, 1996).

Further discussion centres on the size of the sample to be analysed. Hair *et al* (1998) suggest that discriminant analysis is quite sensitive to the ratio of sample size to the number of predictor variables. They recommend a minimum of five observations per independent variable. Diekhoff (1992) recommends that the smallest group should have more cases than there are predictor variables and that the total sample size should have at least 10 times as many cases as there are variables. However, Klecka (1980) recommends less restrictive assumptions, stating that there should be at least two cases per group and that there may be any number of discriminating variables up to the number of cases minus two. Tabachnick and Fidell (1989) also noted that there are no particular problems with unequal group size. One final consideration regarding sample size must be that if group A is much smaller than group B, the optimal cutoff score will be nearer to the centroid of group A than to the centroid of group B. For the sample sizes to be taken into consideration, then the weighted cut-off point must be used (Aaker *et al*, 1998).

The application of discriminant analysis can be divided into three major stages (Hair *et al*, 1998; Hamilton, 1994; Reichert *et al*, 1983) that fulfil the objectives of discriminant analysis noted previously.

1. **Derivation:** Deriving a linear function that best discriminates between the groups of accepted and rejected projects.

2. **Validation:** Classifying existing and new accepted and rejected projects into predetermined groups.
3. **Interpretation:** Identifying the variable(s) that contribute most to the discrimination between the two groups of projects.

5.4.2.1.1 Derivation

Since we have already covered the derivation and form of the discriminant function we shall move on to briefly discuss the method of derivation. Two computational methods can be utilised to derive the discriminant function: the simultaneous (direct) method and the stepwise method (Hair *et al*, 1998). The direct method involves estimating the function so that all the predictor variables are included simultaneously. This method is appropriate when the researcher has *a priori* reasons for the discrimination to be based on all the predictors (Aaker *et al*, 1998). The second method of selection, the stepwise method, is used when there is no indication as to which would be the best set of variables for forming the discriminant function (Sharma, 1999). Stepwise is a useful method of selecting the best set of discriminating variables to form the discriminant function using a forward or backward or stepwise procedure. We should note that the stepwise estimation of the discriminant function becomes less stable and generalisable as the ratio of sample size to independent variable declines below the minimum recommended level of 20 observations per independent variable (Hair *et al*, 1998). It is particularly important in these instances to validate the results in as many ways as possible.

5.4.2.1.2 Validation

If discriminant analysis is to be used for classifying observations then the external validity needs to be examined (Sharma, 1999). External validity in this case refers to the extent to which the discriminant function can classify observations that are from another sample. Cooper (1981) suggested that the ultimate test of a predictive model is its ability to predict, utilising new data. However, often the high cost of gathering data on new product projects precludes this type of validation, but similar approaches such as the cross-slip-half method are available. Methods of validation traditionally include a *holdout sample*, where one sample is used to construct the classification rule and the other used for validation. The *classification matrix* is analysed which contains numbers representing the correct classification of projects and the *hit ratio* calculated to provide the percentage of cases correctly classified (Aaker *et al*, 1998).

In situations where only a relatively modest sample is available an alternative validation procedure known as the *jack-knife* method may be used. Originally proposed by Lachenbruch (1967), this involves leaving out one of the cases in turn and deriving the discriminant function on n - 1 cases and predicting group membership for the left-out case (Hamilton, 1994). SPSS provides a leave-one-out cross-validation method to help diminish the optimistic bias where each case is classified into a group according to the classification functions computed from all the data *except* the case being classified (SPSS, 1997).

As noted above, the predictive accuracy of the model is measured by the hit ratio, obtained from the classification matrix. However, we must address what is an acceptable level of predictive accuracy. To determine this level we must determine the percentage of new product projects that could be correctly classified by chance (Hair *et al*, 1998). There are three methods by which this can be assessed, the *maximum chance criterion*, the *proportional chance criterion* and *Press's Q statistic*.

The *maximum chance* criterion is determined by computing the percentage of the total sample represented by the larger of the two groups of *accepted* and *rejected* projects. It is computed as:

$$C_{MAX} = \max(p, 1 - p)$$

Where p is the proportion of individuals in group 1

(1 - p) is the proportion of individuals in group 2

If the hit ratio for the discriminant function does not exceed this value then it has not helped us predict, based on this criterion. The maximum chance criterion should be used when the sole objective of the analysis is to maximise the correctly classified cases. Usually the researcher wants to correctly identify members of all groups. In cases where the group sizes are unequal and the researcher wants to classify members of all groups, the discriminant function defies the odds by classifying a subject in the smaller group. But the chance criterion does not take this into account. Therefore the *proportional chance criterion* should be used in most cases (Hair *et al*, 1998).

The proportional chance criterion should be used when group sizes are unequal and the researcher wants to correctly classify members of the two groups. The formula is as follows:

$$C_{PRO} = p^2 + (1 - p)^2$$

Where p is the proportion of individuals in group 1
(1 - p) is the proportion of individuals in group 2

These chance model criteria are only useful when computed with holdout samples. If the individuals used in calculating the discriminant function are the ones being classified then there will be an upward bias in the prediction accuracy. In such cases both of these criteria would have to be adjusted upward to account for the bias. Generally, however, Hair *et al* (1998) suggest that the classification accuracy values should be 25% greater relative to chance to be satisfactory.

Press's Q statistic is a simple statistical measure that compares the number of correct classifications with the total sample size and the number of groups. The value is then compared with a critical chi-square value (the chi-square value for 1 degree of freedom at the desired confidence level) (Hair *et al*, 1995). If it exceeds this value then the classification matrix can be deemed statistically better than chance. The *Q* statistic is calculated using the following formula:

$$\text{Press's Q} = \frac{[N - (nK)]^2}{N(K-1)}$$

Where N is the total sample size
n is the number of observations correctly classified
K is the number of groups

5.4.2.1.3 Interpretation

Interpretation of the discriminant function traditionally refers to the sign and magnitude of the *standardised* discriminant weights or coefficients. The value of the coefficient for a particular predictor depends on the other predictors included in the function (Aaker *et al*, 1998). The signs of the coefficients denotes whether it makes a positive or negative contribution (Hair *et al*, 1998). Generally predictors with relatively *large standardised coefficients* contribute more to the discriminating power of the function than do predictors with small values (Aaker *et al*, 1998).

The discriminant loadings (structure correlations) have increasingly become used as a basis for interpretation (Hair *et al*, 1998). Discriminant loadings measure the simple linear correlation between each independent variable and the discriminant function and can be interpreted like factor loadings in assessing the relative contribution of each independent variable to the discriminant function. Loadings are considered relatively more valid than weights (coefficients) as a means of interpreting the discriminating power of independent variables because of their correlational nature and should be utilised whenever possible (Hair *et al*, 1998).

5.4.2.1.4 Discriminant Analysis Output

Discriminant analysis provides different types of output that are of use in this research project. We will briefly outline which of the output are of interest in this study;

1. **Box's M** - If Box's M is not significant ($p > 0.001$), then the assumption of homogeneity of variance-covariance matrices has not been violated (Coakes and Steed, 1999).
2. **Tests of Equality of Group Means** - The first of many statistics that discriminant analysis borrows from ANOVA. The *F* statistics and significance values are from a one-way ANOVA computed from each variable individually. Significance level allows you to measure the significant differences between groups at $p > 0.05$ level.
3. **Equality of group means** - Wilk's Lambda provides information regarding the differences between groups. Its values range from 0 to 1.0. Small values indicate strong group differences; values close to 1.0, no differences (SPSS, 1999).
4. **Eigenvalues** - The percentage of variance and cumulative variance is always 100% for the two group model (SPSS, 1997).
5. **Canonical discriminant function** - significance of the chi-square value indicates how well the function discriminates between the groups. Highly significant chi-square value indicates significant difference between group centroids.
6. **Discriminant loadings (Within Groups Correlations)** - shows the correlation of each variable with the discriminant function (Coakes and Steed, 1999). These are similar to factor loadings in factor analysis and are reported in the 'structure matrix'. In simultaneous discriminant analysis, all variables are entered into the function, and generally any variables exhibiting a loading of plus or minus 0.30 or higher are considered substantive (Hair *et al*, 1998; Greenley and Oktemgil, 1998).
7. **Unstandardised and standardised canonical discriminant function coefficients** - the unstandardised (raw) data are used to compute the discriminant

function (Sharma, 1996) while the standardised coefficients indicate the relative contribution of the variable to the overall discrimination.

8. **Classification results** - shows the correctly classified cases. If the classified cases are the same ones used to estimate the coefficients, this produces an overly optimistic estimate of the success of the classification. It would be ideal to use one sample to compute the classification functions and another sample drawn from the same population to estimate the proportion misclassified. However, given the small sample sizes employed in this study, SPSS provides a leave-one-out cross-validation method to help diminish the optimistic bias as noted above.

5.4.2.1.5 Summary of Discriminant Analysis Technique

Many new product studies use discriminant analysis as highlighted in Table 2.4 (Balachandra and Brockhoff, 1995; Brockhoff, 1994; Zirger and Maidique, 1990; de Brentani, 1986; Balachandra, 1984; Cooper, 1981; Calantone and Cooper, 1981; Balachandra and Raelin, 1980; Cooper, 1979a,b). Indeed, de Brentani (1986) suggests that that because screening involves relatively rough *Go/Kill* decisions, two group discriminant analysis (with a dichotomous *accept/reject* variable) might be more appropriate than the multiple regression approach commonly utilised. The premise of these studies is to identify variables that assist managers in classifying new product projects into likely *successes* and *failures*. This technique is well suited to the study's central question: what distinguishes between *accepted* and *rejected* projects at each stage of the development process (Zirger and Maidique, 1990). Discriminant analysis is, therefore, adopted as the most appropriate technique for this final analysis stage. Table 5.39 outlines some key features of other studies that use discriminant analysis techniques.

Table 5.39 Discriminant Analysis Results and Validation Methods

Source	Variable Entry	Variable Selection	Variables in Function	Correctly Classified	Validation Method
Cooper, 1979a	Stepwise	Wilk's Lambda	11	84%	Montgomery's V_3 method for small samples
Calantone and Cooper, 1981	N/A	N/A	N/A	93%	Cross split half analysis
Cooper, 1981	N/A	N/A	N/A	84%	Cross split half analysis
Balachandra, 1984	Stepwise	N/A	14	92%	Montgomery's V_3 method for small samples
Cooper and de Brentani, 1984	N/A	N/A	9	86%	Jack-knife classification
de Brentani, 1986	N/A	N/A	9	86%	Jack-knife classification
Zirger and Maidique, 1990	N/A	Wilk's Lambda	8	88%	Cross split half analysis
Brockhoff, 1994, (USA sample)	Stepwise	N/A	14	83%	N/A

This table highlights that stepwise variable entry with the Wilk's lambda selection method has been the only method reported in this selection of past research studies. Methods of validating the discriminant function have often had to take account of small sample sizes. However, the percentages of correctly classified cases reported have been high.

5.4.2.2 Discriminant Analysis, Results

To recap, this stage will assess the two groups of *accepted* and *rejected* projects at each stage of the development process and test them for differences in scores across the 32 identified screening dimensions.

We are aware that the size of the samples of *accepted* and *rejected* projects are unequal and in some cases fairly modest. Our earlier discussions highlight ways of side-stepping this issue. We have already discussed that the sample size issue has necessitated the use of the Mann-Whitney *U* test. This assessed the 32 dimensions for differences between *accepted* and *rejected* projects (section 5.4.1). We will, therefore, use this test to provide the substantive theory that is necessary in the building of a screening model at each stage of the NPD process (Sharma, 1999; Balachandra and Brockhoff, 1995; Brockhoff, 1994; O'Gorman and Woolson, 1991). This substantive theory allows us to utilise the *simultaneous* method of variable entry. This method enters the dimensions that exhibit significant differences between *accepted* and *rejected* projects into the discriminant function together (Hair *et al*, 1998). The use of this technique also counters the instability associated with the stepwise entry method when the ratio of sample size to independent variable declines below the minimum recommended level of 20 observations per independent variable (Hair *et al*, 1998).

Assessments of normality and equality of covariance matrices for our data set support the use of this analysis technique. Examination of the correlation matrix for the identified screening dimensions (Appendix 8) also sanctions the appropriateness of this technique. Discriminant functions were calculated for each of the four identified stages of the development process as highlighted throughout this research project. During this analysis the researcher is interested in interpretations of the individual screening dimensions that have statistical and practical significance. Such interpretations are accomplished by identifying the variables with substantive discriminant loadings (Within Groups Correlations) and understanding what the differing group means on each dimension indicate (Hair *et al*, 1998). Dimensions exhibiting loadings of 0.30 or higher are considered substantive (Hair *et al*, 1998; Greenley and Oktemgil, 1998) and are deemed to provide significant discrimination between the groups of *accepted* and *rejected* projects.

5.4.2.2.1 Stage 1 - Concept/Idea Stage

The discriminant function for the Concept/Idea stage of the development process was derived by simultaneously including two dimensions that were found to discriminate between *accepted* and *rejected* projects in the Mann-Whitney *U* test (section 5.4.1).

These two dimensions were;

1. **Compelling Market Size Potential (NOTM2)**
2. **Lucrative Potential Market (FP1)**

Box's M is not significant ($p > 0.001$), thus the assumption of homogeneity of variance-covariance matrices has not been violated (Coakes and Steed, 1999). The one-way comparisons are reported using the Wilk's Lambda statistic. These results corroborate the significant differences found during the Mann-Whitney analysis stage with both dimensions exhibiting significant differences at $p < 0.05$.

The resulting single canonical discriminant function incorporating both these screening dimensions has a significant chi-square value of 8.698 ($p < 0.05$) indicating that the function discriminates well between the two groups of *accepted* and *rejected* projects at this stage of the NPD process (Klecka, 1984). The function has an eigenvalue of 0.230 which accounts for 100% of the total explained variance (the percentage of variance and cumulative percentage of variance are always 100% for the two group model) (SPSS, 1997). The canonical correlation explains the ratio of the between-groups variance to the total variation. The canonical correlation coefficient is 0.433 indicating a good relationship between the groups and the function. The results from this discriminant analysis can be seen in Table 5.40.

The percentage of cases correctly classified in both the analysis and 'leave-one-out' cross-validation sample are greater than can reasonably be expected through chance as seen in the C_{MAX}, and C_{PRO} statistics. The Press's Q values for the analysis sample (16.2) and cross validation sample (11.76) are higher than the critical chi-square value (10.83) at a significance level of $p < 0.001$. The composition of this discriminant function will be discussed in more detail in chapter six.

Table 5.40 Discriminant Analysis - *Concept/Idea Stage*

Univariate Statistics	Wilk's Lambda	*F*	Significance
Lucrative Potential Market (FP1)	0.864	6.792	0.013
Compelling Market Size Potential (NOTM2)	0.885	5.573	0.023

Test Statistics	
Wilk's Lambda	0.813
Canonical Correlation	0.433
Chi Square	8.698
Significance	0.013

Discriminant Function	Within Groups Correlation	Unstandardised Coefficients	Standardised Coefficients
Lucrative Potential Market (FP1)	0.828	0.940	0.683
Compelling Market Size Potential (NOTM2)	0.750	0.679	0.579

Model Validation	%*	C_{MAX} (%)	C_{PRO} (%)	Press's *Q*
Analysis Sample	80.0	75.5	63.1	16.20
Cross-validated sample	75.6	75.5	63.1	11.76

* Percentage of 'grouped' cases correctly classified

5.4.2.2.2 Stage 2 - Evaluation Stage

The discriminant function for the Evaluation stage of the development process was derived by simultaneously including 10 dimensions that were found to discriminate between *accepted rejected* projects in the Mann-Whitney *U* test (section 5.4.1). These 10 dimensions were;

1. **Tangible Technological Advantage (PDA1)**
2. **Superior Consumer Fit (PDA2)**
3. **Clearly Defined Promotional Plan (PP1)**
4. **Senior Management Endorsement (CS3)**
5. **Likely Trade Adoption (TS2)**
6. **Resistance to Brand Switching (NOTM3)**
7. **Lucrative Potential Market (FP1)**
8. **Product-Led Strategy (MS2)**
9. **Market Attack Strategy (MS3)**
10. **Clearly Identified Brand Strategy (PB1)**

Box's M is not significant ($p > 0.001$), thus the homogeneity of variance-covariance assumption has not been violated (Coakes and Steed, 1999). One-way comparisons are reported with the Wilk's Lambda statistic. These results corroborate the significant differences found during the Mann-Whitney analysis stage with significant differences at $p < 0.05$ except for the dimension *Tangible Technological Advantage* (PDA1) which exhibits differences at a significance level of 0.068.

The single discriminant function incorporates the simultaneous entry of these 10 dimensions has a highly significant chi-square value of 23.977 ($p < 0.01$) indicating that the function discriminates well between the two groups of *accepted* and *rejected* projects at this stage of development (Klecka, 1984). The discriminant function has an eigenvalue of 0.795 which accounts for 100% of the total explained variance. The canonical correlation coefficient of 0.665 indicates an excellent relationship between the groups and the function. The results from this second discriminant analysis can be seen in Table 5.41.

The percentage of cases correctly classified in the analysis sample are greater than can reasonably be expected through chance as seen in the C_{MAX}, and C_{PRO} statistics. The Press's *Q* value for the analysis sample (21.33) is higher than the critical chi-square value of 10.83 ($p < 0.001$), while the chi-square value for the cross validation sample (8.33) is higher than the critical chi-square value of 7.88 at a slightly lower significance level ($p < 0.005$). The composition of this discriminant function will be discussed in more detail in chapter six.

Table 5.41 Discriminant Analysis - *Evaluation Stage*

Univariate Statistics	Wilk's Lambda	F	Significance
Tangible Technological Advantage (PDA1)	0.929	3.506	0.068
Superior Consumer Fit (PDA2)	0.805	11.115	0.002
Clearly Defined Promotional Plan (PP1)	0.816	10.367	0.002
Senior Management Endorsement (CS3)	0.793	11.991	0.001
Likely Trade Adoption (TS2)	0.896	5.340	0.025
Resistance to Brand Switching (NOTM3)	0.907	4.709	0.035
Lucrative Potential Market (FP1)	0.807	11.010	0.002
Product-Led Strategy (MS2)	0.829	9.483	0.003
Market Attack Strategy (MS3)	0.838	8.894	0.005
Clearly Identified Brand Strategy (PB1)	0.877	6.430	0.015

Test Statistics	
Wilk's Lambda	0.557
Canonical Correlation	0.665
Chi Square	23.997
Significance	0.008

Discriminant Function	Within Groups Correlation	Unstandardised Coefficients	Standardised Coefficients
Tangible Technological Advantage (PDA1)	0.310	0.079	0.091
Superior Consumer Fit (PDA2)	0.551	0.294	0.240
Clearly Defined Promotional Plan (PP1)	0.533	-0.298	-0.196
Senior Management Endorsement (CS3)	0.573	0.477	0.483
Likely Trade Adoption (TS2)	0.382	0.000	0.000
Resistance to Brand Switching (NOTM3)	-0.359	-0.621	-0.540
Lucrative Potential Market (FP1)	0.549	0.351	0.249
Product-Led Strategy (MS2)	0.509	0.390	0.355
Market Attack Strategy (MS3)	0.493	0.113	0.111
Clearly Identified Brand Strategy (PB1)	0.419	0.304	0.241

Model Validation	%*	C_{MAX} (%)	C_{PRO} (%)	Press's Q
Analysis Sample	83.3	72.9	60.5	21.33
Cross-validated sample	70.8	72.9	60.5	8.33

* Percentage of 'grouped' cases correctly classified

5.4.2.2.3 Stage 3 - Development Stage

The discriminant function for the Development stage of the process was derived by simultaneously entering 14 dimensions that were found to discriminate between *accepted* and *rejected* projects in the Mann-Whitney *U* test (section 5.4.1). These 14 dimensions were;

1. **Superior Consumer Fit (PDA2)**
2. **Clearly Defined Promotion Plan (PP1)**
3. **Clear Product Definition (PC1)**
4. **Senior Management Endorsement (CS3)**
5. **Support Resource Fit (CS5)**
6. **Likely Trade Adoption (TS2)**
7. **Compelling Market Size Potential (NOTM2)**
8. **Rapid Market Changeability (NOTM4)**
9. **Lucrative Potential Market (FP1)**
10. **Product-Led Strategy (MS2)**
11. **Market Attack Strategy (MS3)**
12. **Market-Led Strategy (MS4)**
13. **Clearly Identified Brand Strategy (PB1)**
14. **Global Product Compatibility (PB3)**

Box's M is not significant ($p > 0.001$), thus the assumption of homogeneity of variance-covariance matrices has not been violated (Coakes and Steed, 1999). The one-way comparisons, using the Wilk's Lambda statistic corroborate the significant differences found during the Mann-Whitney analysis stage with significant differences exhibited on 12 dimensions at $p < 0.05$, while two dimensions, *Rapid Market Changeability* (NOTM4) and *Market-Led Strategy* (MS4) show significance levels of 0.052.

The discriminant analysis simultaneously enters these 14 dimensions. The resulting single canonical discriminant function has a highly significant chi-square value of 32.319 (at $p < 0.005$) indicating that the function discriminates well between the two groups of *accepted* and *rejected* projects at this stage of development (Klecka, 1984). The discriminant function has an eigenvalue of 0.885 which accounts for 100% of the total explained variance. The canonical correlation coefficient of 0.685 indicates an excellent relationship between the groups and the function. The results from this third discriminant analysis can be seen in Table 5.42.

Table 5.42 Discriminant Analysis - *Development Stage*

Univariate Statistics	**Wilk's Lambda**	***F***	**Significance**
Superior Consumer Fit (PDA2)	0.864	9.140	0.004
Clearly Defined Promotion Plan (PP1)	0.885	7.500	0.008
Clear Product Definition (PC1)	0.871	8.556	0.005
Senior Management Endorsement (CS3)	0.831	11.792	0.001
Support Resource Fit (CS5)	0.854	9.909	0.003
Likely Trade Adoption (TS2)	0.763	18.051	0.000
Compelling Market Size Potential (NOTM2)	0.899	6.516	0.013
Rapid Market Changeability (NOTM4)	0.936	3.937	0.052
Lucrative Potential Market (FP1)	0.760	18.342	0.000
Product-Led Strategy (MS2)	0.902	6.328	0.015
Market Attack Strategy (MS3)	0.839	11.090	0.002
Market-Led Strategy (MS4)	0.936	3.933	0.052
Clearly Identified Brand Strategy (PB1)	0.822	12.571	0.001
Global Product Compatibility (PB3)	0.918	5.171	0.027

Test Statistics	
Wilk's Lambda	0.531
Canonical Correlation	0.685
Chi Square	32.319
Significance	0.004

Discriminant Function	**Within Groups Correlation**	**Unstandardised Coefficients**	**Standardised Coefficients**
Superior Consumer Fit (PDA2)	0.422	-0.303	-0.259
Clearly Defined Promotion Plan (PP1)	0.382	0.062	0.054
Clear Product Definition (PC1)	0.408	0.091	0.077
Senior Management Endorsement (CS3)	0.479	0.483	0.431
Support Resource Fit (CS5)	0.439	0.147	0.104
Likely Trade Adoption (TS2)	0.593	0.664	0.576
Compelling Market Size Potential (NOTM2)	0.356	0.010	0.008
Rapid Market Changeability (NOTM4)	0.277	0.338	0.361
Lucrative Potential Market (FP1)	0.598	0.193	0.125
Product-Led Strategy (MS2)	0.351	0.200	0.158
Market Attack Strategy (MS3)	0.465	0.413	0.404
Market-Led Strategy (MS4)	0.277	0.038	0.057
Clearly Identified Brand Strategy (PB1)	0.495	-0.083	-0.058
Global Product Compatibility (PB3)	0.317	0.142	0.174

Model Validation	**%***	**C_{MAX} (%)**	**C_{PRO} (%)**	**Press's *Q***
Analysis Sample	83.3	51.7	50.01	26.67
Cross-validated sample	68.3	51.7	50.01	8.07

* Percentage of 'grouped' cases correctly classified

The percentage of cases correctly classified in both the analysis and 'leave-one-out' cross-validation sample are greater than can reasonably be expected through chance as seen in the C_{MAX}, and C_{PRO} statistics. The Press's Q value for the analysis sample (20.08) is higher than the critical chi-square value (10.83) at a significance level of p

< 0.001. The critical chi-square value for the cross validation sample (8.07) is higher than the critical chi-square value of 7.88 at a slightly lower significance level ($p < 0.005$). The composition of this function will be discussed in chapter six.

5.4.2.2.4 Stage 4 - Pre-Launch Stage

The discriminant function for the final stage of the development process, the Pre-Launch stage, was derived using the simultaneous entry of the 10 dimensions that were found to discriminate between *accepted* and *rejected* projects in the Mann-Whitney *U* test (section 5.4.1). These 10 dimensions were;

1. **Superior Consumer Fit (PDA2)**
2. **Clearly Defined Promotion Plan (PP1)**
3. **Sizeable New Technology Requirement (PNTF2)**
4. **Clear Product Definition (PC1)**
5. **Likely Trade Adoption (TS2)**
6. **Compelling Market Size Potential (NOTM2)**
7. **Lucrative Potential Market (FP1)**
8. **Direct Response Strategy (MS1)**
9. **Clearly Identified Brand Strategy (PB1)**
10. **Global Product Compatibility (PB3)**

Box's M could not be calculated due to the modest sample size of rejected projects. Thus the assumption of homogeneity of variance-covariance matrices has not been addressed (Coakes and Steed, 1999). Accordingly, any results from this stage of the analysis should be viewed with caution. The one-way comparisons, reported using the Wilk's Lambda statistic corroborate the significant differences found during the Mann-Whitney analysis stage with significant differences exhibited on nine dimensions at $p < 0.05$, while one dimension, *Sizeable New Technology Requirement* (PNTF2) showed a significance level of 0.096.

The single canonical discriminant function is calculated by simultaneously including these 10 dimensions. This yields a function with a highly significant chi-square value of 49.331 ($p < 0.001$) indicating that the function discriminates well between the two groups of *accepted* and *rejected* projects at this Pre-Launch stage of development (Klecka, 1984). The discriminant function has an eigenvalue of 0.839 which accounts for 100% of the total explained variance. The canonical correlation coefficient of 0.675 indicates an excellent relationship between the groups and the function. The results from this final discriminant analysis can be seen in Table 5.43.

Table 5.43 Discriminant Analysis - *Pre-Launch Stage*

Univariate Statistics	Wilk's Lambda	*F*	Significance
Superior Consumer Fit (PDA2)	0.908	8.701	0.004
Clearly Defined Promotion Plan (PP1)	0.822	18.648	0.000
Sizeable New Technology Requirement (PNTF2)	0.968	2.840	0.096
Clear Product Definition (PC1)	0.827	18.029	0.000
Likely Trade Adoption (TS2)	0.766	26.289	0.000
Compelling Market Size Potential (NOTM2)	0.952	4.349	0.040
Lucrative Potential Market (FP1)	0.717	33.891	0.000
Direct Response Strategy (MS1)	0.864	13.523	0.000
Clearly Identified Brand Strategy (PB1)	0.738	30.506	0.000
Global Product Compatibility (PB3)	0.921	7.362	0.008

Test Statistics	
Wilk's Lambda	0.544
Canonical Correlation	0.675
Chi Square	49.331
Significance	0.000

Discriminant Function	Within Groups Correlation	Unstandardised Coefficients	Standardised Coefficients
Superior Consumer Fit (PDA2)	0.347	-0.383	-0.196
Clearly Defined Promotion Plan (PP1)	0.508	0.487	0.291
Sizeable New Technology Requirement (PNTF2)	0.198	0.050	0.075
Clear Product Definition (PC1)	0.500	0.162	0.098
Likely Trade Adoption (TS2)	0.604	0.526	0.446
Compelling Market Size Potential (NOTM2)	0.246	-0.311	-0.243
Lucrative Potential Market (FP1)	0.686	0.757	0.405
Direct Response Strategy (MS1)	-0.433	-0.413	-0.344
Clearly Identified Brand Strategy (PB1)	0.650	0.467	0.265
Global Product Compatibility (PB3)	0.319	0.130	0.148

Model Validation	%*	C_{MAX} (%)	C_{PRO} (%)	Press's *Q*
Analysis Sample	97.7	90.9	83.5	80.18
Cross-validated sample	94.3	90.9	83.5	69.14

* Percentage of 'grouped' cases correctly classified

The percentage of cases correctly classified in both the analysis and 'leave-one-out' cross-validation sample are greater than can reasonably be expected through chance as seen in the C_{MAX}, and C_{PRO} statistics. The Press's Q value for the analysis sample (81.18) and the validation sample (69.14) are higher than the critical chi-square value at a significance level of $p < 0.001$. The composition of this discriminant function will be discussed in more detail in chapter six.

5.4.3 Summary of Analysis Phase 3

The purpose of this final stage of the analysis chapter was to take the 32 screening dimensions and assess which of them discriminate between *accepted* and *rejected* projects at each stage of the NPD process. Having addressed the issue of those dimensions that *do* exhibit differences across these two groups it was then necessary to find out the relative weightings of each of these dimensions in the screening decision at each development stage.

The computation of the four discriminant functions entered two (Concept/Idea stage), 10 (Evaluation stage), 14 (Development stage) and 10 (Pre-Launch stage) dimensions simultaneously that were found to exhibit significant differences across the groups of *accepted* and *rejected* projects. The resulting single canonical discriminant functions provide a mean percentage of correctly classified projects of 86.1 for the analysis sample and 77.3 for the cross-validation sample. The Q statistics for the analysis and cross-validation samples are significant, satisfying the validation requirements for the model (Hair *et al*, 1995). These results will be discussed in detail in chapter six.

5.5 Chapter Summary

This chapter has included a detailed descriptive analysis, an assessment of screening dimensions for new *fmcg* products and an evaluation of screening dimensions across new product development stages, based on a data set of 244 new product projects (136 *accepted* projects and 108 *rejected* projects).

We have outlined the nature of the responding managers and respondents organisations in terms of their firm size, product sector, project and respondent characteristics. We have proposed a 32 dimension scale for the screening and evaluation of new products in the *fmcg* sector. The chapter concludes by utilising that 32 dimension scale to identify the criteria that are important in discriminating between *accepted* and *rejected* projects at each stage of the development process.

In line with the objectives of this chapter, we have provided a scale for the screening and evaluation of new *fmcg* products that 'dis-aggregates' or 'decomposes' many of the screening criteria proposed by earlier studies into new product screening. The identification of sub-dimensions of many proposed constructs allows for a much more actionable screening model for managers charged with new product decision making. Highlighting the screening dimensions that discriminate between *accepted* and *rejected* projects at each stage of the development process will ensure that managers can focus their time and resources more appropriately. The identification of such crucial screening dimensions will help re-align the mentality of new product screening to ensure that the discipline is one of *selection* rather than *rejection* i.e. managers *selecting* the right projects, those that will best fit with organisation and relevant screening dimensions, rather than trying to *reject* those that do not conform.

The final two chapters of this thesis take the results we have identified and discusses them in more depth, focusing on the managerial relevance and implications of the findings. These results are used to confirm or reject the six hypotheses proposed in chapter three. We will highlight the limitations of this research project and go on to propose areas for the development of research in this field.

6 Chapter Six
Discussion

This chapter discusses the 32 uncovered dimensions of new product screening, reflecting on their composition and relevance to managers responsible for new product decision making. The chapter then discusses the dimensions that are relevant to the new product screening decision at four identified process stages. By identifying those dimensions that play a role in discriminating between accepted and rejected projects managers can make quicker and more accurate new product screening decisions. The chapter then takes the results of chapter five and the discussions of chapter six and uses them to assess the six hypotheses proposed in chapter three. Managerial implications of the findings are discussed.

Chapter Six - Discussion

The previous chapter began with analysis phase 1. This included a discussion of descriptive statistics from the returned questionnaires concerning firm size, product sector, project and respondent characteristics. Phase 2 identified dimensions of screening for new products in the *fmcg* sector. This second phase resulted in 32 reliable and valid dimensions being uncovered from the original 11 factor groupings. The third and final phase of the analysis applied this scale for *fmcg* screening in a discriminant analysis to identify those dimensions that are important in discriminating between *accepted* and *rejected* projects at each stage of the development process.

The primary goal of this chapter is to discuss the nature of the 32 uncovered screening dimensions within the *fmcg* sector and within the academic discipline of new product development. The chapter will be structured in three main sections. The first section will address the structure of the uncovered dimensions. The second section will assess the nature of screening and evaluation at each stage of the development process. Examples will be used to illustrate how the dimensions may be incorporated in day-to-day screening decisions for new *fmcg* products. The final section will take the research findings and apply them to the specific research hypotheses proposed in chapter three (section 3.3).

6.1 'Effect' or 'Causal' Indicators

Prior to discussing the uncovered dimensions of screening it is important that we return to the issues proposed in chapter five (section 5.2.1.3) concerning the relevance of reliability and correlation measures for scale items. To do this we need to gain an appreciation of the nature of the factors that we have identified and an understanding of the appropriateness of some the validating techniques applied to the principal component analyses. Bollen and Lennox (1991) suggest that some of these validating techniques are contingent on the nature of the relationship between the individual items and the underlying construct that they represent. They suggest that in some instances these items do not conform to the classical models of scale development, which view scale items or 'indicators' as dependent on a latent variable (Bollen, 1984). These issues affect the way we treat the dimensions uncovered by the principal component analysis and can provide added value to our understanding of the components of screening in this discussion.

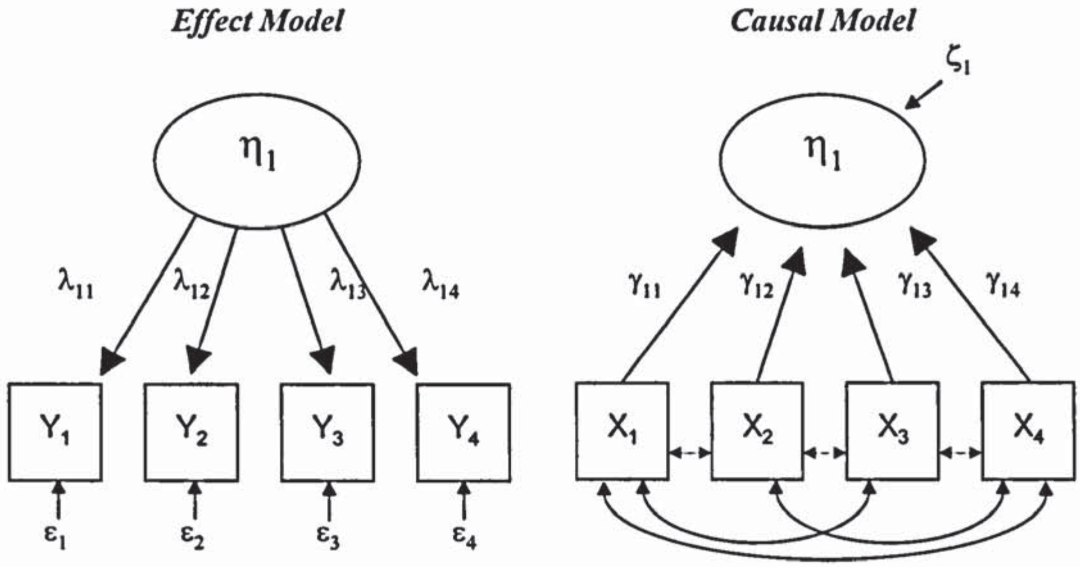
6.1.1 Effect Indicators

The classical approach is demonstrated by the 'effect' model depicted in Figure 6.1. The direction of the 'arrows' indicates that the individual items are dependent on the latent variable itself. What is critical in this 'effect' model and is implied in the assumptions of classical test theory or factor analysis is that the latent variable determines its indicators. In this instance, a high score on the latent construct would be reflected by a high score on all the items in the scale. This model fits the widely accepted premise that indicators positively associated with the same concept should be positively correlated with each other (having corrected for negatively worded items). Accordingly, this 'effect' model supports the internal consistency perspective (Bollen and Lennox, 1991). The uncovered dimensions of new product screening in the *fmcg* sector have, in accordance with past literature, been assumed to broadly follow this model.

6.1.2 Causal Indicators

The contrasting model is termed the 'causal' model and is also shown in Figure 6.1. This model shows four X_i indicators (or questionnaire items) that influence the latent variable η_1 (or underlying screening dimension). In this model the indicators determine the latent construct rather than the reverse in the 'effect' model. An increase in any of the items independently could result in an increase in the latent construct. We do not expect an increase in the latent construct to require a simultaneous increase in all four of the indicators (Hauser, 1973). In this 'causal' model, one cannot know the correlation between X_1 and X_2 nor any pair of the Xs based on the 'causal' model. This means that individual items representing an underlying dimension can have positive, negative or no correlation at all. Internal consistency measures would not be relevant in this case.

Figure 6.1 Effect and Causal Indicator Measurement Models



Where:
η = latent construct
Y_n = indicator
λ_n = coefficient
ε_n = measurement error

Where:
η = latent construct
X_n = indicator
ζ_n = error term

Adapted from Bollen and Lennox (1991)

An awareness of whether any of the uncovered dimensions of *fmcg* screening conform to the 'causal' model will help us understand the relevance of internal consistency and ensure that valid scales are not removed from further analyses by spurious indications of poor internal consistency and mean inter-item correlation.

6.2 The Dimensions of Screening and Evaluation

We shall now go on to discuss each of the identified dimensions of *fmcg* screening in turn. We will try and relate these uncovered dimensions to other empirically derived research findings. These findings have addressed the dimensions of new product screening and/or new product success, which have been shown to be instrumental in providing new product screening criteria (section 2.5).

6.2.1 Product Differential Advantage

A significant finding from the first principal component analysis is that the first factor grouping, *Product Differential Advantage*, is not unidimensional but multi-factored. The three uncovered dimensions measured unique facets of the differential advantage construct. Comparisons with earlier research projects (Table 6.1) note that these dimensions of differential advantage had remained unidentified. The three dimensions follow both 'effect' and 'causal' indicator model types as recommended by Bollen and Lennox (1991).

Table 6.1 Screening Dimensions - *Product Differential Advantage*

	Reported Dimensions and Alpha Values				
Screening and Evaluation Dimensions	*Current Study*	*Song & Parry 1997b*	*Cooper & de Brentani 1984*	*Calantone & Cooper 1981*	*Cooper 1979a*
Product differential advantage		0.89	0.90	✓*	✓*
F1 *Tangible Technological Advantage*	0.81				
F2 *Superior Consumer Fit*	0.82				
F3 *Value Advantage*	0.45			✓*	✓*

* - Dimension similar to that reported in the original investigation.

✓ - Dimension identified but alpha value not calculated.

6.2.1.1 Factor 1 - Tangible Technological Advantage

This first uncovered dimension of *Product Differential Advantage* complies with the 'effect' model of item-factor relationship. In this case the individual items are dependent on the latent variable , thus, conforming to the classical approach of scale development. The high mean inter-item correlations of the items and good alpha value endorse this model classification.

The emergence of a factor concerned specifically with the *Tangible Technological Advantage* dimension of differential advantage is an interesting finding. It has already been established that technological advantage is a widely accepted dimension within industrial NPD (Kristensen, Østergaard and Juhl, 1997; Song and Parry, 1996; 1994; Parry and Song, 1994; Cooper and Kleinschmidt, 1993; 1986; Zirger and Maidique, 1990; Cooper and de Brentani, 1984; Maidique and Zirger, 1984; Calantone and Cooper, 1981; Cooper, 1979a,b). However, its presence in the *fmcg* sector highlights the advantages to be gained by a technologically superior *fmcg* product. Gillette has achieved such benefits through the launch of the Sensor, Sensor Excel and Mach3 razors. They have captured an increasingly disinterested market by launching new, innovative products, highlighting technological breakthroughs. The technologically innovative Mach3 razor has cost Gillette over $1bn, including $750m on manufacturing systems and $200m on research and development costs (Griffith, 1998). Gillette clearly hope that this technological innovation will help them achieve the 70% share of the North American and Western European razor market that the launch of the original Sensor achieved (Willman, 1998a). Such a strategy is becoming commonplace in NPD with technological breakthroughs typically giving manufacturers an 18 month lead time or 'breathing space'. This is the time it takes competitors to equip themselves to imitate the product (McLuhan, 1999).

These product successes offer a contrast to products such as Lever Brother's Persil Power. For this product, the *Tangible Technological Advantage* was a patented 'accelerator' that enhanced the power of the detergent. In this instance, however, the power of the 'accelerator' weakened fabrics and left colour faded (Willman, 1998b). This product clearly had a *Tangible Technological Disadvantage* and as a result was removed from the marketplace with losses of over £200m (Kotler *et al*, 1998).

6.2.1.2 Factor 2 - Superior Consumer Fit

The second dimension of *Product Differential Advantage* also conforms to the classical 'effect' model of item-factor relationship and this is, thus, suitable for traditional measures of reliability and correlation. The high alpha value and strong mean inter-item correlation of items supports this view.

While the element of superiority in terms of *Consumer Fit* is not new to the assessment of differential advantage, the presence of this item as a discrete dimension and the reference to consumers as opposed to customers is new. Many research projects (Song and Parry, 1997b; 1996; Calantone and Cooper, 1981; Cooper, 1979a) have included the items of consumer/customer fit within product differential advantage and not as a separate dimension. Since a large proportion of the prior research in the area has been focused on industrial NPD (section 2.7.1.1), the consumer has largely been ignored in favour of the buyer or customer. The relevance of the consumer in the development of new *fmcg* products cannot be understated. The identification of this sub-dimension of *Product Differential Advantage* improves the decomposition of 'aggregate' factors and is, therefore, welcomed.

High profile examples of successful products with *Superior Consumer Fit* have included Lever Brother's Persil Tablets (Willman, 1998b) and innovations such as Tetley's round tea bags and PG Tips Pyramid bags (Mintel, 1999). In all three instances the products have responded to changes in consumers needs and wants by offering new and superior solutions to consumer problems. Persil Tablets offered the benefits of no mess, no waste and no confusion about the amount to be used. Tetley and PG Tips have arrested the decline in consumption by younger consumers by using round and pyramid bags to keep interest in a product which is, for most buyers, a staple item. Thus, the differentiating factor is not any technological or performance advantage but one with respect to better fit with consumers' lifestyle preferences.

Agres and Dubitsky (1996) suggested that creating differentiation in the minds of the consumer was the first stage in the building of a successful brand. Creating relevant differentiation is a critical and central challenge for all brands. Generally, brands that have managed to achieve high levels of differentiation and relevance virtually define their category or sub-category (Agres and Dubitsky, 1996). In summary, they suggest that delivering differentiating benefits in the mind of the consumer is a more viable and potentially more successful strategy for building brands than enhancing product quality.

6.2.1.3 Factor 3 - Value Advantage

It has already been noted that the third and final dimension to *Product Differential Advantage* exhibits some characteristics that require closer inspection of the internal factor structure (section 5.3.1.2.3). We have identified that is has a reasonably poor alpha value and poor mean inter-item correlation of the two items. Closer inspection of the items making up this dimension show that while they sit well conceptually, they represent two different aspects of the *Value Advantage* dimension. Therefore the structure of this dimension may conform to the 'causal' model identified by Bollen and Lennox (1991). Within this dimension the items determine the latent construct rather than the other way round, as in the preceding two dimensions of *Product Differential Advantage*. The two items reflect aspects of value, with respect to lower costs and lower prices. A lower cost *or* a lower price could result in an increase in the *Value Advantage* of the product. These increases need not be dependent upon each other. Traditional measures of internal consistency and reliability, in this case, may have rendered this dimension inappropriate for further analysis.

Uncovering a *value* element to differential advantage is an important development in NPD research supporting the finding made by Cooper (1981) of an *economic advantage of product* dimension. In other research projects (Calantone and Cooper, 1981; Cooper, 1979a) this dimension relates to *relative price of product*. However, the relevance of the consumer in this investigation highlights the importance of lower price in offering enhanced value. The central issue within the screening decision is whether the product potentially offers a value advantage to *either* the manufacturer *or* consumers. A high degree of value may make the potential product advantageous in the eyes of the manufacturer, the consumer or both, resulting in it being highly desirability for further development.

6.2.2 Product Promotion

The second factor grouping to be subjected to principal component analysis was the *Product Promotion* scale. This grouping was found to be unidimensional and conforms to the classical 'effect' indicator model type recommended by Bollen and Lennox (1991). The high alpha value and reasonable inter-item correlation supports this view. Comparisons with earlier research projects (Table 6.2) note that this dimension was widely recognised within existing literature.

Table 6.2 Screening Dimensions - *Product Promotion*

	Reported Dimensions and Alpha Values			
Screening and Evaluation Dimensions	***Current Study***	*Calantone et al 1996*	*Calantone & Cooper 1981*	*Cooper 1979a*
Product promotion				
F1 *Clearly Defined Promotion Plan*	0.69	0.87#*	✓*	✓*

* - Dimension similar to that reported in the original investigation.

✓ - Dimension identified but alpha value not calculated.

- Mean alpha across 3 studies reported.

6.2.2.1 Factor 1 - Clearly Defined Promotion Plan

The items that make up this *Clearly Defined Promotion Plan* scale reflect promotional issues for the potential new product such as packaging, selling proposition, advertising and future brand development. Although the factor grouping was found to be unidimensional, it was renamed *Clearly Defined Promotion Plan* to improve the applicability of the dimension within a decision making context. This dimension emphasises a *Clearly Defined* nature to a 'short-term' *Promotion Plan* for the potential new product. The items within this dimension sit well together conceptually. An increase in the *Clear Definition* of the *Promotional Plan* could only be achieved through increases in most, if not all, of the scale items.

Table 6.2 shows that marketing elements and promotional efforts have been included in other empirically derived research projects. However, the inclusion of a factor that deals specifically with the clarity and definition of the promotional plan is a further development within the NPD literature. Industrial studies have referred to this construct as *marketing resources and skills* (Calantone *et al*, 1996) and *strength of marketing communications and launch effort* (Calantone and Cooper, 1981; Cooper, 1979b). However, within the *fmcg* sector the development of a clear promotional plan includes elements of product packaging and brand and advertising development. As was suggested in chapter two (section 2.7.1.1) marketing activities for new products may focus more on promotional programmes within the *fmcg* sector. This dimension permits the measurement of the importance of just these marketing mix variables.

6.2.3 Product Newness to the Firm

The third factor grouping to be subjected to principal component analysis, *Product Newness to the Firm*, was found to consist of two unique underlying dimensions. Both conformed to the classical 'effect' model of indicator relationship with the individual items being dependent on the latent variable.

Table 6.3 Screening Dimensions - *Product Newness to the Firm*

	Reported Dimensions and Alpha Values			
Screening and Evaluation Dimensions	*Current Study*	*Cooper & Kleinschmidt 1994*	*Calantone & Cooper 1981*	*Cooper 1979a*
Product - newness to the firm		0.87*	✓	✓
F1 *Incremental Growth Opportunity*	0.79			
F2 *Sizeable New Technology Requirement*	0.89			

* - Dimension similar to that reported in the original investigation.

✓ - Dimension identified but alpha value not calculated.

Table 6.3 shows that in other empirical research projects the element of product newness has remained a unidimensional construct. The identification of two sub-dimensions is a further development within NPD research.

6.2.3.1 Factor 1 - Incremental Growth Opportunity

The nature of the *Incremental Growth Opportunity* dimension is such that the new product represents an opportunity for growth outside of existing product lines or current markets. This type of dimension has been termed *newness to firm* (Calantone and Cooper, 1981; Cooper, 1979b) and even *diversification strategy* (Cooper and de Brentani, 1984) but the nature of the *incremental* growth opportunity as a dimension of new product screening is unique and long overdue.

One new product that would have rated highly on *Incremental Growth Opportunity* would have been Bass Brewers' Hooper's Hooch. Launched by Bass in June 1995, Hooper's Hooch Alcoholic Lemon was the first alcoholic carbonate to be launched in the UK to capitalise on drinkers who were increasingly disinterested in traditional on-trade drinks. The new product operated outside the traditional lager and bitter markets and captured a vast incremental market for the company. It has also offered *Incremental Growth Opportunities* for traditional spirit manufacturers to come in and give their brands a new lease of life in the form of products such as Bacardi Breezer or Smirnoff Mule.

6.2.3.2 Factor 2 - Sizeable New Technology Requirement

The second uncovered dimension of *Product - Newness to the Firm* refers to the inability of the organisation to absorb the potential new product into its current operations without a substantial level of new technology. Note that this screening dimension is asserted in a directional sense and is, therefore, actionable, i.e. the new technology requirement *is* substantial for the proposed product. In this regard, the screening dimension reflects an actual state of affairs and not a general issue of technology requirement. This would result in a more vague screening dimension such as *project familiarity* (Cooper and Kleinschmidt, 1994).

The relevance of this technology requirement dimension to product screening was outlined during the pre-testing stage of this research project (section 4.1.3.8). One NPD manager suggested that the need for new plant or machinery could significantly alter the movement of a new product through the development process, since it would necessitate large capital expense. It was suggested that this issue would also influence the length of the development cycle since;

"At the development stage you may think that it will take four months to order a type of machine but when you come to order it takes seven months because they have never made one 4ft wide, they have only made one 2ft wide".

6.2.4 Product Characteristics

The factor grouping of *Product Characteristics* was found to be multi-factored and not a unidimensional construct. The four uncovered dimensions measured unique aspects of product characteristics. Three of these four dimensions were similar to those identified by previous empirical research as shown in Table 6.4. The *Low Risk of Failure* dimension is a further development in new product screening. The four dimensions follow both 'effect' and 'causal' indicator model types as recommended by Bollen and Lennox (1991).

Table 6.4 Screening Dimensions - *Product Characteristics*

	Reported Dimensions and Alpha Values			
Screening and Evaluation Dimensions	*Current Study*	*Calantone et al 1996*	*Cooper & Kleinschmidt 1994*	*Cooper & de Brentani 1984*
Product characteristics				
F1 *Clear Product Definition*	0.88		0.89*	
F2 *Production Readiness*	0.73	0.82#*		
F3 *Predictable Development Pattern*	0.47			0.49
F4 *Low Risk of Failure*	0.54			

* - Dimension similar to that reported in the original investigation.

- Mean alpha across 3 studies reported.

6.2.4.1 Factor 1 - Clear Product Definition

The first element of *Product Characteristics* conforms to the traditional 'effect' indicator model and exhibits strong internal consistency and high mean inter-item correlation. The element of product definition was proposed by Cooper and Kleinschmidt (1994). This dimension of new product screening reflects the extent to which there is clarity in terms of the nature of the product bundle, including features, consumer benefits, positioning and target markets. It could be suggested that failure to reach an adequate level of *Clear Product Definition* may result in the project being held up at the current stage of development rather than being screened out of the organisation's new product portfolio.

6.2.4.2 Factor 2 - Production Readiness

This second dimension of *Product Characteristics* also follows the 'effect' indicator model and exhibits a good degree of internal consistency and mean inter-item correlation. This item was previously identified as *production start-up proficiency* (Calantone and Cooper, 1981; Cooper, 1979b) and also to a lesser extent *technical activities* (Calantone *et al*, 1996). It is important to note that this element of *Production Readiness* is not simply a measure of capability or proficiency in technical and production terms, but a direct indication of the ability to proceed should the product be given a *Go* decision. To this extent, the dimension offers a further actionable decision criteria. As with the previous dimension of *Clear Product Definition* it would seem likely that a poor *Production Readiness* rating would hold-up the development of a project rather than cause its termination.

6.2.4.3 Factor 3 - Predictable Development Pattern

This third uncovered dimension of *Product Characteristics* was found to have a poor level of internal consistency and mean inter-item correlation (section 5.3.4.2.3). This gave cause for further assessment of the items comprising the scale. Closer inspection confirms that the items do sit well conceptually, but reflect issues of product clarity and predictability and market predictability. This suggests that this dimension may follow the 'causal' model identified by Bollen and Lennox (1991). Within this dimension the items determine the latent construct. An increase in either of the three items (*features that would not change for a long time*, *predictable development patterns* and *product specifications that were clear from the start of the project*) could result in an increase in the level of *Predictable Development Pattern* of the product. But these increases need not necessarily be dependent upon each other. Traditional measures of internal consistency and reliability, in this case, may have rendered this dimension inappropriate for further analysis.

Predictable Development Patterns may become more important due to the reluctance of marketers to create genuinely new products and brands, instead relying on innovation by small increments in minor line extensions or clever revivals (Curtis, 1998). This type of dimension reflects the need for screening criteria to take into account the NPD strategies employed by organisations. If firms wish to launch 'existing-product-developments' which often require lower levels of investment, then a high degree of product predictability would be an essential requirement for a *Go* screening decision. If a certain degree of predictability could not be established then the potential product may require constant updating in the market which may be outside the limits of investment for that particular product.

6.2.4.4 Factor 4 - Low Risk of Failure

The fourth and final uncovered dimension of *Product Characteristics* also exhibits a level of internal consistency at the minimum tolerance level recommended by Cooper and de Brentani (1991) and a reasonable mean inter-item correlation (section 5.3.4.2.4). This dimension followed the traditional 'effect' indicator model of item-factor relationship. A high score on *Low Risk of Failure* would require a high score on both items reflecting minimal damage caused by product failure and also the low cost of reclaiming stock in the event of failure. This dimensions is important in ensuring that the screening decision reflects the corporation's overall objectives (Cooper, 1985) as mentioned in chapter five (section 5.2.1.3). Dimensions with lower variances and lower Cronbach alpha scores are acceptable due the exploratory nature of the screening decision in the *fmcg* sector. Identifying such dimensions addresses the need to publish results even if they are not significant, so that the knowledge of the principle drivers of new product performance may progress beyond an exploratory, descriptive nature (Montoya-Weiss and Calantone, 1994).

The *Low Risk of Failure* dimension assesses the overall risk associated with the new product. This uncovered dimension has not been identified in any previous empirical research into new product screening or success. In conjunction with *Predictable Development Pattern* this dimension may be responsible for the spate of line-extensions and other incremental developments that prevail in the *fmcg* sector. Line-extensions offer clear opportunities for a *Low Risk of Failure*. They are also appealing in that evolutionary NPD is a lot easier to sell to the rest of the organisation than revolutionary NPD, resulting in increased support and favourable investment decisions (Curtis, 1998).

6.2.5 Corporate Synergy

The factor grouping of *Corporate Synergy* is one that is widely recognised in NPD literature. Past research has identified *Corporate Synergy* as both a unidimensional construct and also one that is made up of different component parts (Table 6.5). This investigation uncovered five sub-dimensions of *Corporate Synergy* containing seventeen of the original eighteen items. These five dimensions all followed the 'effect' indicator model proposed by Bollen and Lennox (1991) with the uncovered latent variables determining their indicators.

Table 6.5 Screening Dimensions - *Corporate Synergy*

		Reported Dimensions and Alpha Values			
Screening and Evaluation Dimensions	*Current Study*	*Song & Parry 1997b*	*Calantone et al 1996*	*Cooper & Kleinschmidt 1994*	*Cooper & de Brentani 1984*
Corporate synergy				0.85*	0.89
F1 *Commercial Fit*	0.87	0.91*			
F2 *Production Fit*	0.88	0.91*	0.86#		0.79*
F3 *Senior Management Endorsement*	0.77			0.73*	
F4 *Communication Channel Fit*	0.65				
F5 *Support Resource Fit*	0.64		0.85#		

* - Dimension similar to that reported in the original investigation.

- Mean alpha across 3 studies reported.

6.2.5.1 Factor 1 - Commercial Fit

This first uncovered dimension of *Corporate Synergy* is one of the most commonly cited dimensions of new product screening and success. It has been termed *corporate synergy* (Cooper and de Brentani, 1984), *synergies* (Cooper and Kleinschmidt, 1994) and *overall project/company resource compatibility* (Cooper, 1985).

However, the emergence of a dimension that reflects *Commercial Fit* with the firm's organisational set-up without polluting the measure with items of production and engineering fit is a further development in NPD research. This dimension again highlights the need for actionable screening dimensions that reflect the day-to-day decision making of managers in the field. *Commercial Fit* concerns the need for projects that offer high degrees of fit with the organisations current business plans. This will ensure appropriate product support to ensure the best possible chance of long-term, sustainable profitability.

6.2.5.2 Factor 2 - Production Fit

This second uncovered dimension of *Corporate Synergy* is commonly used in new product research. Established scales concerned with *Production Fit* have shown high levels of internal consistency (Table 6.5) and have been termed *technical synergy* (Song and Parry, 1997), *technical resources and skills* (Calantone, Schmidt and Song, 1996), *technological and production synergy* (Cooper and de Brentani, 1984) and *technical and production synergy and proficiency* (Calantone and Cooper, 1981; Cooper, 1979b).

This dimension could be seen to operate in tandem with the *New Technology Requirement* dimension (section 5.3.3.2.2). Although these two dimensions appear to measure opposite ends of the same scale i.e. one measures 'newness', while the other measures 'fit' or 'familiarity', they may not necessarily play the same role in the screening decision. Keeping both dimensions in the next stages of analysis will address whether *Production Fit* is of greater, lesser or equal importance than *New Technology Requirement* at each decision stage of the NPD process.

6.2.5.3 Factor 3 - Senior Management Endorsement

Senior Management Endorsement is the third uncovered dimension of *Corporate Synergy*. Past literature has subsumed this dimension into other factors such as *corporate synergy* (Cooper and de Brentani, 1984), It has also been termed *internal commitment* (Song and Parry, 1997a; 1994; Parry and Song, 1994; Cooper and Kleinschmidt, 1993; 1986; Zirger and Maidique, 1990; Maidique and Zirger, 1984; Calantone and Cooper, 1981; Cooper, 1979a,b) and *project organisation* (Cooper and Kleinschmidt, 1994).

The *Senior Management Endorsement* dimension reflects a long held belief that whatever conclusions are drawn from market research or consumer testing, senior management have the final say regarding *Go/No Go* decisions in new product development. Many new products are rejected due to a lack of *Senior Management Endorsement*. Currently, the blame for corporate conservatism (in terms of new innovations) is being placed squarely at the door of senior managers (Curtis, 1998). It is they who were mid-level marketers during the 1990's recession resulting in them becoming cautious and risk averse. This has created a vicious cycle of inertia throughout the company that stifles funding and reduces the support for new products which in turn increases the likelihood of failure.

6.2.5.4 Factor 4 - Communication Channel Fit

This fourth dimension of *Corporate Synergy* is not individually identified in past NPD literature. Items from this scale have previously been included in other screening scales including; *market launch proficiency* (Song and parry, 1996), *project familiarity* (Cooper and Kleinschmidt, 1994), *synergies* (Cooper and Kleinschmidt, 1994), *overall project/company resource compatibility* (Cooper, 1985) and reverse scored in *newness to the firm* (Calantone and Cooper, 1981; Cooper, 1979b).

The presence of this dimension of *Communication Channel Fit* reflects the development of a new product that does not require a move away from the firm's traditional media channels. The resulting synergies with current channels of communication are likely to be attractive in that they may require reduced levels of investment, such as media buying savings. Conversely, managers are likely to be wary of developing products that require investment in communication channels that are unfamiliar to the company, such as the internet and e-commerce.

6.2.5.5 Factor 5 - Support Resource Fit

This fifth and final dimension of *Corporate Synergy* is commonly found in previous research largely due to the industrial nature of this work. The three items within this scale have, typically, been part of other 'synergy' scales such as *launch quality* (Cooper and Kleinschmidt, 1994), *project familiarity* (Cooper and Kleinschmidt, 1994), *corporate synergy* (Cooper and de Brentani, 1984) and *overall project/company resource compatibility* (Cooper, 1985).

The dimension *Support Resource Fit* follows the pattern set by the dimensions *Clear Product Definition* and *Production Readiness*. A poor level of *Support Resource Fit* is likely to hold up product development. This item has been crucial in industrial product markets where often a large part of the 'product bundle' concerns the after sales support and technical backup from the selling organisations. Within the *fmcg* sector it reflects support and fit with support services such as consumer support and marketing research techniques and resources.

6.2.6 Trade Synergy

The *Trade Synergy* factor grouping has been a development in NPD research right from the research projects conception. The impact of the trade (retailer) in the development of new *fmcg* products cannot be understated. Viewed from one perspective, new products exist at the centre of the triangle created among consumers, retailers and manufacturers (Stanojev, 1997). Items for this factor grouping were derived from anecdotal literature (Stanojev, 1997; Cadbury, 1975) and exploratory research conducted with managers, consultants and academics in the field of new product development. The four items entered into the principal component analysis returned two unique dimensions of *Trade Synergy*. Both of these dimensions followed the traditional 'effect' indicator model of Bollen and Lennox (1991). Table 6.6 notes the levels of internal consistency exhibited by these two scales. We offer no comparison with other research scales since such comparisons are unavailable.

Table 6.6 Screening Dimensions - *Trade Synergy*

	Reported Dimensions and Alpha Values
Screening and Evaluation Dimensions	*Current Study*
Trade synergy	
F1 *Strong Trade Support*	0.92
F2 *Likely Trade Adoption*	0.81

6.2.6.1 Factor 1 - Strong Trade Support

This first uncovered dimension of *Trade Synergy* represents a critical state for any UK *fmcg* manufacturer. *Strong Trade Support* highlights the relationship between the manufacturer and its distributive trade at a 'corporate' level. Such corporate support is vital to obtaining listings in the large multiple retailers within the UK grocery market. A recent Mintel report (Mintel, 1998a) suggested that during the launch of Müller Dairy's luxury dairy ice cream, they faced a major battle to make any impression on the giants of the ice cream market. The report suggested that Müller secured the listings it had on the strength of its success in the yoghurt market. Were a small company to attempt to get such a product listed it would almost certainly have been given short shrift from the major multiples.

This issue could be a good thing if you are in the position to draw on past successes or a bad thing if you are not. Either way it represents a distinct dimension in new product screening. If your proposed new product is extending your range into new areas and you have *Strong Trade Support* this may advocate a *Go* decision. If you cannot claim this *Strong Trade Support* then perhaps this would advocate a *No Go* decision. Whether this decision would be *Terminate* or *Hold* while *Strong Trade Support* was lobbied, is likely to be project specific.

6.2.6.2 Factor 2 - Likely Trade Adoption

This second uncovered dimension reflects a 'product' specific decision criteria. *Strong Trade Support* reflects 'corporate' support while *Likely Trade Adoption* reflects 'product' support. The term 'trade' is used in both *Strong Trade Support* and *Likely Trade Adoption* to reflect the nature of the outlets in which a product is sold. In that respect the term is largely self-assessed. For niche market products in the UK *fmcg* sector *Strong Trade Support* and *Likely Trade Adoption* may relate to distribution channels other then the 'big four' supermarkets.

However, it is important to take into account the power of the UK grocery trade. As mentioned in chapter two (section 2.7.1.2) the strength of the retailer lies in their ability to wield power both in terms of the products they stock and also the future development of product categories through 'category captains'. The level of *Likely Trade Adoption* is likely to affect a prospective product's movement through the NPD process. It may be a technologically innovative product with a large and growing target market, but if the grocery multiples do not favour the product then it is unlikely to be *accepted* during the development process.

It has been suggested that in the *fmcg* sector, retailer power has become one of the biggest factors inhibiting genuine innovation. Own label has gone from being a budget alternative to a creator of powerful brands, and retailers are now able to get competitive own brands on the shelves so quickly that expensive long-burn NPD projects only yield short-term advantage (Curtis, 1998). This dimension of new product screening is also likely to be important in terms of the possible launch strategy for a product. In launching, it is important to evaluate the potential consumer reach achieved by listings in different retailers. For example, a Tesco or Sainsburys listing would potentially give one exposure each to about a third of the population within four weeks. It is possible to maximise consumer reach, in the most cost-effective way by reviewing the best combination of retailer listing at market level (Bartlam, 1996). However, these retailers must have shown some indication of *Likely Trade Adoption.*

6.2.7 Nature of the Market

The items representing *Nature of the Market* are frequently found in NPD literature (Table 6.7). Due to the exploratory nature of this research project the 18 items pertaining to *Nature of the Market* were addressed together in a principal component analysis to address the nature of these screening dimensions for new *fmcg* products. Five dimensions were uncovered which follow 'effect' and 'causal' indicator models.

Table 6.7 Screening Dimensions - *Nature of the Market*

		Reported Dimensions and Alpha Values			
Screening and Evaluation Dimensions	*Current Study*	*Song & Parry 1997b*	*Cooper & Kleinschmidt 1994*	*Cooper & de Brentani 1984*	*Calantone & Cooper 1981*
Nature of the market					
F1 *Intensely Competitive Market*	0.71		0.61*		✓
F2 *Compelling Market Size Potential*	0.63		0.63*	0.65*	✓*
F3 *Resistance to Brand Switching*	0.70	0.67*			✓*
F4 *Rapid Market Changeability*	0.60				✓
F5 *Low Barriers to Market Entry*	0.41				

* - Dimension similar to that reported in the original investigation.

✓ - Dimension identified but alpha value not calculated.

6.2.7.1 Factor 1 - Intensely Competitive Market

This first uncovered dimension follows the traditional 'effect' indicator model and is frequently found in NPD studies. As the title suggests it represents the extent to which there are many, similar products competing on price. It has been termed *market competitiveness* (Song and parry, 1996; Cooper and Kleinschmidt, 1994), *nature of market* (Cooper, 1981) and *market competitiveness and customer satisfaction* (Calantone and Cooper, 1981; Cooper, 1979b).

This factor, is more specific by nature. It refers to the competitiveness of the market in a more traditional sense as mentioned above; many, similar products competing on price. While an *Intensely Competitive Market* would seem to recommend caution in terms of new product introductions it is by no means a prophet of doom. Proctor and Gamble launched Sunny Delight into an *Intensely Competitive Market* in one of the most successful new product launches of all time (Mintel, 1998b).

Mintel note that since Sunny Delight was launched the impact on the sales of fruit juice has been little short of incredible. Research indicated that during the initial launch phase, the chilled juice drinks market more than doubled by both volume and value in the first half of the year (albeit from a low base of around 15 million litres, to 30 million litres). Mintel also suggest that much of the increase is incremental. The message would appear to be that when considering launching a product in an *Intensely Competitive Market*, marketing muscle such as that of Proctor and Gamble is a considerable advantage.

6.2.7.2 Factor 2 - Compelling Market Size Potential

The three items forming this second dimension of *Nature of the Market* have typically been subsumed into other factors such as *nature of market* (Cooper, 1981), *product customness* (Calantone and Cooper, 1981; Cooper, 1979b), *product scope* (Cooper, 1985a), *size of market* (Cooper and de Brentani, 1984) and *market potential* (Song and Parry, 1997a; 1996; 1994; Parry and Song, 1994; Cooper and Kleinschmidt, 1993; 1986; Zirger and Maidique, 1990; Maidique and Zirger, 1984; Calantone and Cooper, 1981; Cooper, 1979a,b). This *Compelling Market Size Potential* dimension follows the traditional 'effect' indicator model. It represents another *real* and *actionable* screening dimension.

Compelling Market Size Potential signifies a market that is a mass market, is important to the trade and is geographically large. These features make it obvious as to why this sort of dimension should be utilised in the screening and evaluation of a potential new product. Products that exhibit *Compelling Market Size Potential* are more likely to be *accepted* through to the next stage of development.

6.2.7.3 Factor 3 - Resistance to Brand Switching

As with the previous dimension, items relating to consumer loyalty have traditionally been included in other aggregate scales such as *market competitiveness* (Cooper and Kleinschmidt, 1994), *nature of market* (Cooper, 1981) and *market competitiveness and customer satisfaction* (Calantone and Cooper, 1981; Cooper, 1979b). This study of new products in the *fmcg* sector has identified that this dimension needs to be addressed as a specific screening dimension. This dimension follows the traditional 'effect' indicator model. It is reasonable to suggest that a high level of *Resistance to Brand Switching* will only be exhibited through a high score on each of the consumer loyalty and consumer satisfaction items representing the construct.

Brands such as KitKat (Nestlé), Mars bar (Mars) and Cadbury's Dairy Milk (Cadbury) boast brand loyal consumers in the confectionery category. Competing against any one of these products on its own terms would be a dangerous strategy for any new product introduction. This does, therefore, represent another significant screening dimension. *Resistance to Brand Switching* may reflect a 'personal cost' to the consumer that would be incurred by switching between products. If a consumer has grown used to the benefits of using Unilever's Persil Tablets (no mess, no waste and no confusion about the amount used), they may be reluctant to absorb the 'personal costs' of lost time and convenience involved in switching to a powder or liquid detergent. Manufacturers may need to pay much more attention to this type of switching cost, incorporating it into the screening decision.

6.2.7.4 Factor 4 - Rapid Market Changeability

The fourth uncovered dimension of *Nature of the Market* is also typically subsumed into other more aggregate factors such as *nature of market* (Cooper, 1981), *market* *dynamism* (Calantone and Cooper, 1981; Cooper, 1979b) and *competitive intensity* (Song and Parry, 1997a; 1994; Parry and Song, 1994; Cooper and Kleinschmidt, 1993; 1986; Calantone and Cooper, 1981; Cooper, 1979a,b). This dimension contains two items that reflect different aspects of market changeability; changing user needs and frequent new product introductions. Although these items have a reasonable alpha value and mean inter-item correlation, the dimension may follow the 'causal' indicator model where the items determine the latent construct.

Addressing *Rapid Market Changeability* as a separate dimension of *Nature of the Market* further adds another constructive decision criterion that can be applied in day-to-day new product decision making. An organisation may be able to take advantage of *Rapid Market Changeability* by launching radical new products into a market that is familiar and comfortable with change and actively encourages radical innovation.

6.2.7.5 Factor 5 - Low Barriers to Market Entry

This final *Nature of the Market* dimension, *Low Barriers to Market Entry*, is often incorporated into other factor groups, such as *market competitiveness* (Cooper and Kleinschmidt, 1994) and *nature of market* (Cooper, 1981). In contrast to the previous dimension, the two items that make up this scale follow the 'effect' indicator model. The low alpha value and poor mean inter-item correlation may be attributed to the low number of items in the scale as suggested in chapter 5 (section 5.3.7.2.5).

This dimension reflects the strength of competitors in the market and the strategic importance of their products. The effect of this dimension can be seen in the recent 'ice cream wars'. This legality of 'freezer exclusivity' deals was questioned by Mars who claimed that Unilever excluded rivals' products from their retail freezer cabinets in a deliberate strategy to squeeze them out of the market (Pitcher, 1998). Whether Mars or Unilever prove to be correct, this illustrates the point that caution should be recommended when making *Go* or *No Go* decisions for new products with high costs of market entry.

6.2.8 Competitive and Market Intelligence

The *Competitive and Market Intelligence* factor grouping was found to be unidimensional under principal component analysis. This dimension conforms with the traditional 'effect' indicator model of item-factor relationship. The dimension exhibits a good level of internal consistency and mean inter-item correlation. Although the factor grouping was unidimensional, it was renamed *Reliable Market Intelligence* to indicate the nature of the relationship. This dimension emphasises the *Reliable* nature of the *Market Intelligence* for the new product. This will aid the applicability of the dimension to managers in the field.

Table 6.8 Screening Dimensions - *Competitive and Market Intelligence*

Screening and Evaluation Dimensions	*Reported Dimensions and Alpha Values* *Current Study*	 *Song & Parry 1997b*	 *Calantone et al 1996*
Competitive and market intelligence		0.89	0.83#
F1 *Reliable Market Intelligence*	0.77		

\# - Mean alpha across 3 studies reported.

6.2.8.1 Factor 1 - Reliable Market Intelligence

The five items that make up the *Reliable Market Intelligence* dimension reflect the predictability of consumers, competitors and product intelligence. This dimension has been included in many research projects as *competitive and market intelligence* (Song and Parry, 1997b; Calantone *et al*, 1996) and also within other factors such as *marketing knowledge and proficiency* (Calantone and Cooper, 1981; Cooper, 1979b). As with many other identified dimensions of new product screening it is felt that the

Reliability of *Market Intelligence* or lack of it may result in a *Hold* decision rather than a *Termination* of the project altogether.

The magnitude of the decision outcomes (*Go/Hold/No Go*) may be related to the degree of innovativeness of the potential new product. An organisation may be reluctant to launch a radically innovative new product where *Market Intelligence* is notoriously *Unreliable*. They may, however, be more confident to launch an extension of an existing product with an established track record.

There is an argument, however, as to how much legitimacy is given to consumers input in new product development. Hamel and Prahalad (1994; p 65; p 67) suggest that the emphasis should be on executive foresight in NPD. They argued;

"We did not know we wanted mini-vans, mid-size Japanese cars of unrivalled quality, 24-hour TV news, Walkmans or sensibly proceed computers sold without hype until innovative companies put them into our hands" ... "customers are notoriously lacking in foresight. Marketing only the articulated needs of customers you already serve cedes vast opportunities to more foresighted opposition".

Von Hippel (1986) also observes that users' insights into new product needs and potential solutions are inhibited by their own real-world experiences. Users steeped in the present are, thus, unlikely to generate novel product concepts that conflict with the familiar. Rather, an NPD programme should concentrate on searching for problems and solutions that consumers perhaps have not yet perceived, but that they will regard as important, once recognised. The end user cannot really express a useful opinion about a totally new product before he or she has a chance to see it.

The recommendation here is to reflect on the reliability of the intelligence being gathered, but not to base all new product decisions solely on the information available since the legitimacy of reliable information is often brought into question.

6.2.9 Financial Potential

Eight items pertaining to *Financial Potential* were subject to principal component analysis, resulting in a two factor solution. The first uncovered dimension followed the 'effect' indicator model while the second dimension was a single-item or 'univariate' dimension (Cooper, 1984; 1985b). It was, therefore, not appropriate for measures of internal consistency or correlation.

Table 6.9 Screening Dimensions - *Financial Potential*

Screening and Evaluation Dimensions	*Reported Dimensions and Alpha Values* Current Study	*Balachandra 1984*	*Cooper & de Brentani 1984*
Financial potential			0.80
F1 *Lucrative Potential Market*	0.85	✓*	
F2 *Requires Significant Financial Investment*	N/A		0.69*

* - Dimension similar to that reported in the original investigation.

✓ - Dimension identified but alpha value not calculated.

6.2.9.1 Factor 1 - Lucrative Potential Market

This first uncovered dimension reflects the traditional financial aspects of the market for the potential new product. This dimension has been referred to as *financial* (Ronkainen, 1985), *increase in probability of commercial success* (Balachandra, 1984) and *relative market share* (Song and Parry, 1997a). It has also been included in *financial potential* (Cooper and de Brentani, 1984).

The grouping together of so many questionnaire items reflecting market potential suggests that complex individual assessments of profitability, market share and market climate are not necessary in the new product screening decision. In this instance an aggregate dimension of *Lucrative Potential Market* offers an acceptable surrogate measure. Managers are employed to make decisions based on often incomplete information. This dimension suggests that making exhaustive assessments of profitability, share and long-term return on investment may simply inhibit good, fast and expedient decision making.

6.2.9.2 Factor 2 - Requires Significant Financial Investment

This second univariate dimension reflected the nature of the required investment for the potential new product. This dimension has been referred to as *source of idea/investment magnitude* (Calantone and Cooper, 1981; Cooper, 1979b), *project financing* (Cooper and de Brentani, 1984) and included in *financial* (Ronkainen, 1985) and *business risk factor* (Baker and Albaum, 1986).

While this dimension does not directly measure *Financial Potential* it is intrinsically linked with this 'financial' grouping and measures a facet of the overall financial picture. We have already noted how the magnitude of the required investment can inhibit the development of radically new products (section 2.5). This has been suggested through several of the uncovered screening dimensions including *Predictable Development Pattern* (section 6.2.4.3), *Low Risk of Failure* (section 6.2.4.4) and *Communication Channel Fit* (section 6.2.5.4). Departures from the ideal state on all of these dimensions will be likely to result in a larger financial investment and, therefore, reduced chances of *acceptance*.

Also of critical importance to this decision is the prior efficiency of the new product screening process in removing those projects that will likely result in failure. Over the course of an NPD project, costs generally increase at an accelerating rate as the project moves towards commercialisation. It is important to eliminate these failures early, before they lead to major losses in investment that will in turn reduce the propensity of the managers and the organisation to take risks regarding potential new products (Schmidt and Calantone, 1998).

6.2.10 Market Strategy

The tenth factor grouping to be analysed using principal component analysis returned four unique dimensions of *Market Strategy*. These dimensions reflect many aspects of the strategic nature of the proposed new product. Accordingly they include items that reflect the same latent construct but are not directly inter-related. Scale reliability values that are reported for the sake of completeness are fairly good but should be viewed with caution. The first three of the uncovered dimensions may reflect the 'causal' indicator model with the indicators determining the latent construct. The final uncovered dimension is a univariate dimension and, thus, does not reflect traditional measures of correlation and internal consistency. The uncovered dimensions describe the role of the proposed product when viewed in the light of the firm's new product mission or strategy. The presence of strategy elements in NPD screening follows on from the research conducted by Cooper and de Brentani (1984). Comparison with earlier research projects can be seen in Table 6.10.

Table 6.10 Screening Dimensions - *Market Strategy*

	Reported Dimensions and Alpha Values				
Screening and Evaluation Dimensions	*Current Study*	*Baker & Albaum 1986*	*Cooper & de Brentani 1984*	*Calantone & Cooper 1981*	*Cooper 1979a*
Market strategy					
F1 *Direct Response Strategy*	0.62		0.69*		
F2 *Product-Led Strategy*	0.60	✓*			
F3 *Market Attack Strategy*	0.57		0.65*		
F4 *Market-Led Strategy*	N/A			✓*	✓*

* - Dimension similar to that reported in the original investigation.

✓ - Dimension identified but alpha value not calculated.

6.2.10.1 Factor 1 - Direct Response Strategy

This first uncovered dimension of *Market Strategy* reflects the nature of the potential new product as a response to an external stimulus such as competitor activity, a need to replace another product or to reverse a decline in category share.

In past research studies, the items making up the Direct Response Strategy have been assessed for reliability and have been referred to as a *market maintenance strategy* (Cooper and de Brentani, 1984) and been included in larger aggregate scales such as *project characteristics* (Cooper, 1981).

Identifying screening dimensions that reflect new product strategies emphasises the importance of strategic direction within any screening decision. It is vital that *Go* or *No Go* decisions are taken with respect to the strategic aims of the potential new product. If a project is launched to unsettle a particular competitor, as could be the case in a *Direct Response Strategy*, then saddling the project with unnecessary profitability hurdles is going to stifle the progress of the product.

6.2.10.2 Factor 2 - Product-Led Strategy

The second uncovered *Market Strategy* dimension contains three items and reflects a *Product-Led* approach to new product development. This dimension has only been included as part of a success criteria measure reported by Kristensen, Østergaard and Juhl (1997). As such, it is an incremental development in this field.

In many cases products are brought to market in order to take advantage of technological advancements or to create ranges of product. In the past, detergent manufacturers have been guilty of a large range of different products, 'big-box' powders, concentrated powders, liquids, concentrated liquids, variants for colours and so on. Many of the products have been introduced in order to create a range of product as a *Product-Led Strategy*. Currently, Unilever are preparing to launch detergent tablets for the Surf and Radion brands in the UK (Bell, 1998). These products may be relevant to the consumer and the category but they represent *Product-Led* strategies. A failure to acknowledge this may hinder the development of some new products.

6.2.10.3 Factor 3 - Market Attack Strategy

This third uncovered dimension is made up of two items relating to 'aggressive' market strategies of heightening market competition and attacking category share. This factor has been termed *diversification strategy* (Cooper and de Brentani, 1984) and items have also been included in a *success criteria* dimension (Kristensen, Østergaard and Juhl, 1997).

The intention of an organisation to initiate a *Market Attack* represents a strong, positive step that needs to be considered in the screening decision. Should a product have an opportunity to capitalise on a favourable market condition to launch, the screening decision should be equipped to enable this.

6.2.10.4 Factor 4 - Market-Led Strategy

The final uncovered dimension of *Market Strategy* was a single item factor or univariate factor. It has been included in *project characteristics* (Cooper, 1981), *product scope* (Cooper, 1985) and was part of the *source of idea/investment magnitude* dimension (Calantone and Cooper, 1981; Cooper, 1979b).

This final strategy dimension reflects the nature of the idea as being market-derived. Accordingly this dimension is highlighted in many of today's new product introductions. Products like Bass' Carling Premier lager responded to a need for a smoother lager that was between a bitter and a lager. The proliferation of canned beers with 'widgets' can be seen to have been a strongly market led development.

Once the consumer was aware of the availability of the technology all products had to contain one. McCain oven chips are now sold with reference to the low fat content in response to a *Market-Led* demand for 'better-for-you' foods.

6.2.11 Product Branding

The final factor grouping to be analysed by principal components contained thirteen items of *Product Branding*. As with the *Trade Synergy* factor grouping, these items were empirically untested and were derived from managerial literature and exploratory research. Three dimensions were identified, all conforming to the traditional 'effect' indicator model (Table 6.11).

Table 6.11 Screening Dimensions - *Product Branding*

	Reported Dimensions and Alpha Values
Screening and Evaluation Dimensions	*Current Study*
Product branding	
F1 *Clearly Identified Brand Strategy*	0.80
F2 *Brand Fit*	0.82
F3 *Global Product Compatibility*	0.69

6.2.11.1 Factor 1 - Clearly Identified Brand Strategy

The first uncovered dimension of *Product Branding* contains seven items which exhibit a high degree of internal consistency and good mean inter-item correlation. This dimension represents the establishment of a clear branding strategy. By ensuring *Clarity* of the *Brand Strategy* as early as possible, managers are establishing the nature of the product proposition, thus ensuring stability and confidence in the development process. This dimension emphasises a long-term approach to the management of the brand.

It has long been recognised that the intangibles of new brand development play a crucial role in future brand success with a clear and identifiable strategy being a crucial antecedent of product success post-launch. Agres and Dubitsky (1996) suggest that the brand is a set of differentiating promises that links a product to it's customers. Accordingly, the brand does not reside on the shelf even if the product does, but, rather, in the mind of the consumer. Thus, the clarity and stability of the brand strategy is likely to inspire confidence in consumers and impact on this consumers perceptions of brands. Bartlam (1996) noted that there are common elements to the success of products such as Miller, Clover, Dolmio, Heinz Weightwatchers, Radion, Pringles and Always, one of which is a clear product proposition.

6.2.11.2 Factor 2 - Brand Fit

This second uncovered dimension contained three internally consistent and highly correlating items. *Brand Fit* represents the extent to which the brand is compatible with existing brands and products within the organisational portfolio. As a result, this dimension will ensure a comprehensive assessment of the potential *fit* of the new product within the framework of the organisation, alongside other dimensions such as *Superior Consumer Fit*, *Commercial Fit*, *Production Fit*, *Communication Channel Fit* and *Support Resource Fit*.

This dimension will play a considerable role in the development of product extensions which many believe will continue to be central to NPD strategy in *fmcg* sectors (Aaker, 1991).. The difficulty and risk of associated with determining customers' needs have prompted many firms in the *fmcg* sector to rely heavily on line extensions for stimulating demand for their brands. A recent survey of *fmcg* companies revealed that only 5% of new product introductions are new brands, 6% are brand extensions, and the remaining 89% are line extensions (Aaker, 1991). Therefore, it is important that the line extension process is managed effectively. Ensuring adequate levels of *fit* between new and existing products of the same brand will be critical to this effective management.

6.2.11.3 Factor 3 - Global Product Compatibility

The third and final uncovered dimension of *Product Branding* contains two items that display a good level of internal consistency and mean inter-item correlation. This dimension reflects the increasingly 'global' nature of the product development process. The spirits producer UDV has recently created a function to concentrate on the development of new markets and product innovation known as the 'global strategy and innovation' division. Diageo is forming a new unit dedicated to ensuring consistent marketing across its portfolio of global brands.

The addition of such a dimension of screening will further provide managers with criteria that are appropriate and applicable to their day-to-day decisions. By applying a measure of *Global Product Compatibility*, organisations will assess the compatibility of new products across country boundaries. Steinberg and Klein (1998; p 30) suggest that the biggest mistake that a company can make in global branding is to assume image equities are universal.

"Do not assume you can extend an image globally if you have not achieved a consistent brand image in major home markets".

A brand that enjoys a reputation in the USA may find its image and awareness differs, sometimes considerably, in other countries. The identification of this screening dimension is a considerable development for the assessment of new *fmcg* products.

6.3 Screening and Evaluation Across Development Stages

This final stage of the research project has taken the 32 uncovered screening and evaluation dimensions and addressed their importance in discriminating between *accepted* and *rejected* projects at four stages of the new product development process. This analysis has taken two forms; the first, an assessment of differences in the locations of means across each dimension, and the second, an assessment of the power of these dimensions in discriminating between *accepted* and *rejected* projects.

Preliminary findings have suggested that the dimensions that discriminate between *accepted* and *rejected* projects do differ at each stage of the development process. Some dimensions discriminate between the two groups of projects at several stages of the process, others only at a single stage, while others do not discriminate between *accepted* and *rejected* projects at any of the four identified process stages.

The thesis will now discuss each of the four identified stages of the development process in turn. It will highlight those screening and evaluation dimensions that have been shown to discriminate between *accepted* and *rejected* projects and, therefore, should be used in the screening and evaluation of new product projects in the *fmcg* sector.

When assessing each of the identified discriminant functions using the discriminant-loadings approach, there is a need to know which variables are substantive discriminators worthy of note. In simultaneous discriminant analysis, all variables are entered into the function, and generally any variables exhibiting loadings of plus or minus 0.30 or higher are considered substantive (Hair *et al*, 1998). To aid interpretation of the results, dimensions are grouped into High, Moderate and Lower impact dimensions.

6.3.1 Stage 1 - Concept/Idea Stage

Results from the Mann-Whitney *U* test (Table 5.38) showed that two of the 32 screening dimensions exhibited evidence of significant differences between *accepted* and *rejected* projects at the Concept/Idea stage ($p < 0.05$). This test focuses on the mean as a measure of central tendency and assesses the null hypothesis that there is no difference between the two groups in terms of location. The dimensions that exhibited differences between the two groups were; *Compelling Market Size Potential* (NOTM2) and *Lucrative Potential Market* (FP1).

These two dimensions, derived from the ***Market*** section of the original questionnaire, were entered simultaneously into a single canonical discriminant function. This discriminant function correctly classified 80.0% of the projects in the analysis sample and 75.6% of the projects in the cross-validation sample using the discriminant function. While the proportions of correctly classified projects are higher than could reasonably be expected by chance, this classification is not 25% above the 'chance' estimates of C_{MAX} and C_{PRO} as recommended by Hair *et al* (1998). However, Press's Q statistic is significant for both the analysis and validation samples. Of the incorrectly classified projects, seven of the eleven *accepted* projects were incorrectly classified as *rejected* projects. Only two of the 34 *rejected* projects were incorrectly classified as *accepted* projects. This may indicate that the discriminant function exhibits some 'risk averse' characteristics. Incorrectly classified projects are more likely to be classified as *rejected* projects than *accepted* projects.

6.3.1.1 High Impact Dimensions

Both of the screening dimensions entered into this discriminant function exhibit high discriminant loadings. These loadings, or 'within group correlations' are considerably higher than the 0.30 threshold recommended by Hair *et al* (1998) for simultaneously entered variables in discriminant analysis. This assessment shows that there are significant differences between the two groups of *accepted* and *rejected* projects on these two dimensions at this Concept/Idea stage of the development process. The correlations signify that of the two dimensions, *Lucrative Potential Market* (0.828) wields slightly more influence in discriminating between the groups of *accepted* and *rejected* projects than *Compelling Market Size Potential* (0.750).

The first dimension *Lucrative Potential Market* wields the largest influence in discriminating between the groups of projects. Projects that exhibit high return on investment potential, high probabilities of commercial success, high market share potential and sales growth potential and so on are more likely to be *accepted* at the first Concept/Idea stage of the development process. This makes good conceptual sense, with the first screening decision being taken on the likely market potential for the future new product.

The second significant dimension, *Compelling Market Size Potential*, represents the extent to which an organisation can not afford to ignore a particular market. This relates to mass markets, important categories to the trade and geographically large markets. The nature of this dimension also makes conceptual sense.

If the market for a potential new product exhibits characteristics of financial viability (*Lucrative Potential Market*) and overwhelming potential size (*Compelling Market Size Potential*) then it is reasonable to perceive that it should be developed further.

6.3.2 Stage 2 - Evaluation Stage

Results from the Mann-Whitney *U* test (Table 5.38) showed that 10 of the 32 uncovered screening dimensions showed evidence of significant differences between *accepted* and *rejected* projects at the Evaluation stage ($p < 0.05$). These dimensions were; *Tangible Technological Advantage* (PDA1), *Superior Consumer Fit* (PDA2), *Clearly Defined Promotional Plan* (PP1), *Senior Management Endorsement* (CS3), *Likely Trade Adoption* (TS2), *Resistance to Brand Switching* (NOTM3), *Lucrative*

Potential Market (FP1), *Product-Led Strategy* (MS2), *Market Attack Strategy* (MS3) and *Clearly Identified Brand Strategy* (PB1).

These 10 dimensions spanned the ***Project, Synergy, Market*** and ***Branding*** sections of the original questionnaire. They were entered simultaneously into a single canonical discriminant function which correctly classified 83.3% of the projects in the analysis sample and 70.8% of the projects in the cross-validation sample. For this Evaluation stage the degree of correct classification is significantly greater than the 'chance' estimates of C_{MAX} and C_{PRO} although not at the 25% greater level as recommended by Hair *et al* (1998). However, as with the previous discriminant function both Press's Q statistics are significant. This discriminant function incorrectly classified five *accepted* projects as *rejected* projects and three *rejected* projects as *accepted* project at this stage of the NPD process. As at the Concept/Idea stage, the lower number of misclassified *rejected* projects may indicate that the discriminant function exhibits some risk averse characteristics.

All of the 10 dimensions that were entered into the discriminant function have discriminant loadings that are above the 0.30 threshold recommended by Hair *et al* (1998). This indicates that all dimensions play a substantial part in discriminating between *accepted* and *rejected* projects at this Evaluation stage. The 10 dimensions indicate that there are significant differences between the two groups of *accepted* and *rejected* projects at this Evaluation stage of the development process.

6.3.2.1 High Impact Dimensions

The discriminant loadings indicate that *Senior Management Endorsement* (0.573) plays the largest part in discriminating between the groups of *accepted* and *rejected* projects, and wields a positive influence on project outcome. Potential new products that boast the support of senior management are more likely to be *accepted* through to the next stage of development. This dimension makes good conceptual sense. At a fairly early stage in the development cycle the support and endorsement of senior management will largely decide the momentum, investment and priority level of a potential new product and, thus, the future product development pattern. This finding is interesting in that it empirically confirms a state of affairs that most managers would identify with. It also offers some support to a practice often seen as divisive and 'selective'. Managers are the personnel that organisations charge with the responsibility of making new product decisions. These are the men and women who have the experience and intelligence to make such decisions. It is perhaps appropriate that some empirical support is provided for the *acceptable* use of this 'gut-feel' 'endorsement' mentality that pervades new product development decisions.

The second dimension to play a significant role in discriminating between the two groups of projects at this stage is *Superior Consumer Fit* (0.551). This dimension addresses the extent to which the potential new product satisfies and responds to changes in customer needs and values, is superior to competing products in meeting those needs and is of higher quality than what was currently on offer in the category. This dimension promotes the need for early consideration of the consumer benefits derived from product use. It highlights a crucial element of *fmcg* product marketing suggested in sections 1.2 and 6.2.1.2. At the Evaluation stage, differential advantage in the eyes of the consumer is more important that actual 'tangible' product advantages. This corroborates the views of Agres and Dubitsky (1996) (section 6.2.1.2). Brands that have managed to achieve high levels of differentiation and relevance virtually define their category or sub-category. This investigation finds that at the Evaluation stage, delivering differentiating benefits in the mind of the consumer *is* a more successful strategy for building brands than enhancing product quality.

The third major dimension to discriminate between the two groups of projects at this stage is *Lucrative Potential Market* (0.549). This screening dimension exhibits significant differences between project groups at the first two stages of new product development. This indicates that while this screening stage has incorporated more and diverse screening measures, projects must continue to demonstrate a *Lucrative Potential Market*. The impact of this dimension suggests that market potential is not a static measure that is then sidelined while the real business of developing the new product takes place. Rather, it is a fluid, dynamic measure that underpins project selection at both early stages of development.

The next dimension to play a substantial role in this second screening decision is *Clearly Defined Promotional Plan* (0.533). The application of this dimension, at the second stage of development makes good conceptual sense.

The application of this dimension at this stage of development is best explained through the following example. A company (for example **FastGood Ltd.**) is developing a potential new product. At the Concept/Idea stage, the company assessed this potential new product on ***Market*** related issues of *Lucrative Potential Market* and *Compelling Market Size Potential*. The product satisfies executives with respect to these dimensions. Accordingly it is moved on to the next stage of the NPD process for further development. At the Evaluation stage of the process a more thorough assessment of the product's packaging, USP, advertising and brand strategy is necessary. The *Clearly Defined Promotional Plan* dimension provides this additional assessment and enables the manager to discriminate between *accepted* and *rejected* projects at this stage of the NPD process. This reflects an 'escalation' in the organisation's commitment to the potential new product.

The final dimension to exercise a high impact on the outcome of a potential new product is *Product-Led Strategy* (0.509). A product that is being developed to take advantage of a particular technological development or is being developed as part of a range of products is more likely to be *accepted* at this stage of development. This dimension reflects the 'internally' oriented organisation who try hard to be market oriented but still have greater confidence in products that are being developed as part of an 'internally' oriented agenda. As one of its core principals, this investigation empirically represents how organisations in the *fmcg* sector screen new products. Currently, they are being *accepted* on such 'internally' oriented dimensions.

6.3.2.2 Moderate Impact Dimensions

The first dimension to have a moderate impact in discriminating between *accepted* and *rejected* projects is *Market Attack Strategy* (0.493). This dimension, reflects an 'aggressive' market strategy in terms of heightening market competition and attacking category share. However, we have already noted that potential new products that reflect *Product-Led Strategies* are more likely to be *accepted* through to the next stage of development. It is important to acknowledge that these two strategies are not mutually exclusive. Having felt that the potential new product has considerable *Product-Led* benefits, the managers responsible for new product decision making at **FastGood Ltd.** now requires it to demonstrate some *Market Attack* attributes before sanctioning the movement of the project onto the next stage of development. The combination of a new product that exhibits *Market Attack* and *Product-Led Strategies* combines the best features of technical benefit and market application. In such circumstances a project is much more likely to be *accepted* for further development.

The second dimension to have a moderate impact at the Evaluation stage is *Clearly Identified Brand Strategy* (0.419). At this early stage of development it is important for the product proposition to be fixed. Having already identified the crucial role played by *Senior Management Endorsement*, it is not surprising that a brand strategy dimension is found to impact significantly on the *acceptance* of a new product. A *Clearly Identified Brand Strategy* can be seen as a prerequisite in ensuring stability and confidence in the future management of the product. This will result in the release of future development resources to bring the product to market.

6.3.2.3 Lower Impact Dimensions

Three dimensions play a reduced role in discriminating between *accepted* and *rejected* projects at the Evaluation stage. The first of these, *Likely Trade Adoption*

(0.382), signals the importance of screening dimensions that reflect the level of trade acceptance for the potential new product. So far, screening dimensions have addressed the nature of the product from the consumer and manufacturers perspective. It is interesting to note the early importance of the trade in assessing a potential new product.

The second dimension to have a reduced impact on the screening decision is *Resistance to Brand Switching* (-0.359). This dimension is negatively related to the outcome of the project and is termed a 'barrier to success' for the project at that stage of development (Cooper, 1979a). This result makes good conceptual sense. If the potential consumer group for a new product exhibit *Resistance to Brand Switching* (showing a high degree of loyalty to the products they are currently using), then the product is less likely to be *accepted* at this Evaluation stage for further development. Projects whose potential consumer groups exhibit lower *Resistance to Brand Switching* are more likely to be *accepted* through to the next (Development) stage of the NPD process.

The final dimension to offer any meaningful discrimination between *accepted* and *rejected* projects at the Evaluation stage is *Tangible Technological Advantage* (0.310). This dimension reflects a technologically superior product in terms of; (1) important technological strengths, (2) a revolutionary innovation, (3) patentability, (4) technological enhancements and (5) differentiation from competitors' products. This dimension can be seen to work in tandem with *Superior Consumer Fit* to ensure that the major components of *Product Differential Advantage* are encompassed in this second screening decision.

6.3.3 Stage 3 - Development Stage

Results from the Mann-Whitney *U* test (Table 5.38) showed that 14 of the 32 screening dimensions showed evidence of significant differences between *accepted* and *rejected* projects at the Development stage ($p < 0.05$). These dimensions were; *Superior Consumer Fit* (PDA2), *Clearly Defined Promotion Plan* (PP1), *Clear*

Product Definition (PC1), *Senior Management Endorsement* (CS3), *Support Resource Fit* (CS5), *Likely Trade Adoption* (TS2), *Compelling Market Size Potential* (NOTM2), *Rapid Market Changeability* (NOTM4), *Lucrative Potential Market* (FP1), *Product-Led Strategy* (MS2), *Market Attack Strategy* (MS3), *Market-Led Strategy* (MS4), *Clearly Identified Brand Strategy* (PB1) and *Global Product Compatibility* (PB3).

These 14 dimensions spanned all four of the ***Project, Synergy, Market*** and ***Branding*** sections of the original questionnaire. They were entered simultaneously into a single canonical discriminant function which correctly classified 83.3% of the projects in the analysis sample and correctly classified 68.3% of the projects in the cross-validation sample. At this Development stage the degree of correct classification is significantly greater than the 'chance' estimates of C_{MAX} and C_{PRO}. The analysis sample also conforms to the 25% greater level as recommended by Hair *et al* (1998). As with the previous discriminant function both Press's Q statistics are significant. This discriminant function incorrectly classifies *accepted* projects as *rejected* projects on five occasions and *rejected* projects as *accepted* project on five occasions at this stage of the development process.

Of the 14 dimensions that were entered into the discriminant function, 12 dimensions have discriminant loadings that are above the 0.30 threshold recommended by Hair *et al* (1998). This indicates that these dimensions play a significant part in discriminating between *accepted* and *rejected* projects at the Development stage. These 12 dimensions indicate that there are significant differences between the two groups of projects at this Development stage of the NPD process.

6.3.3.1 High Impact Dimensions

The dimension that has the greatest influence on the discriminant function is *Lucrative Potential Market* (0.598). This screening dimension has been found to play a high impact role at each of the first three stages of the NPD process. Rather than using individual financial assessments for potential new products (ROI and sales growth potential, probability of commercial success, market share potential, profit and category margins and economic climate), a composite measure of *Lucrative Potential Market* provides an acceptable surrogate measure to assess the nature of the market. Whilst we have shown that more explicit screening dimensions have improved the appropriateness and applicability of some screening dimensions, in this instance, the aggregate nature of the measure reduces the reliance managers place on unrealistic and unreliable financial forecasting.

The second crucial dimension in that discriminates between *accepted* and *rejected* projects at this third stage of development is *Likely Trade Adoption* (0.593). The importance of this dimension makes excellent conceptual sense as can be shown through the following example.

The company **FastGood Ltd.** Has identified that a new product has a *Lucrative Potential Market* and *Compelling Market Size Potential* at the Concept/Idea stage of the NPD process. Accordingly, the project was moved on to the next stage of development.

At the Evaluation stage the firm gave the product *Senior Management Endorsement*, especially given the *Superior* level of *Consumer Fit*. The product continued to show signs of a *Lucrative Potential Market*. There was a *Clearly Defined Promotional Plan*, following a *Product-Led* and *Market Attack Strategy* with a *Clearly Defined Brand Strategy*. There was a good prospect of *Likely Trade Adoption*, consumers for this product showed little *Resistance to Brand Switching* and the product had *Tangible Technological Advantages*. Since the project satisfies the comprehensive range of screening dimensions, it is moved through to the next stage of development.

At the Development stage the product shows continuing signs of having a *Lucrative Potential Market*. However, the majority of the dimensions thus far have reflected screening from within the organisation, with some reflection on the consumer. Having introduced the trade as a part of the screening decision at the Evaluation stage, the Development stage places the trade as a crucial element of the screening decision. Having undertaken a substantial proportion of development on the potential new product, it is now essential that the level of *Likely Trade Adoption* is assessed for the potential new product. If there is any question of the *Likely Trade Adoption*, then further development and investment may ultimately prove fruitless. This dimension cannot be understated in the UK *fmcg* sector. As has already been noted, UK retailers play a major role in defining future category and new product developments (section 2.7.1.2).

6.3.3.2 Moderate Impact Dimensions

The first dimension to lay a moderate role in discriminating between the two groups of projects is *Clearly Identified Brand Strategy* (0.495). This dimension has a moderate impact at the Evaluation and Development stages of the NPD process. It highlights the necessity for new brands to have clear evidence of their future development and how they fit in with current and future product portfolios, market segments and competitors.

The second dimension to play a moderate role in screening at this stage is *Senior Management Endorsement* (0.479). The inclusion of this dimension, as with the previous stage of development, shows the extent to which the 'gut-feel' of senior management is ingrained in new *fmcg* products. *Senior Management Endorsement* must be courted throughout the 'mid' stages of product development. This will ensure that this potential new product wins the necessary internal battles to secure adequate investment and internal organisational momentum and enthusiasm.

A *Market Attack Strategy* (0.465), again, plays a crucial role in the screening decision as it did at the previous Evaluation stage. This 'aggressive' strategy of increasing competition in a market and attacking category share may reflect a preference for new products that promote confident and bold statements of intent for the managers and organisations involved.

The fourth dimension to play a moderate role in the screening decision and one that has not been found to impact on any of the previous two stages of development is *Support Resource Fit* (0.439). This dimension provides another measure of new product compatibility reflecting championing and marketing support services. At this crucial mid-stage of development, fit with these support elements of the potential new product will further cement the desirability of the new product.

The dimension *Superior Consumer Fit* (0.422) continues to play a role in discriminating between projects at the Development stage as it did at the previous Evaluation stage. However, this dimension has a reduced impact on the screening decision. It may be that having addressed *Superior Consumer Fit* as a major discriminator of project *acceptance* at the Evaluation stage, the development team are more inclined to use this dimension in a supporting way at this Development stage.

The final dimension to have a moderate impact on the screening decision at this third stage of development has also not been found to be involved in either of the previous two stages. The dimension is *Clear Product Definition* (0.408). It is interesting that as the project nears commercialisation, the clarity of the product proposition becomes a crucial factor when assessing a potential new product for future development. This is supported by the importance, noted above, of a *Clearly Identified Brand Strategy*. It is only the products with clear definition and future strategy that will inspire enough confidence to justify the investment decisions that are sure to accompany a move onto the final Pre-Launch stage of development.

6.3.3.3 Lower Impact Dimensions

The first dimension to play a reduced role in the screening decision is *Clearly Defined Promotional Plan* (0.382). This dimension continues to provide discriminatory power between *accepted* and *rejected* projects, albeit at a lower level than the previous stage. Elements of the product proposition continue to provide good evidence of new product potential.

Compelling Market Size Potential (0.356) acts as a supporting screening dimension at this stage having been a primary discriminator of project *acceptance* at the Concept/Idea stage. As with the dimension *Clear Product Definition* it makes good conceptual sense that an organisation would want to confirm the market size potential before embarking on the resource intensive Pre-Launch stage.

The third dimension to play a supporting role in the screening decision is *Product-Led Strategy* (0.351). This strategic dimension works in tandem with the already identified high impact dimension *Market Attack Strategy* as suggested at the previous stage (section 6.3.2.2). The combination of a new product that exhibits *Market Attack* and *Product-Led Strategies* combines the best features of technical benefit and market application leading to the product being a prime candidate to be *accepted* for further development.

The final dimension to play a role in product screening at this Development stage and one that has not been incorporated in any other stage is *Global Product Compatibility* (0.317). This dimension reflects the ability of the product to carry across to other markets and other languages and is a timely reminder of the increasingly global nature of the *fmcg* sector. In terms of the application of this dimension in a screening decision, a potential new product that is compatible with some or all of the organisations export markets may offer a more attractive prospect for the investment of scarce development resources.

6.3.4 Stage 4 - Pre-Launch Stage

Results from the final Mann-Whitney *U* test (Table 5.38) showed that 10 of the 32 uncovered screening dimensions showed evidence of significant differences between *accepted* and *rejected* projects at the Pre-Launch stage ($p < 0.05$). These dimensions were; *Superior Consumer Fit* (PDA2), *Clearly Defined Promotion Plan* (PP1), *Sizeable New Technology Requirement* (PNTF2), *Clear Product Definition* (PC1), *Likely Trade Adoption* (TS2), *Compelling Market Size Potential* (NOTM2), *Lucrative Potential Market* (FP1), *Direct Response Strategy* (MS1), *Clearly Identified Brand Strategy* (PB1) and *Global Product Compatibility* (PB3).

These 10 dimensions span all four of the ***Project***, ***Synergy***, ***Market*** and ***Branding*** sections of the original questionnaire. They were entered simultaneously into a single canonical discriminant function which correctly classified 97.7% of the projects in the analysis sample and correctly classified 94.3% of the projects in the cross-validation sample. For this Pre-Launch stage of the development process the degree of correct classification is greater than the 'chance' estimates of C_{MAX} and C_{PRO} although not at the 25% greater level as recommended by Hair *et al* (1998). As with the previous three discriminant functions, both Press's Q statistics are highly significant. This discriminant function incorrectly classifies *accepted* projects as *rejected* projects on no occasions but classifies two *rejected* projects as *accepted* projects at this Pre-Launch stage of the development process.

Of the 10 dimensions that were entered into the discriminant function, eight dimensions have discriminant loadings that are above the 0.30 threshold recommended by Hair *et al* (1998). This indicates that these dimensions play a significant part in discriminating between *accepted* and *rejected* projects at this Pre-Launch stage. These eight dimensions indicate that there are significant differences between *accepted* and *rejected* projects at this Pre-Launch stage of the process.

6.3.4.1 High Impact Dimensions

The dimension that has the largest influence on the screening decision is *Lucrative Potential Market* (0.686). This raw assessment of market attractiveness has been found to be a high impact dimension in the screening decision at all four stages of the development process. It is, therefore, vitally important in discriminating between *accepted* and *rejected* projects throughout the development process. This finding highlights the need for screening decisions to be 'financially-oriented' throughout the development process within an *fmcg* environment. This finding also highlights the crucial assessment of aggregate 'market potential' throughout product development and highlights it's place in *fmcg* screening.

The next dimension to have a high impact on the screening decision at this Pre-Launch stage is *Clearly Identified Brand Strategy* (0.650). As mentioned earlier, this dimension was found to be an important discriminator of project *acceptance* at all but the Concept/idea stage of development. This finding advocates the need for clear, long-term strategic direction for the brand from all but the earliest stage of the development process. Ensuring that this direction is clear and understood will improve the products chance of winning the internal battle for development resources and, hence, give the best possible chance for the potential new product to succeed post-commercialisation.

The third dimension to play a major role in the screening decision at this stage is *Likely Trade Adoption* (0.604). In a similar fashion as *Clearly Identified Brand Strategy*, this dimension has also been an important discriminator of project *acceptance* at all but the Concept/idea stage. This finding makes good conceptual sense. Having addressed the nature of the potential new product at the earliest stage of development, the *Likely Trade Adoption* dimension becomes of critical importance. This supports anecdotal evidence (section 2.7.1.2) suggesting that more NPD is performed with, and through, the retailer (Curtis, 1998). The importance of this *Likely Trade Adoption* dimension accurately models how *fmcg* suppliers have embraced the shift in marketing management towards category management and ECR principles which seek to align their marketing and new product development to retailers marketing objectives.

The next dimension to play a significant role in the screening decision at this stage is *Clearly Defined Promotion Plan* (0.508). This dimension is also important in the screening decision at all but the Concept/Idea stage of development. At the Pre-Launch stage this dimensions reflects short-term product and promotional mix elements for the potential new product. On a tactical level, for the project to be *accepted* through to market launch, it must exhibit a *Clearly Defined Promotion*

Plan. Failure to comply with this dimension is unlikely to require the potential new product to be eliminated from the organisation's product development portfolio, but would necessitate a rethink of the development timetable.

The final dimension to have a high impact on the Pre-Launch screening decision is *Clear Product Definition* (0.500). This dimension has been an important discriminator of project *acceptance* at the final two stages of the product development process. While product definition may be fluid and adaptable at the early stages of development, a *Clear Product Definition* becomes a crucial factor in securing development and launch funding. This dimension can be seen as something of a 'reality-check' to focus attention on the positioning strategy, consumer benefits, product features and target markets in question. It would be most irregular if a product were to have an unclear definition at such a late stage of the NPD process.

6.3.4.2 Moderate Impact Dimensions

Only one dimension is found to have a moderate influence on the screening decision at this stage of development, *Direct Response Strategy* (-0.433). As with *Resistance to Brand Switching* (Evaluation stage), this dimension has a negative impact on project outcome and is a 'barrier to project success' (Cooper, 1979a). It has not been found to discriminate between *accepted* and *rejected* projects at any of the other three stages of the development process.

This dimension suggests that managers responsible for new product decision making are sensitive to launching products in response to external environmental influences, such responding to competitor activity, trying to reverse a decline in category share or launching product to ensure category survival. This dimension suffers from negative associations. Managers are unlikely to admit that a product is purely a survival strategy but it must be acknowledged that this finding advocates caution when developing products with *Direct Response Strategies*.

6.3.4.3 Low Impact Dimensions

The final two dimensions that discriminate between *accepted* and *rejected* projects have a lesser impact on the screening decision. The first of these dimensions is *Superior Consumer Fit* (0.347). This dimension has already been identified as a high impact dimension at the Evaluation stage, a moderate impact dimension at the Development stage and now a low impact dimension at the Pre-Launch stage. The reduction in importance of *Superior Consumer Fit* could be explained in a number of ways. It could be argued that as the project nears completion and, therefore, commercialisation, the degree of *Consumer Fit* has already been fully assessed and, therefore, this assessment of *Superior Consumer Fit* is used as a final 'back-up' check. An alternative, and more concerning explanation could be that as the project nears completion, the investment of time and resources mean that it will be launched regardless of a final assessment of *Consumer Fit*. This latter explanation would corroborate the views expressed by Schmidt and Calantone (1998) and Balachandra (1984) who note the difficulty managers' face in terminating new product projects. They become emotionally involved to the extent that they are reluctant to terminate it even if there are clear signals that the project will be unsuccessful.

The final dimension to be incorporated in the screening decision at this stage is *Global Product Compatibility* (0.319). This dimension has been shown to have a lower, but meaningful, impact on project acceptance at the final two stages on the development process. The increasingly global nature of *fast moving consumer goods* means that the early identification of products with wider global appeal can facilitate their movement through the NPD process and provide large-scale incremental profit and market share benefits.

6.4 Assessment of Hypotheses

Having discussed the structure of the uncovered dimensions of screening within the *fmcg* sector and the nature of screening and evaluation at each stage of the development process, the final section will take the research findings and apply them to the specific research hypotheses proposed in chapter three (section 3.3). The chapter will discuss each hypothesis in turn and offer managerial implications from the findings of the research.

6.4.1 Hypothesis One. Screening in the *fmcg* Sector

This assessment addresses the research objectives one and two (section 3.2.5). We have identified an applicable and appropriate simplification of the new product development process in the *fmcg* sector. We have also identified 32 screening and evaluation criteria that are used in new product decision making within this sector. This phase of the analysis allows us to address the issues raised by hypothesis one. To recap, the hypothesis was formulated as follows;

H❶ The 11 groups of proposed screening criteria are composed of a larger set of underlying screening dimensions that differentiate between *accepted* and *rejected* projects in the *fmcg* sector.

The discussions of chapter 5, sections 5.3.1 to 5.3.11, and sections 6.2.1 to 6.2.11 of this chapter demonstrate that the 11 factor groupings presented in the research questionnaire (Table 3.4) are composed of 32 underlying screening dimensions. Accordingly we accept hypothesis ❶ and reject the null hypothesis that the screening decision is *not* made up of a larger set of underlying dimensions. Table 6.12 provides a summary of these 32 uncovered dimensions of screening for new *fmcg* products.

Table 6.12 Summary of Screening and Evaluation Dimensions

Factor Grouping	*Uncovered Dimensions*	*No. Scale Items*	*Scale α*
1. Product differential advantage (PDA)	1 *Tangible Technological Advantage*	5	0.81
	2 *Superior Consumer Fit*	5	0.82
	3 *Value Advantage*	2	0.45
2. Product promotion (PP)	1 *Clearly Defined Promotion Plan*	5	0.69
3. Product - newness to the firm (PNTF)	1 *Incremental Growth Opportunity*	3	0.79
	2 *Sizeable New Technology Requirement*	2	0.89
4. Product characteristics (PC)	1 *Clear Product Definition*	4	0.88
	2 *Production Readiness*	2	0.73
	3 *Predictable Development Pattern*	3	0.47
	4 *Low Risk of Failure*	2	0.54
5. Corporate synergy (CS)	1 *Commercial Fit*	5	0.87
	2 *Production Fit*	4	0.88
	3 *Senior Management Endorsement*	2	0.77
	4 *Communication Channel Fit*	3	0.65
	5 *Support Resource Fit*	3	0.64
6. Trade synergy (TS)	1 *Strong Trade Support*	2	0.92
	2 *Likely Trade Adoption*	2	0.81
7. Nature of the market (NOTM)	1 *Intensely Competitive Market*	3	0.71
	2 *Compelling Market Size Potential*	3	0.63
	3 *Resistance to Brand Switching*	2	0.70
	4 *Rapid Market Changeability*	2	0.60
	5 *Low Barriers to Market Entry*	2	0.41
8. Competitive and market intelligence (CAMI)	1 *Reliable Market Intelligence*	5	0.77
9. Financial potential (FP)	1 *Lucrative Potential Market*	7	0.85
	2 *Requires Significant Financial Investment*	1	N/A
10. Market strategy (MS)	1 *Direct Response Strategy*	4	0.62
	2 *Product-Led Strategy*	3	0.60
	3 *Market Attack Strategy*	2	0.57
	4 *Market-Led Strategy*	1	N/A
11. Product branding (PB)	1 *Clearly Identified Brand Strategy*	7	0.80
	2 *Brand Fit*	3	0.82
	3 *Global Product Compatibility*	2	0.69

6.4.1.1 Managerial Implications

In order to appreciate the implications of these findings it would be pertinent to recap some of the issues highlighted in chapter two (section 2.4) and address some of the criticisms levelled at traditional screening procedures.

Bart (1994) suggested that the blame for the failure to produce new product winners could be traced to the quality with which firms select and orchestrate their new product initiatives. Cooper and Kleinschmidt (1987a) also offer this view noting how firms invite failure on their new product projects largely because of the carelessness and lack of rigor with which they execute fundamental new product activities as market research, business-competitive analysis, and assessment of synergies.

This phase of the research project has sought to provide empirical evidence of the nature of screening and evaluation in the *fmcg* sector. This will ensure that the screening decision is accorded the appropriate importance in the product development process. The 32 uncovered dimensions adequately handle factors such as risk, opportunity costs, the relationship with other NPD projects, and non-monetary aspects of the process such as managerial support and organisational behaviour influences. A failure to account for these dimensions has been cited as a major failing of traditional screening procedures (Johne and Snelson, 1988).

The 32 uncovered dimensions allow for an emphasis to be placed on: (1) a need to address the manager's real decision problems in the context of his/her organisation, and (2) a need for efficient and easy to use models that are accurate enough to ensure management confidence, as recommended by Root and Pessemier (1973). The strength and validity of the 32 screening dimensions comes from the fact that they were derived from *current* NPD projects in the *fmcg* sector. Accordingly, they reflect accurate, real decisions in an easy to use model.

This investigation has not been affected by some of the problems associated with traditional retrospective research methodologies (section 2.7.3.1). The data provided by managers represents up-to-date screening decisions on current products. This improves the accuracy and relevance of the 32 uncovered screening dimensions and promotes the use of them within an organisational context.

The crucial benefit to be derived from the 32 uncovered dimensions is that they empirically reflect the day-to-day screening decisions that are being made by managers in the *fmcg* sector. In this respect, these dimensions are not being applied to a sector that they were not intended for. To answer Cooper and Kleinschmidt's (1986) criticisms of new product research (section 1.1) this study has not overlooked the obvious. It has not become too pre-occupied with issues of strategy, synergy, orientation and selecting the right technology and market areas. Instead it has focused on what happens during a new product project in the *fmcg* sector. It has investigated the strengths and weaknesses of the screening activities within the new product process and the impact these activities have on project outcome.

The dimensions that are employed in the new product screening decision will be key to project success (*acceptance*). This research project has addressed the need to examine more closely those actions or activities that make up the new product screening process.

6.4.2 Hypothesis Two. Screening Across Development Stages

Having uncovered the dimensions of screening and evaluation for new *fmcg* products we must now address those criteria that discriminate between *accepted* and *rejected* projects at each stage of the NPD process. This phase of the analysis addresses the issues raised by hypotheses two to six, each of which will be addressed in turn. Two tables are provided that summarise the screening dimensions found to be relevant at each stage of the development process. Table 6.13 groups the screening dimensions according to the high, moderate and low impact they have on the screening decision. Table 6.14 presents the same data in a slightly different format. This table demonstrates the movement of screening dimensions in and out of the decision making process according to development stage. The numbers associated with each screening dimension in this table represent the order of their importance in the screening decision. The discussion will now address hypotheses two to six.

Table 6.13 Crucial Screening Dimensions Across Development Stages

	❶ Concept/Idea stage	❷ Evaluation stage	❸ Development stage	❹ Pre-Launch stage
High	Lucrative Potential Market (0.828)	Senior Management Endorsement (0.573)	Lucrative Potential Market (0.598)	Lucrative Potential Market (0.686)
Impact	Compelling Market Size Potential (0.750)	Superior Consumer Fit (0.551)	Likely Trade Adoption (0.593)	Clearly Identified Brand Strategy (0.650)
Dimensions		Lucrative Potential Market (0.549)		Likely Trade Adoption (0.604)
0.5 and above		Clearly Defined Promotional Plan (0.533)		Clearly Defined Promotional Plan (0.508)
		Product-Led Strategy (0.509)		Clear Product Definition (0.500)
Moderate		Market Attack Strategy (0.493)	Clearly Identified Brand Strategy (0.495)	Direct Response Strategy (-0.433)
Impact		Clearly Identified Brand Strategy (0.419)	Senior Management Endorsement (0.479)	
Dimensions			Market Attack Strategy (0.465)	
0.4 - 0.5			Support Resource Fit (0.439)	
			Superior Consumer Fit (0.422)	
			Clear Product Definition (0.408)	
Low		Likely Trade Adoption (0.382)	Clearly Defined Promotional Plan (0.382)	Superior Consumer Fit (0.347)
Impact		Resistance to Brand Switching (-0.359)	Compelling Market Size Potential (0.356)	Global Product Compatibility (0.319)
Dimensions		Tangible Technological Advantage (0.310)	Product-Led Strategy (0.351)	
0.3 - 0.4			Global Product Compatibility (0.317)	

Table 6.14 Screening Dimensions Across Development Stages

❶ Concept/Idea stage		❷ Evaluation stage		❸ Development stage		❹ Pre-Launch stage
1. Lucrative Potential Market (0.828)	→	3. Lucrative Potential Market (0.549)	→	1. Lucrative Potential Market (0.598)	→	1. Lucrative Potential Market (0.686)
2. Compelling Market Size Potential (0.750)				10. Compelling Market Size Potential (0.356)		
		1. Senior Management Endorsement (0.573)	→	4. Senior Management Endorsement (0.479)		
		2. Superior Consumer Fit (0.551)	→	7. Superior Consumer Fit (0.422)	→	7. Superior Consumer Fit (0.347)
		4. Clearly Defined Promotional Plan (0.533)	→	9. Clearly Defined Promotional Plan (0.382)	→	4. Clearly Defined Promotional Plan (0.508)
		5. Product-Led Strategy (0.509)	→	11. Product-Led Strategy (0.351)		
		6. Market Attack Strategy (0.493)	→	5. Market Attack Strategy (0.465)		
		7. Clearly Identified Brand Strategy (0.419)	→	3. Clearly Identified Brand Strategy (0.495)	→	2. Clearly Identified Brand Strategy (0.650)
		8. Likely Trade Adoption (0.382)	→	2. Likely Trade Adoption (0.593)	→	3. Likely Trade Adoption (0.604)
		9. Resistance to Brand Switching (-0.359)				
		10. Tangible Technological Advantage (0.310)				
				6. Support Resource Fit (0.439)		
				8. Clear Product Definition (0.408)	→	5. Clear Product Definition (0.500)
				12. Global Product Compatibility (0.317)	→	8. Global Product Compatibility (0.319)
						6. Direct Response Strategy (-0.433)

Hypothesis two reflects the overall nature of screening and evaluation across process stages within the *fmcg* sector. To recap, hypothesis two was formulated as follows:

H❷ The criteria that differentiate between *accepted* and *rejected* projects in the *fmcg* sector are dynamic and change in importance over the NPD cycle.

Chapter 5 (sections 5.4) and sections 6.3 and tables 6.13 and 6.14 from the current chapter demonstrate that the screening dimensions that discriminate between *accepted* and *rejected* projects *do* differ at different stages of the development process. The discriminant functions identified that two (Concept/Idea stage), 10 (Evaluation stage), 12 (Development stage) and eight (Pre-Launch stage) dimensions discriminate between the two groups of projects. Accordingly we accept hypothesis ❷ and reject the null hypothesis. The criteria that discriminate between *accepted* and *rejected* projects *are* dynamic and *do* change over the life of the NPD cycle.

6.4.2.1 Managerial Implications

The ramifications of these findings are far reaching. Past literature highlights the crucial nature of the screening decision in identifying future new product successes (Cooper, 1993; Johne and Snelson, 1988; Balachandra, 1984; Mitchell and Hustad, 1981; Cooper, 1981). However, while many authors recommend that screening be viewed sequentially with decisions being based on development stages (Hultink and Robben, 1995; Johne and Snelson, 1988; Crawford, 1986; Ronkainen, 1985; Albala, 1975) few researchers have been able to empirically test this proposition.

The finding that screening dimensions *do* take account of the development stage means that managers may potentially be screening new products on criteria that do not adequately discriminate between those projects that are *accepted* and those that are *rejected*. Hence, the dimensions incorporated in the screening decision are failing to identify projects with the best chance of becoming future new product winners.

Further managerial implications will be addressed in more detail in the discussions of each stage of the development process to follow.

6.4.3 Hypothesis Three. Screening at the Concept/Idea Stage

Hypothesis three is the first hypothesis to make a specific assertion about the nature of the most important screening dimensions at the Concept/Idea stage of the new product development process. Hypothesis three was formulated as follows;

H❸ The criteria that most differentiate between *accepted* and *rejected* projects at the Concept/Idea stage are ***Market*** characteristics.

The discussions of chapter 5 (section 5.4.2.2.1) and section 6.3.1 of this chapter demonstrate that the dimensions that discriminate between the groups of *accepted* and *rejected* projects at the Concept/Idea stage of the development process are *Lucrative Potential Market* and *Compelling Market Size Potential.* These two dimensions were derived from the ***Market*** section of the original questionnaire. Accordingly we accept hypothesis ❸ that the dimensions that most differentiate between *accepted* and *rejected* projects at the Concept/Idea stage are ***Market*** characteristics (Table 3.4).

6.4.3.1 Managerial Implications

The two identified screening dimensions at the Concept/Idea stage have highlighted the essence of early new product screening. The fact that two ***Market*** based dimensions were found to discriminate between *accepted* and *rejected* projects at the Concept/Idea stage demonstrates that early new product screening is precarious in nature. This analysis has found that for 30 of the 32 uncovered dimensions, there were no significant differences between respondent's scores for *accepted* and *rejected* projects. Results from this initial stage of the development process sound a cautionary note for product development professionals. They applaud those managers who apply 'coarse', bare minimum screening dimensions, and question those who make new products jump through screening 'hoops' at the earliest stages of their development cycle. All too often controls can become quite stultifying. A really good idea may not need so many checks (Stagg *et al*, 1996).

This investigation has highlighted that intricate screening dimensions may simply not be necessary at the early stage of development. By employing two fundamental measures of *Lucrative Potential Market* and *Compelling Market Size Potential* managers are ensuring that all potential new products are given the best possible chance to develop into winners. The emphasis of this preliminary stage of screening should be to ensure that as many potential products remain in the development process as possible by *not* screening them out. The forthcoming screening stages will net those projects that are destined for failure long before they incur excess development costs (as will be shown in later stages of this discussion).

6.4.4 Hypothesis Four. Screening at the Evaluation Stage

Hypothesis four makes a specific assertion about the nature of the most important screening dimensions at the Evaluation stage of the new product development process. Hypothesis four was formulated as follows;

H❹ The criteria that most differentiate between *accepted* and *rejected* projects at the Evaluation stage are ***Market*** characteristics.

The discussions of chapter 5 (section 5.4.2.2.2) and section 6.3.2 of this chapter demonstrate that the dimensions that discriminate between the groups of *accepted* and *rejected* projects at the Evaluation stage of the development process are *Senior Management Endorsement, Superior Consumer Fit, Lucrative Potential Market, Clearly Defined Promotional Plan, Product-Led Strategy, Market Attack Strategy, Clearly Identified Brand Strategy, Likely Trade Adoption, Resistance to Brand Switching (-)* and *Tangible Technological Advantage*.

These 10 dimensions span the ***Project, Synergy, Market*** and ***Branding*** sections of the original questionnaire. Accordingly we reject hypothesis ❹ and accept the null hypothesis that the dimensions that most differentiate between *accepted* and *rejected* projects at the Evaluation stage are *not* solely ***Market*** characteristics (Table 3.4).

6.4.4.1 Managerial Implications

A crucial issue to note from this finding is that of the 10 dimensions found to play a significant role in screening and evaluation at this stage of the development process, only *Lucrative Potential Market* discriminates between *accepted* and *rejected* projects at both Concept/Idea and Evaluation stages. The dimensions found to discriminate between the two groups of projects at this stage follow on from the managerial implications of the previous stage of development (section 6.4.3.1). The 10 screening dimensions are more rigorous, covering the ***Project, Synergy, Market*** and ***Branding*** categories. The dimensions found to discriminate between *accepted* and *rejected* projects at this second stage of development further support the ethos of using few and coarse screening dimensions at the Concept/Idea stage. The coarse decision allows as many potential new products as possible to move through the first screening stage. Exercising a second, more rigorous and demanding decision at the Evaluation stage of the development process enhances the integrity of the process. The comprehensive nature of this second screening stage acts as a 'safety-net' to ensure that projects that may potentially fail are eased out of the development process before significant investment decisions are taken and scarce development resources wasted.

6.4.5 Hypothesis Five. Screening at the Development Stage

Hypothesis five makes a specific assertion about the nature of the most important screening dimensions at the Development stage of the new product development process. Hypothesis five was formulated as follows;

H❺ The criteria that most differentiate between *accepted* and *rejected* projects at the Development stage are ***Project*** characteristics.

The discussions of chapter 5 (section 5.4.2.2.3) and section 6.3.3 of this chapter demonstrate that the dimensions that discriminate between the groups of *accepted* and *rejected* projects at the Development stage of the NPD process are *Lucrative Potential Market, Likely Trade Adoption, Clearly Identified Brand Strategy, Senior Management Endorsement, Market Attack Strategy, Support Resource Fit, Superior Consumer Fit, Clear Product Definition, Clearly Defined Promotional Plan, Compelling Market Size Potential, Product-Led Strategy* and *Global Product Compatibility.*

These 12 dimensions spanned the ***Project***, ***Synergy***, ***Market*** and ***Branding*** sections of the original research questionnaire. Accordingly we reject hypothesis ❺ and accept the null hypothesis that the dimensions that that discriminate between *accepted* and *rejected* projects at the Development stage are *not* solely ***Project*** characteristics (Table 3.4).

6.4.5.1 Managerial Implications

In contrast with the first two stages, there are many more common dimensions that discriminate between *accepted* and *rejected* projects at the second and third stages of the process. Of the 12 dimensions incorporated into the screening decision at this Development stage, eight were also important in the screening decision at the Evaluation stage. However, the uncovering of four additional dimensions in this screening decision supports the central thesis of this research project, that the dimensions utilised in the screening decision *do* differ between stages.

The implication of this finding is that if a manager from **FastGood Ltd.** assesses potential new products on all 32 screening dimensions or uses the dimensions identified as being important at the Concept/Idea stage, he or she could potentially eliminate a project from the development portfolio that could have been the next Coca-Cola or KitKat. The cost to the organisation of the application of incorrect screening dimensions is reflected in the opportunity lost than the investment saved.

It is no fluke that this third stage of the development process utilises the most comprehensive screening decision of the three stages so far, covering ***Project, Synergy, Market*** and ***Branding*** categories. This series of screening decisions advocates a tentative commitment to potential new products. This requires an escalation of screening dimensions, in both rigour and coverage, as the project moves towards commercialisation. The screening process acts to provide support to the to investment decisions made as a project moves nearer to market launch.

6.4.6 Hypothesis Six. Screening at the Pre-Launch Stage

The final hypothesis, hypothesis six, makes a specific assertion about the nature of the most important screening dimensions at the Pre-Launch stage of the new product development process. Hypothesis six was formulated as follows;

H❻ The criteria that most differentiate between *accepted* and *rejected* projects at the Pre-Launch stage are ***Project*** characteristics.

The discussions of chapter 5 (section 5.4.2.2.4) and section 6.3.4 of this chapter demonstrate that the dimensions that discriminate between the groups of *accepted* and *rejected* projects at the Pre-Launch stage of the development process are *Lucrative Potential Market, Clearly Identified Brand Strategy, Likely Trade Adoption, Clearly Defined Promotion Plan, Clear Product Definition, Direct Response Strategy, Superior Consumer Fit* and *Global Product Compatibility.*

These eight dimensions span all four of the ***Project, Synergy, Market*** and ***Branding*** sections of the original questionnaire. Accordingly we reject hypothesis ❻ and accept the null hypothesis that the dimensions that differentiate between *accepted* and *rejected* projects at the Pre-Launch stage are *not* solely ***Project*** characteristics (Table 3.4).

6.4.6.1 Managerial Implications

A fundamental outcome from this investigation is that the formulation of hypotheses incorporating only the four major categories of screening (Table 3.4) was inadequate to provide an appropriate picture of screening decisions in the *fmcg* sector. The 32 uncovered screening and evaluation dimensions offer a more appropriate and applicable assessment of new product screening in this sector and will assist in the improvement of new product decision making. However, the framing of hypotheses in this manner has highlighted the difficulty managers must face in trying to adapt existing, academically derived screening models to their current organisational context, specifically in the *fmcg* sector.

The dimensions that are entered into the final screening decision are, in the main, incorporated in the decisions from the previous Evaluation and Development stages of the NPD process. The only newly introduced dimension was *Direct Response Strategy*, which was found to exhibit a negative impact on project outcome. What is apparent from the eight identified discriminators of project *acceptance* at this Pre-Launch stage is that the breadth and coverage of screening dimensions has been reduced. This screening decision incorporates a range of strategic and tactical dimensions that will effectively assess the potential of the new product. At this late stage of development, the bulk of the assessment has already taken place with only those products with the best chance of post-commercialisation success remaining. A glance at Figure 5.4 highlights the split of *accepted* and *rejected* projects at this Pre-Launch stage, indicating the vast reduction in the rate of project rejection.

6.5 Chapter Summary

Part one of this discussion chapter (section 6.2) has addressed the 32 uncovered dimensions of screening in the *fmcg* sector. It has highlighted that many of the original factor groupings were not uni-dimensional but composed of several sub-dimensions. The identification of specific sub-dimensions will assist managers in making reliable and appropriate screening decisions for new *fmcg* products.

It may prove to be significant that rather than applying a set of established industrial scales *en masse* to the *fmcg* sector, the current investigation saw fit to 'pool' as wide a range of empirical and anecdotal screening dimensions as possible. Only through such a pooling of dimensions could we uncover new sub-dimensions and advance current intelligence on the nature of new product screening and evaluation. This approach also suggests that when seeking to validate past research findings by replicating existing scales in new industries researchers should proceed with caution. The factor groupings used in the current study appear to be too general to provide managers in the *fmcg* sector with any meaningful guidelines on new product screening. It is through the decomposition of these scales that this research project offers its first significant contribution to the study of new product development.

Part two of this discussion chapter (section 6.3) has identified that the dimensions that discriminate between *accepted* and *rejected* projects differ at each stage of the development process in the *fmcg* sector. The findings highlight that the range of screening dimensions that are found to discriminate between the groups of projects increases between the Concept/Idea, Evaluation and Development stages of the NPD process. The final Pre-Launch screening is characterised by a range of screening dimensions spanning all four of the ***Project***, ***Synergy***, ***Market*** and ***Branding*** sections of the original questionnaire. These findings pose significant questions for the future of new product screening, specifically within the *fmcg* sector. This investigation rejects the notion that new product screening can be seen as a single decision at an early stage of development. Rather, it recommends that screening reflects the stage of development the project is at. By adopting a stage specific screening approach, managers can potentially make much faster, more appropriate and more accurate screening decisions.

The third and final part of this discussion chapter (section 6.4) has assessed hypotheses one to six. We accept hypothesis ❶ that the screening decision *is* made up of a larger set of underlying dimensions than the 11 factor groupings originally proposed. We accept hypothesis ❷ that the criteria that discriminate between *accepted* and *rejected* projects *are* dynamic and *do* change over the life of the NPD cycle. We accept hypothesis ❸ that the dimensions that most differentiate between *accepted* and *rejected* projects at the Concept/Idea stage *are **Market*** characteristics. However, we reject hypothesis ❹ and accept the null hypothesis that the dimensions that most differentiate between *accepted* and *rejected* projects at the Evaluation stage are *not* solely ***Market*** characteristics. We also reject hypothesis ❺ and accept the null hypothesis that the dimensions that that discriminate between *accepted* and *rejected* projects at the Development stage *are not* solely ***Project*** characteristics. Finally we reject hypothesis ❻ and accept the null hypothesis that the dimensions that differentiate between *accepted* and *rejected* projects at the Pre-Launch stage *are not* solely ***Project*** characteristics.

The final chapter will throw further light on the discussions of this chapter. Of considerable importance are the managerial implications from the findings of this research project and these will be summarised in this section. The final part of the conclusions chapter will look at limitations of the current study and present thoughts on opportunities for the future development of research into new product screening in the *fmcg* sector.

7 Chapter Seven
Conclusions

This final chapter will throw further light on the results presented in chapter five and the discussions of chapter six. The major findings of this research project are the managerial implications and these will be summarised in this chapter. The chapter goes on to offer an assessment of the limitations of the project and suggests some opportunities for future research in the field. The chapter and the thesis end with a final conclusion that draws together the major findings of this research project and places them within an overall framework of new product development decision making.

Chapter Seven - **Conclusions**

The previous chapter compared the 32 uncovered dimensions of new product screening with existing literature. Discussions placed each dimension within the *fmcg* context and reflected how their use would improve real new product decision making. The chapter then addressed those dimensions that are found to impact positively on project acceptance at each stage of the development process. It concluded with an assessment of hypotheses one to six and the managerial implications of the research findings.

These findings suggest that incremental insights can be gained in new product research by examining new solutions to current problems (Table 2.8). This project echo's the sentiments of Wind and Mahajan (1997). They hoped that better awareness of critical issues in NPD would improve understanding of whether the current market research tools and models can help the creation of new product winners and improve the effectiveness of the NPD process. By uncovering new dimensions of screening and evaluation we may improve the relevance and applicability of screening models to managers and take a step towards reversing their under-utilisation (section 2.4).

The major objective of this chapter is to synthesise the discussions presented within the thesis and offer informed conclusions from which academics and practitioners can improve new product screening procedures. The chapter concludes with an assessment of the limitations of the research project and offers guidance on potential areas for research development.

7.1 Summary of Research Findings

At this final summary stage of the research project, it is pertinent to assess the research findings with respect to the criticisms levelled at traditional screening procedures noted in chapter two (section 2.4).

This research project has uncovered 32 dimensions of screening that are specific to the *fmcg* sector, many of which are new to the screening literature. It has also identified that these dimensions *do* differ in their presence and importance at four stages of the development process. The project has confirmed the suspicions of Baker and Albaum (1986) that a great deal of information is *not* necessary for evaluating new product proposals at the idea screening stage. Also, the four screening stages proposed make more conceptual and operational sense than one big 'test'.

At the Concept/Idea stage two dimensions were found to discriminate between *accepted* and *rejected* projects and, hence, have an impact on the *Go/No-Go* decision.

❶ Concept/Idea stage

High Impact Dimensions ➔ Lucrative Potential Market
Compelling Market Size Potential

At the Evaluation stage ten dimensions were found to discriminate between *accepted* and *rejected* projects and, hence, have an impact on the *Go/No-Go* decision.

❷ Evaluation stage

High Impact Dimensions ➔ Senior Management Endorsement
Superior Consumer Fit
Lucrative Potential Market
Clearly Defined Promotional Plan
Product-Led Strategy

Moderate Impact Dimensions ➔ Market Attack Strategy
Clearly Identified Brand Strategy

Lower Impact Dimensions	➔ Likely Trade Adoption Resistance to Brand Switching (-) Tangible Technological Advantage

At the Development stage 12 dimensions were found to discriminate between *accepted* and *rejected* projects and, hence, have an impact on the *Go/No-Go* decision.

❸ Development stage

High Impact Dimensions	➔ Lucrative Potential Market Likely Trade Adoption
Moderate Impact Dimensions	➔ Clearly Identified Brand Strategy Senior Management Endorsement Market Attack Strategy Support Resource Fit Superior Consumer Fit Clear Product Definition
Lower Impact Dimensions	➔ Clearly Defined Promotional Plan Compelling Market Size Potential Product-Led Strategy Global Product Compatibility

At the final Pre-Launch stage of the development process, eight dimensions were found to discriminate between *accepted* and *rejected* projects and, hence, have an impact on the *Go/No-Go* decision.

❹ Pre-Launch stage

High Impact Dimensions	➔ Lucrative Potential Market Clearly Identified Brand Strategy Likely Trade Adoption Clearly Defined Promotional Plan Clear Product Definition
Moderate Impact Dimensions	➔ Direct Response Strategy(-)
Lower Impact Dimensions	➔ Superior Consumer Fit Global Product Compatibility

This process-specific conditional model will help focus the screening decision and, therefore, move the project along faster through the application of more targeted and stage specific screening dimensions. Those projects meeting the specific early evaluation criteria will be conditionally moved on to the next stage of development without having to 'jump through hoops'. This process still allows for the tentative commitment suggested by Cooper (1994) since later screening decisions take into account a broader range of rigorous screening dimensions. This process would optimise the early versus late information requirements since they are constructed from time dependent dimensions.

The evaluation dimensions selected and the answers demanded are commensurate with the quantity and quality of available data at each evaluation point (Albala, 1975) bearing in mind the fact that evaluating new products is a system not an act with the evaluating system evolving as the product evolves (Crawford, 1986).

This research project provides empirical support for the philosophy of evaluating new product ideas in a similar manner to a legal contest, as noted in chapter two (section 2.4) and recommended by Baker and Albaum (1986). In this philosophy, all parties (new product ideas) are considered innocent until proven guilty beyond a level of reasonable doubt. Thus, all new product ideas should be given as much chance to prove that they are good or successful ideas unless it can be demonstrated otherwise. This supports the assertion made in section 2.4 that early screening should be a cursory process targeted at identifying 'possible' future successes rather than identifying 'probable' successes.

A crucial outcome from this research project is that managers in the *fmcg* sector can now be made aware of *specific* screening dimensions that discriminate between *accepted* and *rejected* projects at each stage of the development process. This ensures that better *Go/No-Go* decisions can be made at each stage to enhance the efficacy of the firm's new product development process (Balachandra, 1984). Practitioners in today's dynamic environments can now redress the incongruity of using the same screening model in different environments (Albala, 1975) and for changing sets of *Go/No-Go* criteria (Hultink and Robben, 1995; Ronkainen, 1985). Managers can now take the findings of this project and devise a differentiated systematic screening process to take advantage of the changing characteristics of the various process stages (Albala, 1975). This will also take account of Muncaster's (1981) suggestion that the criteria used within new product screening should be weighted according to their instrumental importance in meeting company objectives.

This identified process of screening and evaluating new products can now be addressed in the light of the considerations offered by Cooper (1985).

1. The use of different screening dimensions at each stage of the development process allows for a truly tentative commitment in a sequential process.
2. The coarse nature of the identified dimensions of early screening and the complete and rigorous nature of latter stages embraces the required balance between *acceptance* and *rejection* errors.
3. The application of different dimensions at different stages takes into account the uncertainty and unavailability of data.
4. The 32 dimensions identified better reflect the day-to-day development activities in the *fmcg* sector, relating to multiple objectives and evaluation criteria.
5. The decomposition of 'aggregated' screening dimensions offers a more realistic decision aid and makes it much more applicable and amenable to management action.

Having summarised the findings of the research project it is important to also summarise the crucial managerial implications from the research findings.

7.2 Summary of Managerial Implications

Chapter 6 (section 6.4.1.1) highlighted the managerial implications to arise from the 32 uncovered dimensions of screening in the *fmcg* sector. This discussion highlighted two key points. First, that this project has identified key dimensions of new product screening that are specific to the *fmcg* sector. The second key point is that by sampling current new product projects this research project has by-passed problems associated with traditional retrospective new product methodologies. This ensures that the research findings accurately reflect new product decision making. It also ensures that the research findings reach a level of detail that will allow managers to apply the findings to their own decision making context. The implications of these two findings are that better, faster and more reliable screening decisions can be made using industry specific criteria. The identification of specific screening dimensions will ensure that firms are given the best possible opportunity to select and orchestrate their new product initiatives, thus improving the chance of selecting new product winners (Bart, 1994). It will also ensure that firms enhance the care with which they evaluate potential new products and improve the rigor of the selection process (Cooper and Kleinschmidt, 1987a).

Chapter six (sections 6.4.2.1, 6.4.3.1, 6.4.4.1, 6.4.5.1 and 6.4.6.1) then discussed the managerial implications arising from the identification of screening criteria that were important in the *Go/No-Go* decision at each stage of the NPD process. This discussion highlights that while past literature has identified the crucial nature of the screening decision in selecting new products, few researchers have empirically addressed this issue. Accordingly, many of the implications of this project have far reaching consequences for new product academics and practitioners alike.

The first major managerial implication from this section is that an intricate and complex range of screening dimensions may not be necessary at the first stage of development. Instead two key measures of *Lucrative Potential Market* and *Compelling Market Size Potential* will provide managers with a good indication of future product potential. The second managerial implication is that the second and third development stages exercise a more rigorous and demanding screening decision. This enhances the integrity of the whole process. The comprehensive nature of the second and third screening stages act as a 'safety-net' to ease potential product failures out of the development process before significant investment decisions are taken and scarce development resources wasted. The last major finding is that the dimensions that are entered into the final screening decision are generally incorporated in the decisions from the previous Evaluation and Development stages of the NPD process. The reduction in the breadth and coverage of screening dimensions has left a range of strategic and tactical dimensions that will effectively assess the potential of the new product at this late stage of development. The bulk of the screening and assessment work has already taken place with only those products with the highest likelihood of post-commercialisation success remaining.

This conclusion chapter has summarised both the research findings and managerial implications of those findings. It is now important to address the limitations of this investigation and offer some avenues for the development of research in the area.

7.3 Limitations of the Study

Many of the limitations of this research project have been discussed in specific chapters of this thesis. It is, however, important to reflect on some broad limitations of the study and the implications for future research.

The first limitation is reflected in the exploratory nature of this research project. Since little research time has been spent addressing the nature of new product screening within *fast moving consumer goods*, substantive theory could only be used to guide the project. This is apparent in the development of a simplified new product development process and also the pooling of screening and evaluation items to be used in the research questionnaire. However, detailed pre and pilot-testing stages provided sufficient validation of the adopted process and measures.

The second limitation of the study concerns the fact that the sample frame was not a probability sample but a judgement sample, selected for its ability to serve the research purposes (Churchill, 1995). While this selection procedure follows established works (Cooper and de Brentani, 1984; de Brentani and Dröge, 1985; de Brentani, 1986; de Brentani and Dröge, 1988) this raises the issue of generalisability. Since the selection procedure was not probability based, caution must be taken when generalising results across product categories. However, having acknowledged this methodological limitation, this investigation covered a broad range of product categories and included a wide variety of new product projects, thus, providing some justification for the application of the research findings to other *fmcg* categories.

The third limitation of this research project concerns the issue of sample sizes. As has already been acknowledged (section 5.4) the sample sizes of *accepted* and *rejected* projects at some stages of the development process are modest. However, methodological steps have been taken to minimise the effect of these modest sample sizes (section 5.4.1). By identifying those dimensions where significant differences exist between the groups of *accepted* and *rejected* projects, the onus is taken off the need for large sample sizes when using stepwise discriminant analysis. However, caution must again be recommended when interpreting or generalising the results of this investigation. Replication of this project with larger samples of *accepted* and *rejected* projects at each NPD stage would help validate the research findings.

A final limitation of this research project is that it does not address the success or failure of new *fmcg* products in the marketplace. The research project instead concentrates on the development of potential new product throughout the new product development process. In order for a product to be successful in the marketplace it must first have successfully negotiated its way through the NPD process. Implicit in this assumption is the awareness that a product cannot be successful if it has been screened out of the organisations development portfolio.

7.4 Recommendations for Future Research

The first recommendation for future research in this area directly addresses the issue of marketplace success and failure. By revisiting the database of *accepted* projects that were included in this study, one could assess how many of them have subsequently been launched onto the market, and how they have fared. This current study is the crucial first stage of assessing future project potential. Addressing those dimensions that discriminate between *accepted* and *rejected* projects through the development process is critical since if the project is screened out it will not get to the stage of market launch. However, an assessment of how projects fare once they are launched onto the market would give added value to this research and address the validity of the identified discriminators of new product *acceptance* at NPD stages.

The second recommendation for research in this area is covered in the limitations of the current project and refers to the importance of further large scale studies into the development of new *fmcg* products. These replications could be used to address the issue of whether the dimensions of new product screening and subsequent discriminators of *acceptance* at each stage of the development process are the same within different countries. Such a development would allow the different power of the trade (retailer) to be addressed in a country specific context. This would re-affirm the feeling that a better understanding of the factors affecting new product success would be gained by comparing firms in similar industries and countries that are similar in economic development (Mishra *et al*, 1996).

The third recommendation for research in this area is to undertake a longitudinal study of new *fmcg* projects across the development cycle. This would involve tracking of a large sample of new product projects from their conception to their conclusion. In this type of study the need would be to gain support and access from a series of organisations to track and measure a large sample of projects. This would ensure that a reasonable number of projects make it through to market launch, given the high rate of new product attrition.

A final recommendation for future research in the area would be to undertake a study large enough that one could assess whether the screening dimensions and subsequent discriminators of *acceptance* at each stage of the development process are the same for 'really new' versus 'incremental' product developments. At the recent 28th European Marketing Academy conference, Berlin, 25% of the new product development papers reflected the need to address issues relating to 'really new' versus 'incremental' product development.

7.5 Conclusions

The discussions and managerial implications of the research findings make it clear that we can *accept* our first two primary hypotheses. New product screening in the *fmcg* sector *is* composed of a larger set of dimensions than the 11 groups proposed. These dimensions differ in their ability to discriminate between *accepted* and *rejected* projects at each stage of the NPD process. However, we acknowledge that hypotheses three to six do not adequately reflect the nature of the screening decision at the four identified stages of the NPD process. Accordingly, more importance should be placed on appreciating the dimensions found to discriminate between *accepted* and *rejected* projects at each stage of the development process rather than the acceptance of refutation of the relevant hypotheses.

The decomposed nature of the uncovered screening dimensions ensures that they are appropriate and applicable to managers charged with new product decision making in the *fmcg* sector. The identification of those dimensions that discriminate between *accepted* and *rejected* projects at each stage of the development process ensures that management now have the intelligence from which better informed screening decisions can be made. However, the findings of this research project suggest that there is now considerable evidence to advocate a comprehensive re-think of the way academics and practitioners view new product screening. This project highlights that the use of a single, discrete decision at an early stage of development (section 2.4) is a wholly inadequate way of assessing the potential of a new product project. The findings of this project advocate the use of stage-specific dimensions that embrace the requirements of a comprehensive screening decision to assess future project potential. Ultimately, the understanding of how dimensions can and should be used to screen new product projects is central to the effective allocation of scarce development resources (Cooper and Kleinschmidt, 1990).

The corporate, regulatory mechanisms that pass for screening tools in many of today's organisations are designed to place financial constraints on the new product activities of managers. Such programmes are laudable, but may simply not be necessary. In terms of the impact on new product development, these schemes ensure that any innovative or maverick spirit is swiftly conquered for the greater good of reduced new product failure. Any manager who knows that his or her job may hang on the successful launch of a new product is hardly going to throw caution to the wind and attempt to find another Hooper's Hooch, Müller Twinpot or Sunny Delight. Instead, this process resigns the manager to incremental line extension, ensuring steady and predictable growth.

In terms of product innovation it has already been noted that to strive to eliminate failure from the NPD process is to misunderstand the nature of developing new product winners (section 1.1). Only through the failure of Persil Power could Lever Brothers' have developed Persil Tablets, a product that has seen them overtake Proctor and Gamble in the detergent wars for the first time in years (Milmo, 1999). New product failure is an inherent part of product development and should be accepted as an integral part of corporate learning. What is not acceptable, however, is unstructured and unplanned innovation, the like of which prevails in many of today's top *fmcg* organisations resulting in systematic new product failure. Corporate level regulatory mechanisms require football strikers to ask their managers where they should shoot when they get in front of goal. More rigorous screening and evaluation techniques, such as those proposed, ensure that when strikers get in front of goal they instinctively know where to put the ball.

This investigation provides valuable intelligence to address screening issues within manager's real decision problems, ensuring more efficient and easy to use models that are accurate enough to ensure management confidence (Pessemier and Root, 1973). The framework of screening dimensions proposed may liberate creativity by allowing managers to feel they can express ideas within the company and have systems and processes that allow them to get those ideas into the marketplace. New product success can never be guaranteed, but given the payoffs of a successful product innovation programme, there is certainly ample justification for paying more attention to the way managers conceive, select, develop and commercialise new products (Cooper and Kleinschmidt, 1986).

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Appendix 1 - Covering Letter

Tel: 0121 359 3611 Ext. 4609
E-mail: c.d.stagg@aston.ac.uk

<Address>

<Date>

Dear *<Name>*

Further to our telephone conversation of *<date>* I enclose a copy of our research questionnaire for you to complete. I would like to thank you for agreeing to take part in this investigation into consumer product development and ask if you could return your completed questionnaire in the pre-paid envelope provided within the next two weeks.

This questionnaire is part of a joint research initiative between Aston Business School and Warwick Business School investigating new product development within branded *fmcg* manufacturers. The project looks at the *criteria* managers use to evaluate new product projects and how the importance of these criteria may vary between different stages of the development process.

Your response will help us identify those evaluation criteria that are critical to the successful movement of a project through the stages of the development process and assist managers in the effective allocation of resources.

Once again, may I thank you for taking part in this research. Please do not hesitate to contact me if you require any further information.

Yours sincerely

Chris Stagg

Appendix 2 - Research Questionnaire

New Product Selection

Confidentiality statement

The data obtained by this questionnaire will only be used by Aston Business School for the purposes of academic research and no information provided will be attributed to persons in part or in full without their prior written consent.

Thank you for participating in this study of managers' new product development decisions. Please do not hesitate to contact me if you require any further information. Return your completed questionnaire in the pre-paid envelope to:

Chris Stagg
Research Institute
Aston Business School
Aston University
Birmingham, B4 7ET

Tel 0121 359 3611 Ext. 4609
Fax 0121 333 3871
E-mail c.d.stagg@aston.ac.uk

1. New product project overview

Please fill in the appropriate blanks

- Focus on two *specific* current or recent NPD projects that you have direct responsibility for, or are directly involved with (e.g. through project teams).
- One of these projects has proceeded through to the next stage of its development (*accepted project*), the other one has not (*rejected project*).

Please indicate the type of projects you have chosen? (e.g. new soap powder, new count-line)

Accepted project ______________________

Rejected project ______________________

New products range from the radically innovative to those displaying incremental changes. For the projects you identified in the previous question, please indicate which classifications they fit into. Tick *one* box only for each project.

Project classification	Accepted project	Rejected project
Category innovation products New products/brands, true innovation in a category, creates categories.	☐	☐
Equity transfer products Existing brand name extends to other products.	☐	☐
Competitive market entry Very similar to existing products within category.	☐	☐
Line extensions & improvements New flavours, forms, sizes, revitalises product or increases shelf space.	☐	☐
Temporary & seasonal items Product use is date or season specific.	☐	☐

Please indicate the category that best represents the stage of the NPD process which the *accepted project* is at and the stage at which the *rejected project* was discontinued. Tick *one* box only for each project.

Development process	Accepted project	Rejected project
Concept / Idea stage Concept generation, idea screening, focus groups, initial consumer views.	☐	☐
Evaluation stage Quantitative market evaluation, technical and production analysis, second screen.	☐	☐
Development stage Product development, in-house prototype testing, consumer testing, test mktng.	☐	☐
Pre-Launch stage Pilot production, pre-launch business analysis, market launch preparation.	☐	☐

2. Project characteristics

Please circle the appropriate number for the accepted AND rejected project

Please indicate the extent to which you *agree* or *disagree* with the following statements concerning the *accepted project* and the *rejected project*.

	Accepted project	Rejected project
	1 = *disagree* *5 =* *agree*	*1 =* *disagree* *5 =* *agree*
Product differential advantage		
We will be the first to introduce this product type to market	1 2 3 4 5	1 2 3 4 5
The product would:		
be a revolutionary innovation	1 2 3 4 5	1 2 3 4 5
be clearly differentiated from competitor products	1 2 3 4 5	1 2 3 4 5
achieve important technological strengths	1 2 3 4 5	1 2 3 4 5
make the firm a major entity in the category	1 2 3 4 5	1 2 3 4 5
be patentable	1 2 3 4 5	1 2 3 4 5
be of higher quality than what is on offer in the category	1 2 3 4 5	1 2 3 4 5
have different applications to competitors' products	1 2 3 4 5	1 2 3 4 5
be clearly superior to competing products in terms of meeting consumers' needs	1 2 3 4 5	1 2 3 4 5
be priced lower than competing products	1 2 3 4 5	1 2 3 4 5
clearly satisfy identified consumer needs	1 2 3 4 5	1 2 3 4 5
respond to changes in consumer needs & wants	1 2 3 4 5	1 2 3 4 5
be highly consistent with existing consumer values	1 2 3 4 5	1 2 3 4 5
Product promotion		
The product would have:		
a clear USP (unique selling proposition)		
consistent advertising support	1 2 3 4 5	1 2 3 4 5
constant brand development	1 2 3 4 5	1 2 3 4 5
attractive packaging	1 2 3 4 5	1 2 3 4 5
functional packaging	1 2 3 4 5	1 2 3 4 5
Product - newness to the firm		
The product would:		
be a new product class to the firm	1 2 3 4 5	1 2 3 4 5
serve new types of users' needs	1 2 3 4 5	1 2 3 4 5
require technologies that are new to the firm	1 2 3 4 5	1 2 3 4 5
require production processes that are new to the firm	1 2 3 4 5	1 2 3 4 5
place the firm in new competitive environments	1 2 3 4 5	1 2 3 4 5
use new consumer service and technical support	1 2 3 4 5	1 2 3 4 5
Product characteristics		
The product idea came to us from the marketplace	1 2 3 4 5	1 2 3 4 5
Product specifications were clear from the start of the project	1 2 3 4 5	1 2 3 4 5
The product is subject to political and social influences	1 2 3 4 5	1 2 3 4 5

	Accepted project *1 = disagree* *5 = agree*					Rejected project *1 = disagree* *5 = agree*				
The product would have:										
clearly defined target markets	1	2	3	4	5	1	2	3	4	5
consumer benefits that were clearly defined	1	2	3	4	5	1	2	3	4	5
a positioning strategy that was clearly defined	1	2	3	4	5	1	2	3	4	5
features that were clearly defined	1	2	3	4	5	1	2	3	4	5
features that would not change for a long time	1	2	3	4	5	1	2	3	4	5
predictable development patterns	1	2	3	4	5	1	2	3	4	5
long term relevance to consumers	1	2	3	4	5	1	2	3	4	5
production facilities that were geared up for launch	1	2	3	4	5	1	2	3	4	5
production volume that would meet predicted demand	1	2	3	4	5	1	2	3	4	5
low cost of reclaiming stocks in the event of failure	1	2	3	4	5	1	2	3	4	5
caused little damage to company reputation through failure	1	2	3	4	5	1	2	3	4	5
a variety of applications	1	2	3	4	5	1	2	3	4	5

3. Synergies

Please circle the appropriate number for the accepted AND rejected project

Please indicate the extent to which you *agree* or *disagree* with the following statements concerning the *accepted project* and the *rejected project.*

Corporate synergy	Accepted project *1 = disagree* *5 = agree*					Rejected project *1 = disagree* *5 = agree*				
The product would:										
fit the firm's present business	1	2	3	4	5	1	2	3	4	5
fit the firm's organisational set-up	1	2	3	4	5	1	2	3	4	5
fit the firm's managerial capabilities	1	2	3	4	5	1	2	3	4	5
fit top management's preferences	1	2	3	4	5	1	2	3	4	5
be aimed at the firm's current consumers	1	2	3	4	5	1	2	3	4	5
have competitors who were known and understood	1	2	3	4	5	1	2	3	4	5
use current sales and distribution channels	1	2	3	4	5	1	2	3	4	5
utilise current marketing research techniques	1	2	3	4	5	1	2	3	4	5
use current advertising	1	2	3	4	5	1	2	3	4	5
use current sales promotion techniques	1	2	3	4	5	1	2	3	4	5
utilise current consumer support resources	1	2	3	4	5	1	2	3	4	5
utilise current engineering and design resources	1	2	3	4	5	1	2	3	4	5
utilise current R&D resources	1	2	3	4	5	1	2	3	4	5
utilise current manufacturing experience	1	2	3	4	5	1	2	3	4	5
use current manufacturing plant & equipment	1	2	3	4	5	1	2	3	4	5
be strongly supported by senior management	1	2	3	4	5	1	2	3	4	5
have an internal company 'champion'	1	2	3	4	5	1	2	3	4	5
minimal 'line start-up' production problems	1	2	3	4	5	1	2	3	4	5

Trade synergy	Accepted project *1 = disagree 5 = agree*	Rejected project *1 = disagree 5 = agree*
It would be easy to get shelf space for this product	1 2 3 4 5	1 2 3 4 5
This product would have strong trade support	1 2 3 4 5	1 2 3 4 5
The firm has strong relationships with the trade	1 2 3 4 5	1 2 3 4 5
The company has important goodwill and reputation at the trade level	1 2 3 4 5	1 2 3 4 5

4. Market characteristics

Please circle the appropriate number for the accepted AND rejected project

Please indicate the extent to which you *agree* or *disagree* with the following statements concerning the *accepted project* and the *rejected project.*

Nature of the market	Accepted project *1 = disagree 5 = agree*	Rejected project *1 = disagree 5 = agree*
We are the dominant organisation in this category	1 2 3 4 5	1 2 3 4 5
Consumers are loyal to competitors' products	1 2 3 4 5	1 2 3 4 5
Potential consumers are very satisfied with the competitors products they are using	1 2 3 4 5	1 2 3 4 5
Competitors launch new products frequently in this category	1 2 3 4 5	1 2 3 4 5
Users' needs change quickly in this category	1 2 3 4 5	1 2 3 4 5
This product category would be important to the trade	1 2 3 4 5	1 2 3 4 5
Competing products are not strategically important to owners	1 2 3 4 5	1 2 3 4 5
The product would have:		
a mass market	1 2 3 4 5	1 2 3 4 5
a geographically large market	1 2 3 4 5	1 2 3 4 5
aggressive competition	1 2 3 4 5	1 2 3 4 5
competing products that were very similar to each other	1 2 3 4 5	1 2 3 4 5
an intensely price competitive market	1 2 3 4 5	1 2 3 4 5
many competitors in this market	1 2 3 4 5	1 2 3 4 5
legislation influencing design and testing	1 2 3 4 5	1 2 3 4 5
weak competitors in this market	1 2 3 4 5	1 2 3 4 5
stable demand	1 2 3 4 5	1 2 3 4 5
consumers who are amenable to trying new products	1 2 3 4 5	1 2 3 4 5
low risk of cannibalising other of own firms products	1 2 3 4 5	1 2 3 4 5
Competitive and market intelligence		
We understand the consumer's behaviour	1 2 3 4 5	1 2 3 4 5
We know what consumers will pay for the product	1 2 3 4 5	1 2 3 4 5
We know how competitors will react to this product launch	1 2 3 4 5	1 2 3 4 5
Consumer requirements can be predicted	1 2 3 4 5	1 2 3 4 5
Demand would be easy to forecast	1 2 3 4 5	1 2 3 4 5

Financial potential	Accepted project *1 = disagree* … *5 = agree*					Rejected project *1 = disagree* … *5 = agree*				
ROI potential would be high	1	2	3	4	5	1	2	3	4	5
Sales growth potential would be high	1	2	3	4	5	1	2	3	4	5
Market share potential would be high	1	2	3	4	5	1	2	3	4	5
There would be a positive economic climate in this market	1	2	3	4	5	1	2	3	4	5
This product would require significant financial investment	1	2	3	4	5	1	2	3	4	5
This product would offer high profit margins	1	2	3	4	5	1	2	3	4	5
This would be a profitable category for the trade	1	2	3	4	5	1	2	3	4	5
This product has high probability of commercial success	1	2	3	4	5	1	2	3	4	5
Market strategy										
The product would:										
be launched to hold category share	1	2	3	4	5	1	2	3	4	5
represent a survival strategy	1	2	3	4	5	1	2	3	4	5
replace a current product	1	2	3	4	5	1	2	3	4	5
represent a technological enhancement	1	2	3	4	5	1	2	3	4	5
help increase the firm's category share	1	2	3	4	5	1	2	3	4	5
be launched in response to competitor activity	1	2	3	4	5	1	2	3	4	5
be launched to make the category difficult for competitors	1	2	3	4	5	1	2	3	4	5
have lower costs than existing products	1	2	3	4	5	1	2	3	4	5
improve the firm's reputation in society	1	2	3	4	5	1	2	3	4	5
be launched to create a range of product offering	1	2	3	4	5	1	2	3	4	5
appease consumers demanding innovation	1	2	3	4	5	1	2	3	4	5

5. Branding characteristics

Please circle the appropriate number for the accepted AND rejected project

Please indicate the extent to which you *agree* or *disagree* with the following statements concerning the *accepted project* and the *rejected project.*

Product branding	Accepted project *1 = disagree* … *5 = agree*					Rejected project *1 = disagree* … *5 = agree*				
An existing brand would be used for the new product	1	2	3	4	5	1	2	3	4	5
The brand name for the new product is a leading brand	1	2	3	4	5	1	2	3	4	5
The new product fits well with products of the same brand	1	2	3	4	5	1	2	3	4	5
The branded product would:										
be differentiated from other products in the firm's portfolio	1	2	3	4	5	1	2	3	4	5
fit well with other products in the company portfolio	1	2	3	4	5	1	2	3	4	5
convey differentiation from competitors	1	2	3	4	5	1	2	3	4	5
establish a distinct segment to target	1	2	3	4	5	1	2	3	4	5
be easily registered as a trademark	1	2	3	4	5	1	2	3	4	5
be relevant within the product category	1	2	3	4	5	1	2	3	4	5

	Accepted project *1 = disagree* … *5 = agree*	Rejected project *1 = disagree* … *5 = agree*
be easily recognised	1 2 3 4 5	1 2 3 4 5
ensure easy product recall by consumers	1 2 3 4 5	1 2 3 4 5
carry across to other markets	1 2 3 4 5	1 2 3 4 5
carry across to other languages	1 2 3 4 5	1 2 3 4 5

Please note any evaluation criteria we didn't ask you about and rate them accordingly by circling the appropriate number for the *accepted* AND *rejected* project.

	Accepted project *1 = disagree* … *5 = agree*	Rejected project *1 = disagree* … *5 = agree*
✍	1 2 3 4 5	1 2 3 4 5
✍	1 2 3 4 5	1 2 3 4 5

6. Background information

Please tick the appropriate boxes and / or fill in the appropriate blanks

Functional responsibility

- Marketing ☐
- Sales ☐
- R & D / Design ☐
- Finance / Accounting ☐
- General management ☐
- Other ________________

Management level

- Director (including CEO) ☐
- Senior management ☐
- Middle management ☐
- Line management ☐
- No management responsibility ☐

For what markets were the products identified earlier being developed?	Accepted project	Rejected project
Global	☐	☐
Regional (e.g. Europe, Nth America etc)	☐	☐
International (e.g. several national markets)	☐	☐
National	☐	☐

The following questions concern the Strategic Business Unit (SBU) or Operating Division in which you work. Please complete with respect to *that operating unit.*

- How many people are employed in your SBU? (FTE) ______________
- What was the sales turnover for your SBU in 1997? £ ______________
- What is the nationality of your Parent company? ______________
- What would be the length of a typical NPD lifecycle for a successful project in your SBU? ______________ months

7. Follow-up

Please tick the appropriate box and / or fill in the appropriate blanks

Thank you for completing the above questionnaire. It would be of great value to this study if the same questions could be applied to the successful project *later on in the development process* by completing the questionnaire again at the next stage of evaluation.

Would you be prepared to participate in a follow up to this questionnaire?

Yes ☐ No ☐

If you answered **YES**

Please provide us with the following information to allow us to process the follow-up questionnaire with the minimum of inconvenience to yourselves and to help identify the project concerned. This information will only be used for these purposes and will be treated in STRICT CONFIDENCE.

Under what internal name is the accepted project (identified earlier) being developed?

____

Name ______________________________

Title ______________________________

Company ______________________________

Telephone ______________________________

Thank you for completing this questionnaire.

Chris Stagg
Research Assistant
Aston Business School

Professor John Saunders
Head of School
Aston Business School

Dr Veronica Wong
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Appendix 3 - Pre-Test, Project Proposal

A Study of Success Criteria in Consumer New Product Development Projects

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Introduction

Academic literature in the field of new product development has concentrated on factors that are critical to new product success and failure, thus pinpointing what differentiates between winners and losers. These studies have sought to positively influence managerial performance in new product development on the basis of the high product failure rates reported by academic research (60-90%).

Many studies looking at new product success and failure investigate the past performance of new products, eliciting responses from managers responsible for NPD decision making. Concerns are raised over the validity of *self-reported* data and how differences in cultures and people's perceptions affect the magnitude of scores given to project success measures.

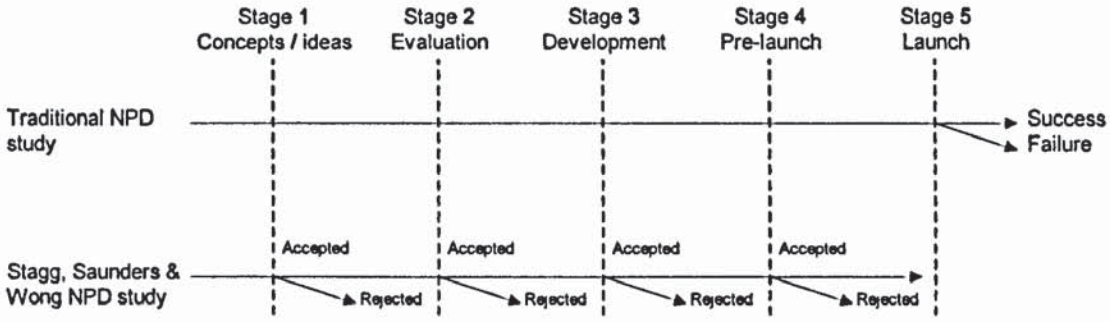
Proposed Research

The proposed research will measure the importance of different project evaluation criteria at different stages of the new product development process. The research will investigate whether there is a shift in the importance of particular success criteria as the project moves between process stages. It is reasonable to hypothesise that the evaluation criteria that are critical for the successful movement of a project from idea generation through to preliminary assessment will be very different from those needed to move the project from development to launch. Understanding the dynamics involved in the changing importance of success criteria will be of vital importance for management to effectively focus attention and allocate resources at critical activities in the process.

Key Requirements for the Study

1. Gain understanding of the process of NPD within major consumer product organisations.
2. Clarify discreet stages within the NPD process.
3. Determine / confirm those criteria used to evaluate projects in consumer new product development.
4. Determine whether the same evaluation criteria are applied at each stage of the development process and if the importance of criteria changes according to the stage of development.
5. Measure the NPD cycle times involved (idea generation to launch).

Figure 1 - NPD Process - simplification



By making a simplification of the process of new product development (Figure 1), 3 or 4 key stages may be identified at which key evaluation criteria can be measured. Projects will be classified as *'accept'* or *'reject'* based on their ability to pass through to the next stage of their development.

This type of tracking study will enable us to bring to light important features of those products that are not commercially launched. Whilst these projects have failed in their bid to reach commercialisation they may have successfully passed through some stages of product development prior to their failure. Understanding the factors behind their failure can only be derived from a comparison of the successful and failed stages. This will assist management in the possible re-work of failed ideas.

The research will take cross-sectional samples of consumer new product projects at particular stages of their development lifecycle. Managers close to the projects will measure the importance of different evaluation criteria at that particular stage of product development. The study will measure different projects at differing stages of development.

A more thorough understanding of how success criteria can and should be used to screen new product projects is central to the effective allocation of scarce development resources. New product success can never be guaranteed, but given the payoffs of a successful product innovation programme, there is certainly ample justification for directing more attention to the way managers conceive, develop and commercialise new products.

Appendix 4 - **Reminder Letter**

Tel: 0121 359 3611 Ext. 4609
E-mail: c.d.stagg@aston.ac.uk

<Address>

<Date>

Dear *<Name>*

A few weeks ago I sent you a copy of a research questionnaire that was looking at new product development within *fast moving consumer good* manufacturers. To date I have not received your response. I hope that you do not mind this reminder since I appreciate that you are very busy. If you do get the opportunity to complete the questionnaire in the next week or two I would be very grateful. Please do not hesitate to contact me if you have any questions about the research we are undertaking.

In anticipation, thank you for your valuable time and assistance.

Yours sincerely

Chris Stagg

Appendix 5 - **Final Reminder Letter**

Tel: 0121 359 3611 Ext. 4609
E-mail: c.d.stagg@aston.ac.uk

<*Address*>

<*Date*>

Dear <*Name*>

Some time ago you were kind enough to agree to take part in our study of new product development within branded *fast moving consumer goods*. I appreciate that you are busy but I would like to reiterate that your views are still very important to our research and we would be grateful if you could take the time to complete the enclosed questionnaire. I would be grateful if you could respond within the next week or two. Please do not hesitate to contact me if you have any questions about the research we are undertaking.

In anticipation, thank you for your valuable time and help.

Yours sincerely

Chris Stagg

Appendix 6 - Follow-Up Letters

Tel: 0121 359 3611 Ext. 4609
E-mail: c.d.stagg@aston.ac.uk

<Address>

<Date>

Dear *<Name>*

Many thanks for your response and completed questionnaire. Your assistance is of great value to our research. We are also grateful for your help in agreeing to complete a follow-up questionnaire. This will consist of a questionnaire containing the same set of questions, but will only be applied to your choice of *accepted project* ***<accepted project name>***. The questionnaire should be completed when this project has reached the next stage of the new product development process ***<next development stage>.***

I anticipate that the project will have moved on to this next stage of development around ***<note appropriate date>*** and will, therefore, be in contact with you at that time. If this timing is not realistic I would be grateful if you would let me know of a more suitable time to get in touch. If you would like any further information please do not hesitate to contact me.

Once again, thank you for your valuable time and assistance.

Yours sincerely

Chris Stagg

Tel: 0121 359 3611 Ext. 4609
E-mail: c.d.stagg@aston.ac.uk

<Address>

<Date>

Dear *<Name>*

Some time ago you were kind enough to complete a questionnaire for us concerning the evaluation of new product projects within your organisation. At that time you also kindly agreed to complete a follow-up questionnaire when the project you chose as your accepted project had moved on to the next stage of it's development.

The following questionnaire should only be applied to your choice of *accepted project **<accepted project name>***. The questionnaire should only be completed when this project has reached the next stage of the new product development process ***<next development stage>*** or any later stage. If the project has not yet reached this stage of development I would be grateful for you to wait until it has before completing the questionnaire.

We are very grateful for your help in this research. Should you require any further information please do not hesitate to contact me.

Once again, thank you for your valuable time and assistance.

Yours sincerely

Chris Stagg

Appendix 7 - **Follow-Up Reminder Letter**

Tel: 0121 359 3611 Ext. 4609
E-mail: c.d.stagg@aston.ac.uk

<*Address*>

<*Date*>

Dear <*Name*>

Some time ago you were kind enough to agree to complete a follow-up questionnaire for us concerning the evaluation of new product projects within your organisation. To date we have not received your response. I hope that you do not mind this reminder since I appreciate that you are very busy. If you do get the opportunity to complete the questionnaire in the next week or two I would be very grateful.

The questionnaire should only be applied to your choice of *accepted project* ***<accepted project name>***. The questionnaire should only be completed when this project has reached the next stage of the new product development process ***<next development stage>***. We are very grateful for your help in this research. Should you require any further information please do not hesitate to contact me.

Once again, thank you for your valuable time and assistance.

Yours sincerely

Chris Stagg

Appendix 8 - Bivariate Correlations, Screening Dimensions

Bivariate Correlations between Screening and Evaluation Dimensions

	pda_1	pda_2	pda_3	pp_1	pntf_1	pntf_2	pc_1	pc_2	pc_3	pc_4	cs_1	cs_2	cs_3	cs_4	cs_5	ts_1
pda_1	1															
pda_2	0.369	1														
pda_3	-0.102	-0.024	1													
pp_1	0.457	0.653	-0.091	1												
pntf_1	0.223	0.285	0.009	0.313	1											
pntf_2	0.451	0.171	-0.099	0.246	0.350	1										
pc_1	0.268	0.662	-0.057	0.606	0.228	0.154	1									
pc_2	-0.013	0.210	0.103	0.195	-0.112	-0.096	0.340	1								
pc_3	0.077	0.203	0.102	0.097	0.020	0.025	0.308	0.138	1							
pc_4	-0.196	-0.012	0.125	-0.084	0.045	-0.094	0.038	0.161	0.066	1						
cs_1	-0.110	0.102	-0.050	0.082	-0.325	-0.185	0.160	0.358	0.186	0.053	1					
cs_2	-0.368	-0.045	0.131	-0.109	-0.305	-0.673	-0.021	0.306	0.021	0.256	0.414	1				
cs_3	0.157	0.318	-0.080	0.371	-0.026	0.045	0.334	0.300	0.098	-0.104	0.477	0.113	1			
cs_4	-0.100	-0.147	0.057	-0.167	-0.289	-0.180	-0.114	0.108	0.155	0.080	0.465	0.278	0.193	1		
cs_5	0.106	0.249	0.003	0.356	0.012	0.029	0.359	0.205	0.134	0.051	0.474	0.187	0.353	0.316	1	
ts_1	0.054	0.149	0.004	0.196	0.007	-0.038	0.165	0.271	0.111	-0.042	0.370	0.186	0.184	0.247	0.272	1
ts_2	0.257	0.363	-0.043	0.390	0.059	0.104	0.288	0.239	0.179	-0.060	0.250	0.021	0.378	0.222	0.238	0.317
notm_1	-0.126	-0.023	0.206	-0.090	-0.097	0.026	-0.015	0.027	0.102	-0.039	0.115	0.098	-0.003	0.102	0.086	0.177
notm_2	0.165	0.318	-0.072	0.372	0.045	0.145	0.375	0.231	0.171	-0.083	0.311	0.057	0.250	0.054	0.314	0.396
notm_3	0.015	-0.010	0.118	-0.009	0.125	-0.029	0.097	-0.006	0.198	-0.043	-0.057	0.035	-0.043	-0.004	0.036	-0.016
notm_4	-0.062	0.057	0.131	0.001	0.012	-0.053	-0.026	-0.063	0.000	0.164	-0.079	0.015	-0.179	-0.055	0.051	-0.058
notm_5	-0.091	-0.176	0.177	-0.281	-0.065	-0.047	-0.170	0.101	0.044	0.183	-0.036	0.107	-0.052	0.048	-0.125	-0.122
cami_1	0.027	0.288	0.088	0.218	-0.036	-0.006	0.404	0.303	0.334	0.098	0.352	0.204	0.325	0.142	0.152	0.256
fp_1	0.341	0.571	-0.027	0.528	0.238	0.135	0.523	0.293	0.166	0.090	0.215	0.070	0.415	-0.003	0.291	0.274
fp_2	0.463	0.272	-0.110	0.425	0.272	0.451	0.288	0.054	0.118	-0.177	-0.122	-0.483	0.145	-0.185	0.118	0.054
ms_1	-0.131	-0.120	0.173	-0.204	-0.248	-0.101	-0.185	-0.018	0.079	-0.006	0.084	0.083	-0.049	0.168	-0.077	-0.070
ms_2	0.231	0.359	-0.029	0.286	0.373	0.115	0.240	-0.041	0.060	0.055	0.044	-0.054	0.185	0.021	0.072	0.071
ms_3	0.224	0.342	-0.067	0.325	0.059	0.128	0.286	0.026	0.221	-0.039	0.233	-0.114	0.290	0.084	0.203	0.182
ms_4	-0.031	0.209	-0.039	0.053	0.177	-0.022	0.148	-0.025	0.231	0.021	0.030	0.015	-0.026	0.060	-0.009	0.058
pb_1	0.376	0.562	-0.069	0.584	0.298	0.147	0.600	0.308	0.125	0.053	0.139	0.001	0.393	-0.045	0.334	0.215
pb_2	-0.065	-0.011	-0.011	-0.028	-0.151	0.081	0.051	0.138	0.142	-0.025	0.194	0.085	0.098	0.216	0.210	-0.003
pb_3	0.161	0.187	-0.031	0.240	0.188	0.067	0.084	0.104	0.041	0.002	0.019	0.035	0.127	-0.022	0.083	0.086

	ts_2	notm_1	notm_2	notm_3	notm_4	notm_5	cami_1	fp_1	fp_2	ms_1	ms_2	ms_3	ms_4	pb_1	pb_2	pb_3
pda_1																
pda_2																
pda_3																
pp_1																
pntf_1																
pntf_2																
pc_1																
pc_2																
pc_3																
pc_4																
cs_1																
cs_2																
cs_3																
cs_4																
cs_5																
ts_1																
ts_2	1															
notm_1	-0.044	1														
notm_2	0.360	0.315	1													
notm_3	-0.079	0.275	0.096	1												
notm_4	0.010	0.276	0.086	0.137	1											
notm_5	0.009	-0.172	-0.195	-0.189	-0.075	1										
cami_1	0.347	0.214	0.358	0.021	0.020	-0.035	1									
fp_1	0.493	-0.080	0.405	-0.025	0.007	-0.101	0.381	1								
fp_2	0.189	0.018	0.264	0.073	0.056	-0.125	0.084	0.257	1							
ms_1	-0.045	0.181	-0.080	0.004	0.172	0.119	0.088	-0.194	-0.075	1						
ms_2	0.206	-0.108	0.149	-0.075	0.112	-0.079	0.112	0.391	0.076	-0.006	1					
ms_3	0.274	0.004	0.334	-0.075	0.042	-0.197	0.257	0.455	0.268	0.149	0.272	1				
ms_4	0.108	0.018	0.084	0.053	0.029	0.056	0.079	0.072	0.040	0.104	0.073	0.077	1			
pb_1	0.379	-0.107	0.351	0.025	-0.023	-0.133	0.318	0.657	0.293	-0.222	0.326	0.300	0.005	1		
pb_2	0.155	0.058	0.013	-0.073	-0.019	-0.077	0.140	-0.005	-0.057	0.170	0.008	0.118	-0.002	0.068	1	
pb_3	0.199	-0.022	0.161	-0.041	0.042	0.054	0.098	0.235	0.137	-0.007	0.125	0.191	0.017	0.236	0.090	1