

MARKETING AND DESIGN IN ORGANISATIONAL
NEW PRODUCT DEVELOPMENT
EARLY EVIDENCE FROM NEW ZEALAND MANUFACTURING FIRMS

By
Susan Sun

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ABSTRACT

The multidisciplinary nature of organisational new product development (NPD) suggests that the development of successful new products is dependent upon the individual and combined efforts of various functions. Despite being recognised as two highly important disciplines in NPD, marketing and design have received little empirical examination of their roles in the NPD process and their effects on NPD outcome. In order to address this gap within the literature, the objectives of this thesis were to assess the presence of marketing and design in NPD, explore the nature of the marketing-design relationship, and examine the effects of marketing influence, design influence, and the level of marketing-design connectedness on NPD outcome.

The study was set within the New Zealand context and data was collected via a web-based survey from 91 manufacturing firms that adopted both marketing and design in their NPD programmes. The results showed marketing and design to be two highly influential functions in NPD. Both functions were also found to be strongly involved in the NPD process. A positive relationship was found between marketing and design's functional influence, which suggested the possibility of an interdependent relationship between the two disciplines. Finally, marketing and design were found to affect different aspects of NPD outcome, with marketing positively affecting product innovativeness, and design positively affecting process proficiency and financial performance. The research has implications for the future development of marketing, design, and NPD theories, as well as for managers seeking to improve their NPD activities through the alignment of their marketing and design functions.

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1. INTRODUCTION

The innovation literature suggests organisational survival in today's economy requires firms to reinvent their strategies and offerings in order to adapt to various environmental changes whilst delivering products and services that capture customer value (Cagan & Vogel, 2002; Edersheim & Drucker, 2007; Shapiro, 2002; Teece, 2007). From a financial perspective, successful products help firms generate greater return on investments, market share, brand equity, and company shares (Blundell, Griffiths, & Van Reenen, 1999; Cooper, 2001). From a strategic perspective, the development of innovative capabilities enables firms to achieve better integration, communication, learning, and efficiency (Calantone, Cavusgil, & Zhao, 2002; Edersheim & Drucker, 2007; Hurley & Hult, 1998). In essence, innovation and NPD possess both financial and strategic merits for the organisation, making them a source of competitive advantage that contributes directly to the sustainable wellbeing of the organisation.

Looking broadly at the new product development (NPD) literature, it seems that the subject area has mostly been treated as a sub-domain of the marketing discipline (Cooper, 1979; Gatignon & Xuereb, 1997; Olson, Walker Jr, & Ruekert, 1995). Indeed, although the development and launch of new products is a multidisciplinary activity, marketing's unique understanding of market conditions, competitor performance, and consumer needs has been found to play a vital role throughout the NPD process (Day, 1994; Moorman & Rust, 1999; Siguaw, Simpson, & Enz, 2006).

In addition to marketing, research into the role of design in NPD has also gained tremendous momentum in recent years, following the success stories of Apple and IDEO (T. Brown, 2009; Brunner, Emery, & Hall, 2008; Gallo, 2011). This group of studies considers design to be a 'strategic tool' – one that could become a source of competitive advantage, offering firms new opportunities that inspire radical and industry-leading products (Beverland & Farrelly, 2007; Lorenz, 1994; Verganti, 2008).

Whilst the field of NPD has acknowledged marketing and design as two highly important disciplines to successful innovation, few of these studies have directly examined how marketing and design contribute to the NPD process and product outcome. This is especially the case for design, which despite being named as a key success factor to innovation, has received little empirical validation (for exceptions see: Bruce, Potter, & Roy, 1995; Gemser & Leenders, 2001; Hertenstein, Platt, & Veryzer, 2005). Furthermore, given the amount of existing research on the interfaces between marketing and other functions such as manufacturing, R&D, and finance (Griffin & Hauser, 1996; Mukhopadhyay & Gupta, 1998; Pennings, Wetzels, & Meulenbergh, 1999), the marketing-design interface has been largely under-represented. This is a particularly fruitful area of research as the NPD literature has consistently emphasised the importance of cross-functional integration (Cagan & Vogel, 2002; Rothwell, 1994). For marketing and design, the relationship between the two disciplines has also been found to require special academic attention (Beverland, 2005; Perks, Cooper, & Jones, 2005). According to Kotler and Rath (1984), if marketing is concerned with the marketing mix, then design is a key player in the development of 'product' strategies. Similarly, Bruce and Roy (1991) identified design as a valuable resource to the firm, one which needs to be more strategically integrated into the organisation, particularly with marketing.

Based on the above studies, it is clear that research is still required on how marketing and design operate in relations to firms' NPD strategies. This study therefore aims to address this gap by: (1) assessing marketing and design's presence in organisational NPD; (2) exploring the relationship between marketing and design; and (3) examining the effects of marketing, design, and marketing-design connectedness on NPD performance. Given that most research concerning NPD and design originated from Europe and America, the current study uses New Zealand manufacturing firms as the main sample. New Zealand is also selected for its unique market conditions and commitment to design. It is believed that the study will help enrich academics' current understanding of marketing, design, and NPD, and provide guidance for managers seeking to improve their NPD activities through the alignment of their marketing and design functions.

The thesis begins with a literature review on NPD, marketing, design, and the marketing-design interface, which then leads into the development of research questions. The conceptual framework, research model, and hypotheses are presented next, followed by descriptions of measurements and the research methodology. Research results and discussions form the next two sections, and the thesis ends with conclusions, implications, limitations, and recommendations for future research.

2. LITERATURE REVIEW

The proceeding literature review highlights four areas of research central to the objective of this study. Firstly, the innovation and NPD literature is explored, and emphasis is placed on the NPD process, factors contributing to product success, and evidence that suggests a shift towards greater collaboration and integration between NPD functions. The second part of the literature review examines the role of marketing, its impact on innovation and NPD, and the factors that influence its place within the organisation. This is followed by an overview of design within the organisation and NPD. This section includes an overview of the different definitions of design in the literature, and the various roles design plays during NPD. The literature review concludes with a section on the marketing-design interface, which explores the benefits and the challenges associated with the integration process.

2.1 Organisational Innovation and NPD

2.1.1 Defining innovation and NPD

It has been widely acknowledged that innovation is a key contributor to organisational performance, particularly for firms operating in highly turbulent and competitive markets. The Centre of Innovation Studies defines innovation as ‘the process of creating and delivering new customer value in the marketplace’ (cited in: Carlson & Wilmot, 2006), which echoes the viewpoint of Peter Drucker, who refers to innovation as the act of changing customer expectations (Edersheim & Drucker, 2007).

As a source of competitive advantage (Lengnick-Hall, 1992), innovation has been conceptualised as a multidimensional construct (Damanpour & Gopalakrishnan, 1999; Harvard Business School Press, 2009; Kline & Rosenberg, 1986). This is

evident from the broad scope of the innovation literature, which spans across a number of topics including business models, technology, product development, organisational structures, and processes. Amongst these facets of innovation, new product development (NPD) in particular has been a fruitful area of research given its role in organizational development and survival. As suggested by Cooper (2001), NPD is a viable tool for firms to overcome market changes, which could take in the forms of technological changes, shifts in customer needs, the shortening of product lifecycles, and increase in global competition. Similarly, Edersheim and Drucker (2007) use the term ‘silent revolutions’ to describe opportunities that could be leveraged by firms through innovation and NPD, which include acceleration in information flow, broadening in geographic reach, increase in customer power, and collapse of organisational boundaries. Recent works in innovation and NPD have also pointed to greater focus being placed on the symbolic elements of products, product individualisation and customisation, effective and responsible use of resources, and the establishment of new collaborative linkages between key departments (Harvard Business Press, 2009).

Johne and Snelson (1988) define NPD as the development of new product lines targeted at existing and/or new customer segments. The authors argue that firms often confuse NPD with old product development (OPD), which involves the extension of existing product lines. While Johnne and Snelson concentrate their definition on the concept of ‘new’, other academics place greater emphasis on the ‘product development’ aspect of NPD. Loch and Kavadias (2008) for example, believe NPD ‘consists of the activities of the firm that lead to a stream of new or changed product market offerings over time, [which includes] the generation of opportunities, their selection and transformation into artefacts, and activities offered to customers and the institutionalisation of improvements in the NPD activities themselves’ (cited in: Ale Ebrahim, Ahmed, & Taha, 2010). This is also mirrored in a recent definition given by the Product Development and Management Association (PDMA), where NPD is conceptualised as ‘the overall process of strategy, organisation, concept generation, product and marketing plan creation and evaluation and commercialisation of a new product’ (cited in: Griffin & Somermeyer, 2007).

2.1.2 The NPD process

As a process pertaining to the development of new products and services, there have been various depictions of the NPD process within the innovation literature. The ‘linear model’ for example, conceptualises NPD as a four-step and one-way process consisting of research, development, production and marketing (Kline & Rosenberg, 1986). By comparison, the ‘chain-linked model’ depicts NPD as a set of inter-related activities that progress through the infusion of existing and new knowledge, and use feedback loops as methods of evaluation and refinement (Kline & Rosenberg, 1986). Cagan and Vogel (2002) categorised NPD as a four-phase process beginning with concept generation, followed by product refinement, production prototypes, and launch preparation. In contrast, Tim Brown’s design approach to innovation is more fluid and network based (T. Brown, 2009). Rather than portraying NPD as a linear process, his design process model is an interwoven network between three phases: inspiration, ideation, and implementation.

Amongst the many representations of the NPD process, Cooper’s (2001) stage-gate model (Figure 2.1) has been one of the most cited frameworks within the study of innovation and NPD. The stage-gate system is a blueprint that segments the NPD process into several key stages, each containing a set of strict requirements that act as benchmarks to determine the termination or progression of the project. As noted by Cooper, although the stage-gate system is presented as a linear process, it is highly reliant on cross-functional integration, including integration between marketing and manufacturing, and cross-functional decision making at each stage-gate (Cooper, 1994). Other conditions of the model include a strong market orientation, emphasis on pre-development planning, and sharp criteria and metrics at each decision gate (Cooper & Kleinschmidt, 1987, 1990, 1991).

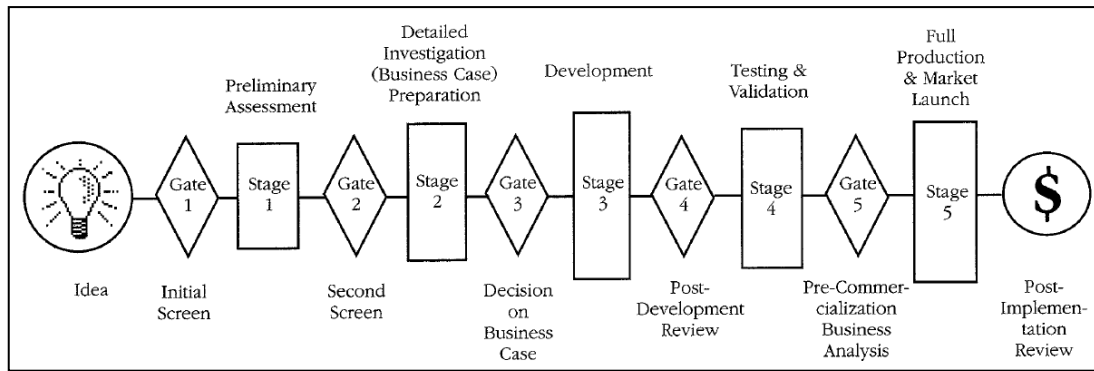


Figure 2.1 Cooper's stage-gate system

The specific NPD phases identified in Cooper's framework could be discussed in relation to Krishnan and Ulrich's review of key NPD decisions, namely: concept development, supply-chain design, product design, and production ramp-up and launch. Concept development decisions are concerned with the selection of product ideas that balance market preferences with firms' internal capabilities (Krishnan & Ulrich, 2001). In particular, these include product appearance, configuration, value, and appeal. Cagan and Vogel (2008) define this phase as a process of identifying, understanding, conceptualising, and realising opportunities created by social, economical, and technological factors. Similarly, Cooper (1990) considers the phase to include preliminary and detailed investigations into the concept's market, technical, and financial feasibilities.

Compared with concept development, supply-chain decisions include the selection of components, personnel, location, development processes, and tools associated with product manufacturing (Bhoovaraghavan, Vasudevan, & Chandran, 1996; Clark, 1989; Fisher, 1997; Gupta & Krishnan, 1998; Jeffrey, 1996). According to Cooper (2001), firms should conduct a manufacturing appraisal that specifies issues associated with manufacturability, costs, and investments required.

Product development decisions are concerned with the physical design of the product, and involve frequent forward and backward communication between the development unit and market analysis team (Krishnan & Ulrich, 2001). It has been argued that the involvement of lead-users during product development assists firms

with making decisions regarding the designation of design parameters, materials, and detailed assembly methods (Herstatt & Von Hippel, 1992; Veryzer Jr, 1998).

The outcomes of product development can take the form of prototypes and working models ready for testing and validation. During this post-development phase, the product's feasibility is assessed. As identified by Cooper (2001), methods of testing and validation could take the form of in-house product tests, user or field trials, and trial sales. Kline and Rosenberg (1986) also presented a process of 'design-build-test-redesign' as a common approach firms adopt during this phase of NPD.

Finally, production and launch includes the full manufacturing of the product as well as the marketing of product appeals. Poor decision making and performance during early phases of the NPD could have direct ramifications for the quality of this stage (Dwyer & Mellor, 1991; McGuinness & Conway, 1989). As this phase is particularly resource-consuming, pre-commercialisation business analysis conducted in the test and validation phase is highly concerned with projected financial returns (Cooper, 2001).

2.1.3 Determinants of NPD outcome

As one of the riskiest endeavours undertaken by organisations, research into the factors pertaining to the success of NPD has been one of the most examined questions within the field of innovation and NPD. Existing work on this topic has stemmed mainly from two roots: those focusing on the attributes of a successful product, and those concerning the development and management of the NPD process.

Within the first category, studies have found values to be embedded within products' appearance, function, configuration, and disposal (Bloch, 1995; Crilly, Moultrie, & Clarkson, 2004). Furthermore, these values could be utilitarian and symbolic, and intrinsic and extrinsic to the product (Belk, 1988; Rochberg-Halton, 1984; Zeithaml, 1988). According to Rogers (1995), the diffusion of innovation is dependent upon the relative advantage, compatibility, complexity, trialability, and observability of the product. From the organisational perspective, successful products have been examined in the form of incremental versus radical innovation (Dewar & Dutton,

1986; Ettlie, Bridges, & O'Keefe, 1984). The general conclusion of this stream of research suggests firms should adopt a mixture of both innovations given the significant variances in resources and risks (Danneels, 2004; Darroch & McNaughton, 2002; Terziovski, 2002). Other studies have argued that the development of robust product concepts and technologies provide firms with more opportunities, compared with lean product concepts (Rothwell, 1992; Rothwell & Gardiner, 1984). In essence, studies concerning innovation from a product perspective suggest success should be reflected in customer satisfaction and future development opportunities.

Alternatively, NPD success has been examined through the factors contributing to the efficiency and effectiveness of the NPD process. At the project level, studies show a strong customer focus, quality of planning (especially during the fuzzy front end), early product definition, and continuous evaluation and assessment to be some of the most vital elements in the development of successful products (Balachandra & Friar, 1997; Calantone, Schmidt, & Benedetto, 1997; Cooper & Kleinschmidt, 1990). At the organisational level, capabilities such as the integration of departments, commitment from top management, and open communication and knowledge sharing are considered to be central to NPD success (Balbontin, Yazdani, Cooper, & Souder, 1999; Song, Montoya Weiss, & Schmidt, 1997; Thamhain, 1990). This further transcends into the cultural level, where an innovative and entrepreneurial organisational culture and climate is needed to foster NPD as a strategic activity within the enterprise (Cooper & Kleinschmidt, 1995; Voss, 1985).

Cooper and Kleinschmidt (1987) reported synergy variables such as strong linkages between R&D and the sales force, marketing research, and engineering resources and skills to affect final product outcome, along with the amount of effort and investment made in pre-development activities.

Henard and Szymanski (2001) approached the question of why some new products are more successful than others through a meta-analysis across 60 articles and 24 success predictors. The cumulative results show that product advantage, marketing synergy, structured approach, predevelopment task proficiency, marketing task proficiency, technological proficiency, launch proficiency, senior management support, and market potential all positively enhance product performance. Amongst

these factors market orientation and marketing synergy were found to have moderate levels of influence, whereas product advantage had the strongest influence.

Compared with Henard and Szymanski, Brown and Eisenhardt (1995) structured their review around three streams of product development research. Research considering NPD as a rational plan sees product development success to be dependent upon superior product, attractive market, and rational organisation. Studies that view NPD as a communication web suggest outcomes to be directly affected by the quality and level of internal and external communication. Finally, works that see NPD as disciplined problem solving assert the use of multidisciplinary teams and ‘subtle control’ from senior management (where moderate levels of autonomy are assigned to the development team) as central to development success.

Ernst’s (2002) review of NPD success factors was conducted in accordance with organisational levels. At the project level, the study reported a strong customer focus, quality of planning (especially during the front end), early product definition, and continuous evaluation and assessment to be some of the most vital elements in the development of successful products. At the organisational level, capabilities such as the integration of departments, commitment from top management, and open communication and knowledge sharing were considered to be central to NPD success. These factors were further found to transcend into the cultural level, where an innovative and entrepreneurial organisational culture and climate was found to be central to the recognition of NPD as a strategic activity within the enterprise.

2.1.4 Innovation and NPD: towards an integrated era

The review of NPD models and success factors in the previous sections provide a line of evidence on the importance of functional integration in NPD. This section identifies some of the more prominent developments around integration within the innovation and NPD literature.

In his review of the innovation literature, Rothwell (1994) noted management concepts such as open communication and integration first began to receive proper attention during the early 1970s, where process efficiency achieved through the

coupling of technology-push and market-pull forces became central to innovation success. By the 1980s, it has been reported that cross functional collaboration became more widely adopted following the 'rugby' approach to product development displayed by the Japanese (Takeuchi & Nonaka; 1986). Key to the success of this approach is the use of Integrated Product Development strategies (IPD), which overlaps development phases and introduces functions at the backend of the NPD process to the front end (e.g. manufacturers and suppliers) (Naveh, 2005). The concept 'design for manufacturability' for example, considers manufacturing constraints during concept development in order to reduce the likelihood of delays further down the development process (Petersen, Handfield, & Ragatz, 2005; Ragatz, Handfield, & Petersen, 2002; Youssef, 1994). According to Rothwell (1994), as innovation enters the new millennium (year 2000), advances in modern computer technology combined with the establishment of network linkages will become even more critical to NPD success. The author presented a list of 24 factors central to the realisation of this era, which included: horizontal management styles, integrated teams, designed-in flexibility, close linkages with primary suppliers involving lead-edge users in design and development activities, and accessing external know-how.

While the 'rugby' approach and IPD view integration as a method of improving efficiency, Cagan and Vogel's (2002) concept of integrated new product development (iNPD) contends that greater integration between functions could provide more clarity to the fuzzy front end of the NPD process and prevent further downstream mistakes. This responds to the recent developments in the nature of the NPD process, which have pointed to a shift from linearity and structure to chaos and fuzziness. As found by Cheng and Van de Ven (1996) and others (e.g. Elmquist & Segrestin, 2007; Koen et al., 2001), chaos associated with sensing and comprehending information is especially high during the early phases of NPD. Consequently, Koput (1997) concluded firms must establish and manage linkages across different NPD phases (namely search, screening, and implementation), and develop feedback loops as a means of seeking clarity.

Characterised as a new way of thinking, iNPD is developed on the basis of three conditions: (1) a truly horizontal and interdisciplinary structure; (2) a commitment to and focus on customer and stakeholder values; and (3) the adoption of qualitative

methods of discovery that evolve toward quantitative methods of refinement and manufacture (Cagan & Vogel, 2002). Under these conditions, members involved in NPD are required to develop mutual respect and trust, which creates open platforms for knowledge sharing and collaboration. By sharing a common goal of delivering customer value, cross-departmental conflict caused by differences in objectives is greatly reduced (Walsh, 1996). The use of qualitative methods provides firms with broader investigation scope, which in turn aids the discovery of hidden opportunities (Beverland & Farrelly, 2007; Clark & Fujimoto, 1990). As noted by a number of scholars, exposed customer behaviours may not be fair representations of underlying needs (Bettencourt, 2009). Consequently, the nature of qualitative research methods are more suited to the discovery of core needs and values. Mello (2003) calls this process ‘digging for gold’, where researchers are required to probe beyond what is on the surface to reach the ‘golden nugget’ of customer needs.

2.1.5 Conclusions on organisational innovation and NPD

NPD is a key, if not essential, strategy for firms hoping to obtain new opportunities within the marketplace. The NPD process is a complex and often chaotic system that requires close integration between functions as well as efficient and effective use of resources. A recent shift within the NPD literature has pointed to a need for greater functional integration, which suggests key units involved in NPD must work closely with each other in order to produce the optimum outcome. Looking at the NPD process and the factors that contribute to the development of successful products, it is clear that marketing and design are two functions central to NPD and business strategy. From idea generation to final product launch, marketing’s strong focus on customers and stakeholders as well as design’s creativity and outside-the-box thinking represent some of the most vital elements of successful innovation. The next two sections of the literature review will thus focus on the roles of marketing and design in the organisation and their impact on NPD. The role of marketing within innovation and NPD is looked at first, and the different ways in which marketing enhances innovation, as well as the factors that determine its position within the firm, is discussed.

2.2 Marketing in organisational innovation and NPD

2.2.1 The role of marketing

From the organisational perspective, the role of marketing has changed significantly with advances in the theorisation and conceptualisation of the marketing concept. Amongst these changes, shifts from transactions to relationships, firms to customers, and manufacturing to co-creation of value have been some of the major cornerstones to the development of marketing theory and practice (Grönroos, 2004; Hoyer, Chandy, Dorotic, Krafft, & Singh, 2010; Webster, 2005). In addition to these, the emergence of market orientation and marketing management has significantly impacted on the way marketing is perceived and deployed within organisations today. This is reflected in the growing number of calls within the literature for marketing to be more strategically recognised at the board level, including its influence on the design of organisational strategies and everyday business practices (Merlo & Auh, 2009; Narver & Slater, 1990; Srivastava, Shervani, & Fahey, 1999)

Anderson (1982) theorises marketing's role is to assist firms with achieving optimal market positions, including the identification of the optimal position, the development of strategies that allow the firm to capture this position, and the implementation of the strategies with other functions. Moorman and Rust (1999) focused their study on the dimensions of the firm-customer relationship, and identified three key connections, namely customer-product connection (communicating marketing mix and managing customer satisfaction), customer-service connection (enhancing customer satisfaction through post-purchase services), and customer-financial accountability connection (managing the link between customer satisfaction, customer retention, and firms' financial outcomes such as brand equity).

Webster Jr. (1992) and Bruning and Lockshin (1994) both argue that the role of marketing differs in relation to its position within the organisational hierarchy. At the operational level, marketing is considered to be the interface between the firm and its customers, and marketing's role is the management of customer satisfaction. As marketing moves up the hierarchy to the business unit level, its responsibilities become more strategic, including market segmentation, customer targeting, and

product positioning. Finally at the corporate level, marketing is seen as a culture that directs all functional efforts towards delivering superior customer value. As marketing takes on greater responsibilities with its move up the hierarchy, Bruning and Lockshin (1994) note it must become more knowledgeable of the overall business, and play an active part in assisting firms with the integration and alignment of all organisational functions.

2.2.2 Market orientation in innovation and new product development

The term ‘market orientation’ has mostly been used to describe marketing’s position at the corporate level. Defined as the organisation-wide effort towards generating, disseminating, and responding to customer and competitor intelligence with the aim of delivering superior customer value, market orientation’s positive effect on organisational performance has become widely accepted. In a recent review, Baker and Sinkula (2007) concluded: ‘market orientation, properly instilled in the organisation seems to be a business philosophy as important as proffered years ago by Drucker (1954)’.

Within the context of innovation, Hurley and Hult (1998) makes the point that learning, open decision making, and engaging in innovative behaviour (i.e. responding to different market conditions) are characteristics central to market orientation and organisational innovation. The authors found that all three factors positively influence firms’ capacity to innovate, and proposed that future research should incorporate innovation more directly into the examination of market orientation and its contribution to the development of competitive advantages. While Hurley and Hult (1998) viewed innovation as embedded within market orientation, Siguaw et al. (2006) argued innovation orientation is an antecedent of market orientation. To them, learning (which they refer to as ‘learning philosophy’), market vision (which they refer to as ‘strategic direction’), and functional alignment (which they refer to as ‘transfunctional acclimation’) are central to the development of innovation competencies.

The effect of market orientation on new product performance was examined by Souder et al. (1997), who reported that New Zealand firms enjoy higher levels of

new product success compared with their US counterparts as the result of greater customer orientation. Baker and Sinkula (2005) found that market orientation positively influences new product success and profitability. New product success was also found to mediate the effect of market orientation on market share and profitability. In another study, Lukas and Ferrell (2000) examined the relationship between market orientation and innovation types and found that customer orientation enhanced new-to-the world products whilst it inhibited the development of me-too products; competitor orientation increased the development of me-too products and reduced line extensions and new-to-the-world products; and interfunctional coordination increased the launch of line extensions and prevented the launch of line extensions and me-too products. These findings suggest market orientation could assist firms with the balancing of innovation programmes. Similar propositions have also been made by Baker and Sinkula (2007) from the organisational learning perspective. Finally, by categorising market orientation as reactive and proactive, Atuahene-Gima et al. (2005) found a U-shaped relationship between responsive market orientation and new product performance, and an inverted U-shape relationship between proactive market orientation and new product performance. The authors suggested that both market orientation approaches have positive effects and firms must aim to effectively combine the two, notably matching highly responsive market orientation with low proactive market orientation and vice versa.

2.2.3 Marketing processes, resources, and capabilities in innovation and NPD

Jones and Tollin (2008) discussed marketing's role in organisational renewal and innovation by viewing marketing as a set of processes, assets, values, and capabilities. In contrast to the studies surrounding market orientation, which associated marketing with customer and competitor orientation, the authors drew on literature that discussed marketing's contribution to the development of innovation capabilities.

According to Srivastava et al. (1999) and Doyle (2000), there is a growing need for firms to develop products that offer customised solutions. Doyle (2000) uses the term 'differential advantage' to describe the unique and superior value firms must incorporate into their offerings, and believes the creation of these advantages is

dependent upon strategising key marketing processes, particularly NPD, customer relationship management, and supply chain management. Srivastava et al. (1999) also shared a similar view by contending marketing must become more integrated into the workflow of organisations: 'If marketing as an intellectual and operating discipline is to be institutionalised in organisations... it must influence the processes by which work gets done' (p. 169).

In addition to processes, Srivastava et al. (2001) suggest marketing possesses relational and intellectual assets that aid firms with innovation. Relational assets are gained through close relationships with stakeholders and strategic partners. Intellectual assets are those gained through developing knowledge of customers and other parties associated with innovation. Hooley et al. (2005) consider marketing resources to encompass brand reputation, customer relationships, and market orientation as an overall culture and trait of the firm. Market orientation as an organisational culture in particular is argued to contain a number of strategic elements central to the development of innovation capabilities, namely organisational structures that foster learning and knowledge sharing, the integration and alignment of functions, and a consistent dedication towards delivering customer value.

As a set of capabilities, marketing is mostly labelled as the boundary spanner between the organisation, its customers, and its strategic partners. Day (1994) characterises marketing capabilities as being outside-in, inside-out, and spanning. Outside-in capabilities reflect the firm's ability to sense market trends and disseminate them throughout the organisation. In order to properly carry out market sensing, firms must adopt a 'multisource approach' by gathering information from a wide range of informants such as customers, suppliers, distributors, and educational institutions. As suggested by Kok et al, (2003), organisational learning is also a large part of market sensing. The authors define market-oriented product development as a two-tier learning capability, one being understanding the factors that influence the development process (e.g. market and technological trends), and the other being the understanding of factors that influence each product development stage (e.g. different stakeholder values and inputs to innovation).

In contrast to outside-in capabilities, inside-out capabilities are those associated with the firm's ability to use its internal strengths to capture market opportunities (Day,

1994). These capabilities include competencies to develop new products as response to changes in customer needs, as well as successfully launching these products to the market. Techniques used to gather market information, and the stipulation of sales, distribution, and service are also regarded as capabilities that will enhance products' appeal to the end-user.

Finally, spanning capabilities refer to the ability for firms to integrate outside-in and inside-out capabilities (Day, 1994). An example is innovation management, which requires firms to integrate functions with different educational and technical backgrounds. During this process, the marketing and R&D interface has been found to be particularly vital but problematic given marketing's external focus and R&D's internal orientation. Menguc et al. (2007) believe the employment of an innovation champion or 'transformational leader' could ease the process, as this is a person who understands the strategic and long-term benefits of change.

2.2.4 Factors influencing the role of marketing within the organisation

The studies presented in the sections above offer certain insights into the role of marketing within the organisation, particularly in innovation and NPD. Against these backdrops, a number of academics have raised the issue of a deficiency in the number of empirical studies directed towards examining how marketing is practiced within organisations and the factors that influence its position.

By applying institutional theory, which considers organisational actions and structures to be embedded within its social networks, Homburg et al. (1999) found that firms with a culture which fostered marketing subsequently developed its strategies and structures around this belief. Bennett (2009) found firms with a strong sales-oriented culture were more likely to have sales managers at the board level. In relation to organisational culture, the background of CEOs and top management has been found to be a key factor determining the role of marketing within firms. In a recent study, Merlo et al. (2011) found companies with CEOs in marketing also had more influential marketing functions. Similar findings have also been generated in Homburg et al. (1999) and Verhoef and Leeflang (2009). Within the context of NPD, the effect of organizational culture and climate on marketing's influence was

illustrated in Workman Jr. (1993). In his attempt to explore the role of marketing in NPD projects within computer firms, the author found a strong engineering culture to be a main inhibitor to the recognition of marketing – a function seen to help get the product ‘out the door’. Furthermore, employees with engineering backgrounds were found to attain higher positions and have greater chances of promotion, causing marketing personnel to have little motivation, confidence, and belief in the marketing discipline. These findings illustrate that minimal marketing input to NPD not only prevent the function from realising its full potential (e.g. assists with the fuzzy front end of the NPD process), but also affects marketing’s reputation within the firm.

In addition to organisational culture and climate, Walker and Ruekert (1987) found firms adopting different organisational strategies varied in their marketing positioning. Those adopting a prospector strategy were found to place greater emphasis on marketing, personal selling, R&D, and engineering, whereas those with a cost defender strategy were more focused on engineering, production, distribution, and finance. Using Porter’s three business strategies (i.e. product differentiation, cost-leadership, niche), Homburg et al. (1999) reported firms adopting differentiation strategies had more influential marketing departments than firms with cost-leadership strategies. From a NPD perspective, Johne and Snelson (1988) reported leading innovative firms to be market-led and more market oriented, and less innovative firms to be more technical and marketing-led. This finding thus suggests that firms adopting growth strategies tend to place marketing at the corporate level rather than the operational level.

A factor examined alongside organisational strategy and used to explain its influence on marketing’s role is market condition. As differentiation and prospector strategies require growth through new product development and market expansion, firms face greater uncertainty with regard to market demands and trends. Whilst this proposition is plausible in theory, a number of studies attempting to empirically validate this relationship have failed to offer support. When examining the role of marketing in relation to market conditions, Homburg et al. (1999) reported marketing’s influence to be higher in firms operating in changing markets, however no relationship was found between marketing’s influence and market complexity. The same finding was generated in more recent studies by Verhoef and Leeflang

(2009) and Merlo (2009). Bennett's (2009) investigation into the progressions of marketing executives within British companies also offered some confirmation, as no differences in the promotion of marketing executives were found between companies with high and low levels of competitive intensity and volatility.

Merlo (2009) believes the insignificant relationship between market conditions and the influence of marketing indicates a deficiency in marketing's ability to provide information on future and latent market trends, an explanation as to why marketing is often amongst the first to receive budget cuts at times of resource constraints. Limitations in marketing's ability to lead firms through times of change (particularly through innovation and new product development) have also been discussed by Christensen (2003), where the concept of 'innovator's dilemma' has been used to describe the contradictions managers face when deciding to adopt incremental or radical innovations. Merlo (2009) uses the term 'provider of certainty' to describe marketing's ability to cope with uncertainty, and suggests the inability to achieve this has direct implications for marketing's position within the firm.

In addition to coping with change, Verhoef and Leeflang (2009) found that marketing's ability to contribute to organisational innovation is an influencing factor on marketing's role within the firm. The authors refer to this as 'innovativeness' and quote Malter et al. (2005) who assert: 'Marketing must redouble its efforts to prove its value to the innovation stream' (p. 41). In addition to innovativeness, marketing's accountability was also found to influence its position within the firm. Defined as the ability to justify its efforts, accountability was viewed as marketing's ability to directly impact an organisation's bottom-line (Verhoef & Leeflang, 2009). Since innovation involves significant risk and resource commitment, marketing in turn is under great pressure to turn investments into monetary results. Bennett (2009) offers evidence for this point as marketers with knowledge in finance and sales were found to have a greater likelihood of being promoted to board level.

2.2.5 Conclusions on the role of marketing in innovation and NPD

This part of the literature review has looked at the role of marketing within the organisation, and its contributions to innovation and NPD. In summary, marketing's role differs according to its position within the organisation. Its value to innovation and NPD (in the form of market orientation, marketing processes, resources, and capabilities) is highly dependent on organisational culture and climate, top management attitude, organisational strategy, and its own functional efficacy. Consistent with a shift towards collaborative innovation and integrated NPD, studies in this section acknowledged marketing as a boundary spanner responsible for information dissemination and interfunctional coordination. As the next section of the literature review illustrates, similar traits have also been discussed within the role of design in innovation and NPD. Together, these propositions pose interesting questions in relation to the management of marketing and design within the context of NPD. They also raise questions about the integration and interplay between marketing and design, given that the two functions differ in some aspects of their underlying theory and practice.

2.3 Design in organisational innovation and NPD

2.3.1 Defining design in NPD and innovation

According to a number of academics, the design discipline has struggled to develop a unified design definition due to the large scope and fragmentation of the design theory (Gemser & Leenders, 2001; Lorenz, 1994; Luchs & Swan, 2011; Yazdani, 1999). According to Walsh (1996), design covers a range of activities, including graphics, industrial design, fashion, and engineering. Cooper and Jones (1994) believe that the design function consists of three disciplines, namely ergonomics, engineering, and industrial design. By comparison, Shirley (1988) view design as including graphic design, product design, and industrial design. Industrial design is also seen as a fusion of graphics and product design.

Whilst the overall design discipline is seen to be multidimensional, research into design and its involvement in product development and organisational innovation has often found a divide between industrial and engineering design. According to Cooper (1994): 'Engineering design is concerned primarily with the function/operation and manufacture of the product; [and] product/industrial design with the appearance and function/operation'. Despite these differences, Cooper believes engineering and industrial design must be closely integrated during the planning and implementation of design strategies. This is also reflected in Ulrich and Eppinger (2007), who went as far as to define design as a combination of 'engineering design and industrial design'.

In contrast to Cooper and Ulrich and Eppinger (2007), Walsh (1996) and the Design Business Association believe engineering is a discipline of its own, and should not be placed in the design category with industrial design. This is evident in a number of design definitions grounded in industrial design principles. Oakley (1990) for example, defines design as the 'outward appearance of physical arrangement of objects... the technology that goes into a product or its convenience in use... and economics'. Similarly, Urban and Hauser (1993) view design as the 'designation of the key benefits... and the fulfilment of the product promises by physical features'.

Within the context of NPD, design has been largely associated with the designation of product strategies. Krippendorff (1989), for example refers to design as 'making sense of things', an activity that captures the exterior look of the product whilst tapping into the symbolic meanings communicated by the product. Sharing a similar belief, Verganti (2008) views design as the formation of languages. According to the author, design is the identification and comprehension of evolutions within the socio-cultural environment, and the creation of new meanings and visions for existing products. In a recent review on product design, Luch and Swan (2011) identified 21 definitions of product design, but found that only two received more than one citation. The authors further assert that a few design definitions within the literature have managed to capture the co-existence of form and function, as well as the synergy effect that is created through their union. As a result, the authors present their own definition of product design, which is: 'The set of properties of an artefact, consisting of the discrete properties of the form (i.e. the aesthetics of the tangible

goods and/or services) and the function (i.e. its capabilities) together with the holistic properties of the integrated form and function' (p. 388).

The definitions presented above suggest the value of design in organisational NPD and innovation extends far beyond its traditional 'styling' roles (Beverland, 2005; Cooper & Jones, 1994). This has also paved the way for more recent work in the areas of strategic design and design management. These studies advocate a more holistic and strategic conceptualisation of design, one that captures management concepts such as process management, integration, function interface, and user orientation (Cooper, 1994; Lai, Lin, Yeh, & Wei, 2006; Oakley, 1990).

Earlier examples illustrating the broadening of design activities can be found in the works of Gorb and Dumas (1987), whose term 'silent design' was used to describe the implementation of design activities by functions other than design. Later studies focusing on the management of design within the organisation suggest that the dissemination of design theories and practices is largely dependent on top management attitude as well as the power of design champions (Barngrover, 2005; Black & Baker, 1987; Jevnaker, 2000; Pawar & Sharifi, 1997). At the forefront of the push for strategic design is the concept of 'design thinking' developed by Tim Brown of IDEO. Defined as 'a discipline that uses the designer's sensibility and methods of matching people's needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity' (cited in: Martin, 2009), design thinking requires firms to position design at the centre of the organisation (T. Brown, 2009). According to Brown and others (Martin, 2009), design thinking is not exclusive to designers, nor solely required for design activities. Under this school of thought, design is an activity performed both by the designer and everyone else in the organisation.

2.3.2 The role of design

The above perspectives showcase design as a multi-faceted discipline. Furthermore they illustrate clear divides on the scope and specialisation of the design function. Design's involvement in the development of product form and function suggests that the discipline is still largely recognised by its traditional values, yet studies that

advocate more strategic positioning of the function suggest the role of design must also be broadened to encompass other organisational factors.

Candi (2006) explored the role of design in relation to product development and identified three types of design roles: 'visceral design' includes design's focus on product beauty and form; 'functional design' includes the focus on product usability, understandability, and quality; and 'experiential design' includes the development of overall product meaning such as emotional, psychological, spiritual, and social appeals. Design's influence on the holistic product appeal has also been emphasised in the works of Walsh (1996) and Lorenz (1994), where design is considered to create a more 'rounded-out effect' for products and be a key contributor to product integrity.

In addition to product design, Sisodia (1992) suggests design's place in NPD extends beyond the development of product concepts. As a source of competitive advantage, design's contribution to organisational success was discussed through four design principles. 'Product basics' consists of design's ability to develop simple, reliable, aesthetically pleasing, and valuable products. 'Process basics' refers to design's ability to coordinate and align other strategic units during product manufacturing and assembly. 'Responsive factors' are associated with design's ability to develop products that are intelligent and adaptable to different contexts. Finally, 'custom factors' include design's ability to lengthen product lifecycles and customer relationships through methods such as product upgrading, recycling, and product line extensions.

In their research on the evolving role of design within organisational NPD, Perks et al. (2005) offer a trajectory for the role of design, which shows the discipline rising from a specialised function solely responsible for product styling and aesthetics to a strategic asset widely studied and practiced among multinational corporations. The authors further contend that as firms face stronger pressures to reinvent their strategies as a response to market uncertainties and competition, design must become more disseminated within the organisation and take on theories and practices of other strategic functions. Evidence from their study shows that different positionings of design have direct effects on the design activities performed and the skills required of designers. At the functional level, design was seen as a distinctive unit that was

separate from the other units. Designers were only required to perform the most basic design tasks such as creating visualisations, developing product aesthetics, and performing computer-aided design activities. In contrast, design as a part of a multifunctional team saw the function playing an integrative role between stakeholders and other key product development units, such as manufacturing and market. At this level, designers were required to exhibit communication skills, flexibility, as well as empathy for other functions. Finally, at the most strategic level, design was found to undertake a leadership role during NPD. Here, design activities were practiced by designers and other functions, and design was held responsible for the final product and the overall development process.

Although exploratory in nature, the study by Perks et al. (2005) offers valuable insights into the role of design within design-oriented firms, an emerging type of organisation that adopts design as a strategic tool and a source of competitive advantage. Verganti (2008) characterises design-driven firms as those that aim to achieve radical innovation through the re-conceptualisation of product meanings. Instead of looking to customer information or technology advances (which are strategies used by market-driven and technology-driven firms), design-driven firms seek inspiration from the socio-cultural environment. This is achieved through close communication between the designer and the ‘design discourse’, a network of relationships between the designer and other designers, artists, suppliers, users, and media sources. Drawing on the success of Italian furniture firms, Verganti’s studies suggest design’s role as a boundary spanner (between the ‘design discourse’ and the firm) enables firms to anticipate socio-cultural trends before customer-oriented firms, thus allowing products to be trend-setting and market-driving (Dell’Era & Verganti, 2009; Verganti, 2008).

In comparison with Verganti, Beverland’s definition of design-led firms includes those that perceive design as an organisational philosophy (Beverland & Farrelly, 2007). Using Fisher and Paykel and the National Australia Bank as examples, Beverland argues that the role of design in design-led firms should be a culture that fosters curiosity, cross-functional empathy, and constant ethnography to discover new opportunities. The latter is also reflected by Brunner et al. (2008), who contend that design methods such as observations used for market sensing should become a

common practice among design-driven firms. Through direct communication with customers, designers are seen as a network and relationship builder between the firm and the market.

Despite the various roles identified by the studies above, early empirical evidence on the practice of design among firms shows design remaining as a functional unit responsible for basic product development activities. In their study examining the use of design among British SMEs, Bruce et al. (1995) found that firms adopt a range of design activities including engineering design, industrial design, product design, and graphic design. Amongst these, graphic design in the form of logo and packaging design was found to be the most frequently adopted design practice given its low risk and resource requirement, and its ability to generate short-term results by adding value to existing products. Mozota (2002) also reported similar findings where product design and industrial design were the most commonly performed design activities within UK manufacturing firms. Although a time lag exists between these studies and current advances in strategic design, they nevertheless indicate a gap between design theory and practice. Bruce et al. (1995) for example, reported that while managers showed strong perceptions of the value of design to organisational development, in actuality the role of design within the firms was still largely restricted to product aesthetics and styling.

2.3.3 Design as a competitive advantage in NPD and innovation

As noted by a number of academics, although design has been found to take on various roles within the organisation, its effect on organisational performance is seldom explored. Amongst the very few exceptions, Hertenstein and Platt (2001) found that firms with more effective design enjoyed greater earnings on asset investment and stock market returns. Mozota (2002) found firms with no clear design strategies suffered during product development, compared with firms that viewed design as a managerial and resource competence. In their study examining the risks and rewards of investing in design, Bruce et al. (1995) reported firms that invested in design also experienced greater effectiveness in project management, and company image and credibility. By comparison, Gemser and Leenders (2001) found that the

relationship between design and organisational performance varies across industries, as design was seen to increase profit, profit growth, and turnover growth among firms in the instrument industry, but not the furniture industry.

Despite a lack of evidence on the effect of design on organisational performance, studies that focus on the value of specific design roles shed light on the various ways in which the discipline contributes to NPD and innovation. For example, early research in design's styling roles found that product aesthetics was considered the most important determinant of new product performance among managers (Bruce and Whitehead, 1988; Cooper & Kleinschmidt, 1987). Studies have also reported that product form (including product aesthetics and packaging) directly impacts customer attitudes, preferences, and perceptions of product quality and value (Berkowitz, 1987; Schoormans & Robben, 1997). As explained by Bloch (1995), product form contributes to product success through cutting across clutter, communicating information and customer values, and evoking positive responses.

In contrast to product form, product function has also been found to be vital for product success (Swan, Kotabe, & Allred, 2005). Works by Rogers (1995) show comparative advantage and complexity as two key determinants of innovation diffusion. The literature surrounding technology adoption has also identified usefulness and ease of use as directly driving the adoption of technological products and services (Adams, Nelson, & Todd, 1992; Davis, 1989). Within the domain of design, the concept of 'user-centred design' (or user-oriented design) has been widely cited to describe the need for products to be designed in accordance with customer competencies (Flach & Dominguez, 1995; Karat, 1997; Veryzer & Borja de Mozota, 2005). Krippendorff (2011) also emphasises the need for designers to obtain a 'second-order understanding' during product development; a practice that requires designers to think from the users' perspective.

In addition to product advantage, design's contribution to product development process proficiency is also vital, given its impact on development time and cost. According to Veryzer (2005) and others (Dahan & Srinivasan, 2000; Srinivasan, Lovejoy, & Beach, 1997; Vriens, Loosschilder, Rosbergen, & Wittink, 1998), design methods such as visualisations and prototypes could directly reduce cross-departmental confusion regarding product specifications. In a study comparing

methods of concept evaluation between marketing and engineering design, Pullman et al. (2002) found the quality function deployment (QFD) approach adopted by engineering designers to be more effective at selecting concepts which are unique and represent outside-the-box thinking. By comparison, conjoint analysis adopted by marketers was found to be best suited for products that captured customers' expressed and current needs. Wainwright (1995) believes design is a missing link in manufacturing strategy as it has direct implications for the cost, delivery, quality, reliability, and flexibility of the manufacturing process. According to the author, product design technologies and support systems such as CEA and CAD greatly reduce the time associated with product assembly and modifications. Furthermore, they provide designers with a level of standardization which enhances operational flexibility and shortens time to market. Ulrich and Pearson (1998) focused their study on the effect of design in manufacturing cost. By comparing coffee makers that ranged in price and design, the study found component selection and configuration costs were directly influenced by design capabilities adopted by the firm. The study further found that many high-priced coffee makers exhibited low-priced manufacturing components, which suggests that successful design strategies could improve product value, whilst simultaneously reducing manufacturing costs.

Apart from contributing to product appeal and the development process, research concerning the strategic value of design has also been found to enhance firms' financial performances and more importantly their innovative capabilities. Mozota (2006) for example, believes that the four powers of design (differentiator, integrator, transformer, and good business) enhance firms' economic value added (EVA) through increasing economic values (e.g. sales, margins, and market share), as well as substantial values (e.g. customer relations, competitiveness, process improvement, individual creativity, and knowledge management). Amongst these four powers, 'design as a transformer' (which refers to design's ability to transform new business opportunities and market changes into competitive advantages) is also considered to be the absolute core value of design among design-oriented firms. As seen in previous discussions on the role of design in design-driven and design-led firms, design personnel, theories, and practices are particularly relied upon for their idea generation and market exploration capabilities (Beverland & Farrelly, 2007; Verganti, 2008). Works by Cooper (2001) and others (e.g. Cagan & Vogel, 2002; Pullman et

al., 2002; Wainwright, 1995) strongly encourage the use of design methods such as visualisation, model-making, technical drawing and diagrams during idea generation. As put by Kelley (2001): ‘Prototyping doesn’t just solve straightforward problems... call it serendipity or even luck, but once you start drawing or making things you open up new possibilities of discovery’ (p. 38).

As discussed earlier, the field of NPD is shifting towards greater cross-functional integration, which according to Cagan and Vogel (2002) should also include the adoption of more qualitative methods of discovery. Many researchers have already found traditional market research methods to be myopic in identifying latent and core consumer needs, and argue that observational and ethnographic research approaches used among designers are significantly more beneficial for organisational innovation (Beverland & Farrelly, 2007; Clark & Fujimoto, 1990; Krippendorff, 2011). Beverland and Farrelly (2007) contend: ‘Curiosity at the core of a design-led culture results in different approaches to understanding customers. This leads to a rejection of traditional market research methods that suffer from the knowledge limitations and halo effect of group members in favour of ethnographic techniques’ (p. 13). Similarly, Gemser and Leenders (2001) believe designers’ personal understanding of users and environments, combined with their specialised knowledge of design, are the very traits that enable them to enhance product values, lengthen product lifecycles, and stimulate product innovations among firms in mature markets and technologies. The effect of design research on product outcome was particularly evident in Jang et al. (2009), whose investigation into the development of LG’s Chocolate Phone showed that design’s ability to identify and incorporate customers’ emotional needs into concept design was one of the key contributors to product success.

2.3.4 Conclusions on design in organisational innovation and NPD

This section of the literature review has shown design to evolve beyond its traditional styling roles in NPD and organisational innovation. In addition to enhancing product appeal and development process efficiency, design has also become acknowledged as an integrator, network builder, and a source for idea generation similar to the role of

marketing. Other similarities between marketing and design discussed by academics include design's focus on customer value, identification of new market opportunities, as well as design becoming a corporate philosophy directing all organisational activities. Despite these merits, there remains a gap between design practice and theory on how design should be positioned within the firm. One possible explanation for this gulf may be a deficiency in empirical evidence on the effect of investing in strategic design on firms' NPD and innovation abilities. Equally important to the value of investing in design is how the discipline should be managed and integrated with other units. As noted above, marketing and design both provide valuable inputs into NPD, therefore their relationship with each other will also need to be properly managed in order to generate synergies. The next part of the literature review will thus explore the marketing-design interface, focusing specifically on the benefits and challenges associated with the integration of the two functional units.

2.4 Integrating marketing and design

2.4.1 The marketing-design relationship

Despite the prominence of marketing and design in organisational NPD, the relationship between marketing and design is seldom explored. Although marketing and design may differ in certain theories and practices, the earlier sections of the literature review have also shown them to share some strategically important common ground such as user orientation and the discovery of new opportunities. Early studies have linked design to the development of marketing mix strategies, as it directly contributes to the designation of key product attributes, costs of manufacturing and production, materials involved in distribution (e.g. packaging), and general promotional materials (e.g. flyers, advertisements) (Cooper, 1994). Other studies have proposed that design is a key communicator of corporate image, where design is harnessed by firms hoping to enhance brand equity (De Mozota, 2003; Lorenz, 1994; Montaña, Guzmán, & Moll, 2007). Olins (1990) characterised design as the visual realisation of marketing, which conveys brand values to customers.

Similarly, Mortell (1995) referred to branding as the 'life blood that flows through the product life cycle' and design as a 'critical element that pumps this life blood'.

Beverland (2005) and Cooper and Jones (1994) both argue that it is important for designers to be kept up to date with the latest market information, and believe marketing's ongoing interface with customers ensures design is consistently briefed. Cooper and Jones (1994) also note that changes in design requirements need to be regularly updated, and all market information must always be presented clearly and 'at all times appropriate for the needs of the designers'.

A common theme among studies exploring the marketing-design relationship has been a tendency to view marketing as the more dominant function that determines design decisions and design's influence within the firm. Mukhopadhyay and Gupta (1998) for example, consider marketing managers as the bridge between customers and design, and believe that effective co-ordination between marketing and design is reliant on marketer's abilities to develop an understanding of the design discipline. Luo et al. (2005) contend: '[By] being closer to the customer and the competition, the onus of leading this coordination effort falls naturally upon the marketing function' (p. 189). According to the authors, marketing must be responsible for gathering customer information, which is subsequently discussed with designers during concept development. More recently, Bruce and Daly (2007) proposed that the marketing-design relationship extends beyond the product level. In addition to the influence that market changes, customer tastes, and technological advances have on the selection of product materials and attributes, design's role in the organisation was also found to be highly affected by marketing strategies, such as the decision to enter a new market or to extend existing product lines.

Marketing's concern with customers, competitors, and the overall organisational strategic direction is a key reason behind its importance within the organisation and its influence on design (Beverland, 2005; Blaszczyk, 2000; Leonard & Rayport, 1997). Stompff (2003) for example argues that design activities must be consistent with organisational branding. This view is shared by Just and Salvador (2003) who uses the term 'brand compass' to illustrate the use of corporate branding to direct design activities. Veryzer (2005) describes the relationship between marketing and design as one of creating 'constraints', which is agreed upon by Heskett (2002) who

believes potential tensions could arise between designers' self-expression and firms' brand-driven culture. Filson and Lewis (2000) further found that a dominant organisational culture could inhibit the strategic realisation of design and stand in the way of design management and functional integration.

In contrast to the above studies, Moll et al. (2007) found that design orientation stimulates market orientation. Their study revealed that firms which harnessed design as a competitive advantage also exhibited strong customer focus. It was further found that the firms shared a number of common traits, including a strong managerial efficacy, market orientation, and integrative culture, which suggested the possibility of a dyadic relationship between market orientation and design orientation. In other words, in addition to the authors' suggestion that design oriented firms are more market oriented, there is also the possibility that market oriented firms are able to better harness and incorporate design into their product development activities.

2.4.2 Challenges in integrating marketing and design

Despite the close relationship between marketing and design, a number of academics have observed that the integration of marketing and design may be difficult, given the many differences between the marketing and design disciplines. As put by Oliver (2002): 'Differences in orientation between disciplines in respect of time scales, style of work and objectives may all lead to tensions' (p. 141).

Michalek et al. (2005) argue that marketing and design differ significantly in disciplinary boundaries, perception of product development, and the use of performance and success measures, all of which pose challenges to the development of a formalised system for integrating marketing and design. At the disciplinary level, marketing possesses strong scientific rigour and is grounded in a left-brain thinking paradigm. By comparison, design draws inspiration from multiple sources and adopts strong right-brain thinking that focuses on individual expression, vitality, and human elements. At the project level, marketing is the provider of market-pull information, whereas design is responsible for the transformation of market-pull and technology-push factors into products (Cooper & Jones, 1994). In terms of success indicators, marketing relies on customer satisfaction, market share, and profit; whereas design

uses technical performance, innovativeness and cost effectiveness, as well as peer reviews, expert opinions, and industry rewards (Beverland, 2005).

Extending from Michalek et al. (2005), Kristensen and Gronhaug (2007) suggest marketing and design differ in terms of people, key focus and efficacy, work organisation, and deliverables. According to the authors, marketers are mostly graduates from business schools therefore are educated in enhancing profits, market share, and brand equity. By comparison, designers' educational backgrounds place their focus on delivering practical solutions and beauty. Marketers are shown to prefer working under formalised organisational structures and communicating their ideas through written analysis and reports. By comparison, designers are shown to prefer organic structures and use methods of visual representations and models to express their opinions.

Heskett (2002) believes rational analysis, which tends to dominate organisational information processing, often facilitates marketing but contradicts design thinking. This is because designers often aim to project future market preferences rather than identifying current needs (Michalek, et al., 2005; Pullman, et al., 2002). Mukhopadhyay and Gupta (1998) also highlighted a number of potential conflicts that could arise as the result of conflicts of interest between marketing, design, and manufacturing. For example, manufacturing's preference for simple product designs that are easy to assemble, modify, and repair could contradict marketing's preference for products with added features and high complexity based on customer preferences.

According to Cooper and Jones (1994), failure to recognise and overcome the differences between marketing and design could jeopardise firms' overall innovative capabilities. Through their case studies, the authors found it was common for marketing and design to hold little mutual understanding which combined with a lack of clear communication channels, resulted in minimal information exchange and little coordination between marketing, design, and sales. It was also found that little respect existed between marketing and design, partially due to differences in functional roles and purposes.

Lack of mutual respect between marketing and design was also evident to Beverland (2005), whose investigation into the management of design and corporate branding

showed major ‘value-based conflicts’ between winemakers and business personnel. Firstly, the study found significant differences in the use of success factors, with winemakers focusing on product quality, originality, and uniqueness, and marketers focusing on finance, branding, and market share. Secondly, the study revealed great frustrations displayed by both groups when the other was mentioned. Winemakers perceived the use of marketing as detrimental to the value of the product. By comparison, marketers believed winemakers paid insufficient attention to the importance of corporate finance and branding, and often found them ‘annoying’ when business strategies were questioned.

2.4.3 Benefits of integrating marketing and design

The challenges of integrating marketing and design discussed above suggest that failure to establish clear communication channels and cross-functional understanding between the two functions could generate tensions throughout the firm. However, when properly integrated and coordinated, the combination of marketing and design has also been found to generate synergistic effects that directly contribute to firms’ ability to innovate. Kristensen and Gronhaug (2007) identified four potential benefits of better integration between marketing and design, namely: marketing communication, product distribution, market surveillance, and concept development. The first two benefits are established on the basis of design’s traditional involvement in the development of promotional materials and product packaging, and represent design’s ‘styling’ role during NPD and its contribution to post-product development activities including product launch and commercialisation. By comparison, the latter two benefits are largely associated with firms’ innovative capabilities, and represent the strategic contributions embedded in the ‘coupling’ of marketing and design (Walsh, 1996).

For market surveillance, Kristensen and Gronhaug (2007) argue that designers’ exploration and understanding of the user must be comprehended in the larger marketing context to ensure marketability. This echoes Fitzsimmons et al. (1991) who highlight the importance for firms to recognise the interdependence between design, marketing, and manufacturing, as successful infusions of these functions will

enable firms to identify greater opportunities, including developing a better understanding of the potential trade-offs that occur when balancing different product specifications. Leonard and Rayport (1997) believe that the combination of market research and design exploration methods could ‘spark innovation’ through ‘empathic design’. According to them, design research methods such as observations and other anthropological approaches enable firms to identify latent and unexpressed customer needs, which when combined with traditional market research methods allows the creation of products with greater customer appeal and differentiation. Veryzer and Mozota (2005) proposed that marketing-design integration to enhance idea generation through ‘visualisation/conceptualisation, form alignment, and transmutation of the design challenge’. Their paper on user-oriented design (where design decisions are centred around use needs) drew on studies that show firms to develop new perspectives and development strategies by aligning design with marketing, as well as studies of firms that conduct NPD through ‘technology humanisation’.

In terms of concept development, Kristensen and Gronhaug (2007) believe joint problem solving by marketing and design helps refine ideas and produce more targeted solutions. This was illustrated in Michalek et al. (2005) and Luo, et al. (2005), where the use of both marketing and design information during concept evaluation generated designs with higher customer utility. As Luo et al. (2005) point out, product concepts must satisfy a number of conditions such as addressing market needs and reflecting firms’ capabilities, as well as being economically and technologically feasible. Consequently, integration between marketing and design early on in the NPD process produces transparency during prototype development, which reduces costs and time associated with concept development and selection.

In addition to identifying more effective product concepts, Bruce and Daly (2007) found firms with stronger design-marketing integration also developed more comprehensive product briefs. Their study revealed firms with strategic approaches to marketing and design were more dedicated towards identifying market opportunities, as well as performing market analysis and competitor analysis. These firms were also more customer oriented, seen in the use of customer feedback as references for future improvements. By comparison, firms with less marketing and

design were found to base their briefs on verbal agreements, which tended to generate confusion and required multiple sign-offs that created delays in the development process. Cooper and Jones (1994) believe that the combined efforts of marketing and design during the development of product briefs prevent ‘gaps’ in the product concept. In addition, marketing and design should have equal rights to question elements of the brief, and no development activities should be carried out until a level of mutual understanding and agreement is achieved.

2.4.4 Conclusions on the marketing-design relationship

In summary, marketing and design share multiple touch points throughout the development process. Whilst the two disciplines differ in their underlying philosophies, theories, functional roles, and practices, their integration, when properly managed, has been found to benefit the development process and product outcome. The way in which marketing and design should be integrated during innovation and NPD remains a subject of debate. According to Bruce and Roy (1991) and Kotler and Rath (1984), other than coupling design and marketing, firms may also choose a marketing-dominated or a design-dominated strategy as a method of minimising functional conflicts. Wetlaufer (2001) for example, found that designers at Moët Hennessy Louis Vuitton (LVMH) took the lead in the development of products, including the design of promotional materials. This approach was driven by a top management team that believed shielding design from business constraints would maximise designers’ abilities to create and innovate. Together, these studies show the decision to integrate marketing and design to be dependent on a number of factors such as the nature of business and top management attitude.

3. RESEARCH OBJECTIVES AND QUESTIONS

The literature review has identified a number of emerging themes within the fields of NPD, marketing, design, and the marketing-design interface, which also represent key areas within the literature that could benefit from further exploration.

Firstly, marketing and design have been identified as two functions largely involved in organisational NPD. They possess a number of distinct characteristics central to innovation, such as a common focus on customer needs and requirements. Despite the number of studies that acknowledge the importance of marketing and design in NPD, there has been little empirical research into the effect of marketing and design on NPD outcomes. This is a particularly fruitful area of research as recent developments within marketing and design theories have advocated more involvement and influence from both disciplines respectively, in relation to innovation and NPD capabilities and practices. According to Verhoef and Leeflang (2009) and others (e.g. Bennett, 2009; Malter, et al., 2005), the ability for functions to enhance firms' performance is a key determinant of their position and power within the firm. As a result, studies that are able to validate the benefits associated with investing in marketing and design will constitute an important step towards the realisation of strategic marketing and design in practice.

Secondly, many recent studies in NPD have focused on the importance of functional integration (e.g. Cagan & Vogel, 2002; Rothwell, 1994). However, it remains unclear whether marketing and design are closely connected during NPD and whether this connection contributes to NPD performance. As seen in the literature surrounding the marketing-design relationship, opinions remain divided on whether the two functions should be integrated. On the one hand, some scholars have suggested that the two functions should complement each other, which suggests the possibility of synergy effects (Cooper & Jones, 1994; Kristensen & Gronhaug, 2007). On the other hand, studies have reported tensions arising from marketing and design integration, which has resulted in firms purposely separating the two functions (Michalek, et al., 2005;

Mukhopadhyay & Gupta, 1998; Wetlaufer & Arnault, 2001). It could be argued that the decision to separate marketing and design may be the result of inadequacies in implementation rather than a fundamental incompatibility between the two disciplines. However, given that research addressing the marketing-design relationship is scant, the grounds on which conclusions could be drawn on the benefits associated with integrating marketing and design remains highly constrained.

Finally, in order to fully understand the value of marketing and design in organisational innovation and NPD, more needs to be known about how the two functions operate in relations to firms' NPD strategies. For example, studies show that many firms maintain a marginalised design practice despite positive perceptions of the discipline (e.g. Bruce et al., 1995; Mozota, 2002), which suggests a gap between attitude and practice. Furthermore, the specific roles played by the marketing and design functions, as well as the influence of these functions, should also be assessed, as they help to provide a more complete picture of the strategic importance of marketing and design in NPD.

Based on the gaps identified above and the potential benefits of developing a better understanding of marketing and design and their relationship, three research objectives and six research questions were set for the study (see Figure 3.1).

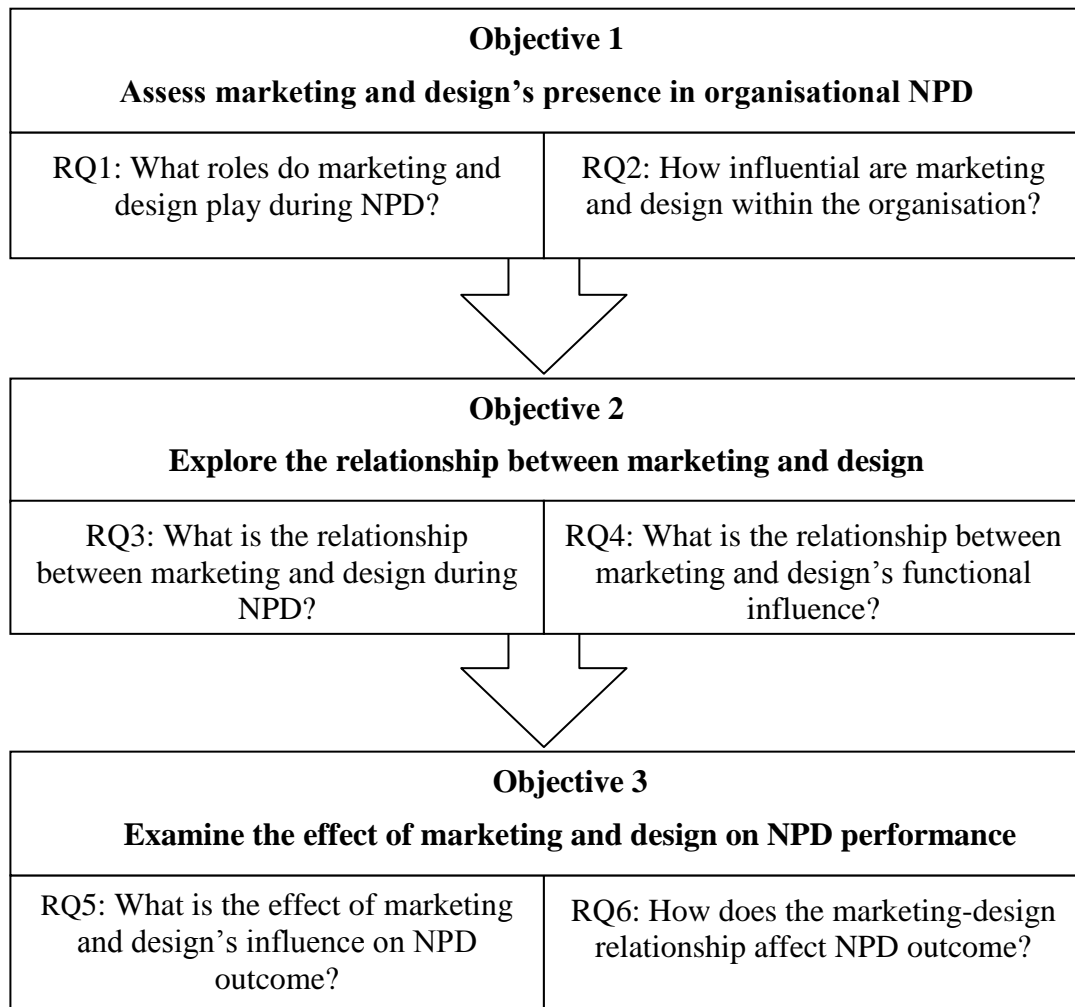


Figure 3.1 Research objectives and questions

The first research objective sought to provide details on marketing and design's presence within organisational NPD. This objective consisted of two exploratory research questions, the role of marketing and design during NPD, and the level of influence held by the marketing and design functions. Since NPD is a multidisciplinary activity, the way in which marketing and design contributes to the NPD process offers particularly valuable insights into how each discipline is adopted in practice. Details on these functional roles are especially needed for the design discipline as earlier studies have found a gulf between theory and practice. Furthermore, as noted by Harmancioglu and colleagues (2007), NPD involves competing goals of minimising risk by acquiring sufficient market information while reducing costs and time to market. Their argument thus shows that the way that NPD

strategies are designed (including how functions are positioned) is equally important to how each phase is implemented.

The study's second objective was to explore the relationship between marketing and design, which included assessing the degree of closeness exhibited by marketing and design during NPD, and the relationship between marketing and design's functional influence. Compared with research into other cross-functional interfaces, the marketing-design interface has received little empirical assessment. Furthermore, existing research into the marketing-design interface has generated mixed results. Given that functional integration is becoming increasingly important in successful innovation, this objective sought to provide additional insights and contribute to the current discussion on the marketing-design relationship.

The third objective of the study was to investigate the effect of marketing and design on NPD performance. In particular, functional influence and marketing-design closeness were considered to be factors that contribute to NPD outcomes. From this, the aim was to provide empirical evidence in respect of the value of marketing and design in organisational NPD.

Through addressing the research objectives and questions above, it was expected that the study would contribute to theory development in the fields of NPD, marketing, and design, and provide insights for managers seeking to improve their new product development outcomes through the alignment of their marketing and design functions.

4. CONCEPTUAL FRAMEWORK, RESEARCH MODEL AND HYPOTHESES

4.1 Conceptual framework

Research objectives and questions developed for the study contain both exploratory and confirmatory elements. As a result, a conceptual framework was developed to illustrate the key variables and relationships that the study sought to investigate.

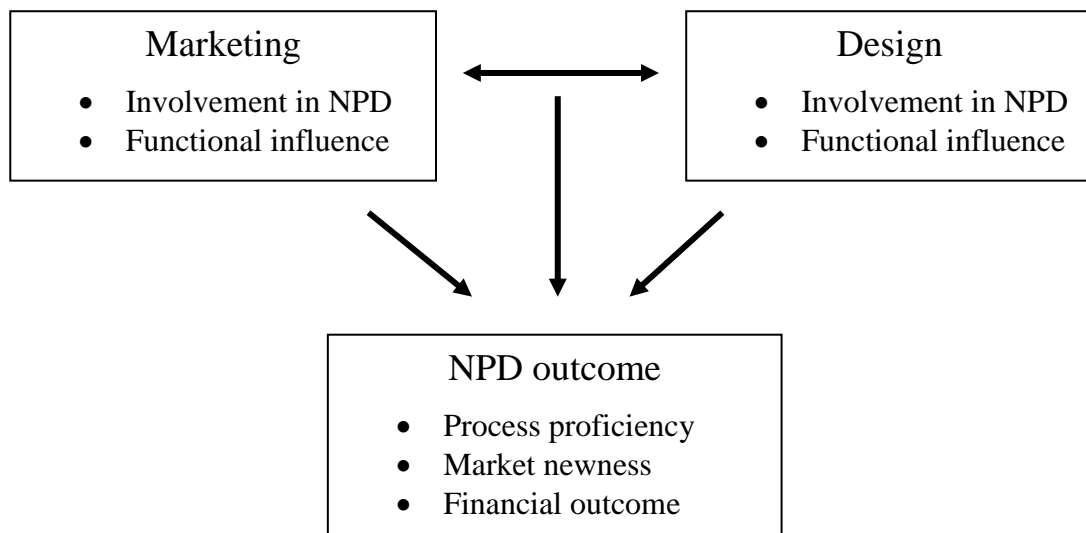


Figure 4.1 Conceptual framework

As depicted in Figure 4.1, the study first explored how marketing and design were positioned within the organisation as individual strategic units. In order to obtain a detailed understanding of the configuration of marketing and design, firms were asked to identify the specific NPD phases in which marketing and design held the main accountability, as well as the influence of each function.

Secondly, the relationship between marketing and design was explored through comparisons across their respective NPD involvement and functional influences. A ‘degree of connectedness’ scale was also developed and used to assess the degree of interaction between marketing and design across a number of NPD decisions.

The overall purpose of these first two objectives was to understand and profile how marketing and design were represented and organised within NPD manufacturing firms, the relative influences of each within the firm, and the specific roles played by each discipline during specific phases of the NPD process. An area of particular interest that was to be explored with these objectives was the nature of the marketing and design relationship, given the apparent ambiguity surrounding their relationship in the extant literature.

Finally, the effects of marketing and design influence and their level of connectedness were explored through regression analyses. Details of the research model, its variables, and construct relationships are discussed in the following subsections.

4.2 Research model

To empirically assess the effect of functional influence and connectedness on NPD, the study drew on the works of Verhoef and Leeflang (2009), Homburg et al. (1999), Merlo (2009), and Merlo et al. (2011) whose research examined the effect of marketing’s functional influence on organisational performance.

While building upon the research approach of earlier work, the current study also differed from others within the field in a number of respects. Unlike many existing studies which typically focus on the influence of the marketing function alone, the current study looked at both marketing and design, and their level of connectedness, as factors that potentially contributed to NPD performance. Another factor distinguishing the study from others (especially those within the field of design) was its focus on the relationship between design influence and NPD performance. Earlier studies had already identified different levels of design within organisations (e.g.

Perks et al., 2005), but only a few had examined how this impacts on performance. Furthermore, in comparison with studies that only assessed NPD performance through product outcome, the current study also included an assessment of ‘NPD process proficiency’. NPD process proficiency is defined as: ‘How well NPD stages and the NPD process as a whole is performed’ (Millson and Wilemon, 2002 p. 1). Finally, the innovation literature had conceptualised product success as a multi-dimensional construct, one which could not be measured by financial success alone. As a result, this study examined ‘market newness’ in addition to product financial performance. Market newness is the extent to which the product can draw on customer competences new to the firm, and was included in this study as an indicator of product innovativeness. This was premised on the view that products that exhibit high ‘market newness’ are seen to be more innovative as they enable firms to capture new market opportunities through developing products that address new consumer needs (Rosenø, 2005). The research model for this phase of the study is presented in Figure 4.2¹. Details of the hypotheses are outlined in the following sub-section.

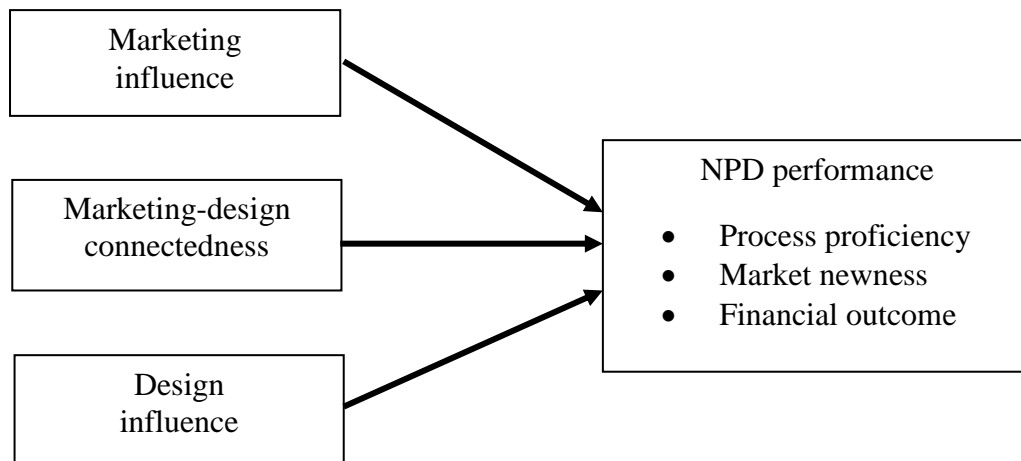


Figure 4.2 Research model

¹ The researcher is aware that by including three indicators of NPD performance, attention should be paid towards specifying the relationship between these measures. Despite this, minimal research that examines the relationship between process proficiency, market newness, and product financial outcome has been conducted, which limits the available information from which conclusions could be drawn. Given that the main purpose of the study was to assess how marketing and design contributed to NPD performance rather than to develop a unified measure of NPD outcomes (which could be a topic for future research), the present study chose to assess these outcomes individually rather than in aggregate.

4.3 Hypotheses development

4.3.1 *The influence of marketing*

Studies concerning the value of marketing have shown marketing to be a strategic unit that directly influences a firm's overall performance. Verhoef and Leeflang (2009) for example, concluded that firms should have a strong marketing department in order to facilitate market and customer orientation. Similarly, Vorhies and Yarbrough (1998) reported that firms with superior marketing capabilities exhibited higher profitability, more consumer segments, effective environmental scanning processes, higher market share growth, and better market positions. Moorman and Rust (1999) proposed that firms investing in marketing capabilities will simultaneously establish better connections between customers, products, services, and organisational performance (e.g. customer satisfaction, customer retention and brand equity). Their argument echoes Day (1994) who argued that marketing capabilities are central to the identification and reconfiguration of market information.

Within the context of NPD, Baker and Sinkula (2005) found that firms with stronger market orientation experienced greater new product success. Similarly, Johne and Snelson (1988) reported that firms adopting a holistic view of marketing experienced higher new product success than firms that viewed marketing as being solely sales-oriented. Li and Atuahene-Gima (1999) found that marketing's influence in NPD positively affected new products' market performance as well as timeliness of development, which suggested marketing had a positive effect on product outcome and the development process. Based on the evidence generated by these studies, the current study hypothesised that:

H1: There is a positive relationship between marketing's influence and NPD process proficiency.

H2: There is a positive relationship between marketing's influence and new products' market newness.

H3: There is a positive relationship between marketing's influence and new products' financial performance.

4.3.2 The influence of design

As identified in the literature review, several studies pointed to the importance of firms investing in design (Bruce, et al., 1995; Gemser & Leenders, 2001; Hertenstein, et al., 2005). Furthermore, research had shown that design methods and practices directly contributed to the efficiency and effectiveness of the development process by providing outside-the-box thinking, selecting more user friendly concepts, and reducing development time (Jang, et al., 2009; Pullman, et al., 2002; Veryzer & Borja de Mozota, 2005).

Despite a lack of evidence on the relationship between design's influence and new product success, work within the field of design-led and design-oriented firms had shed light on the benefits of developing an influential design department. Perks et al. (2005) for example, proposed that firms should aim to establish a leading design department during NPD, and train designers to become agents for opportunity sensing, problem solving, and knowledge sharing. This view was shared by Brown (1999) and Beverland (2007), who argued that firms must develop a more comprehensive understanding of design, and adopt more diverse design roles during innovation and strategy development. Following the arguments posed by these academics, the study hypothesised that:

H4: There is a positive relationship between design's influence and NPD process proficiency.

H5: There is a positive relationship between design's influence and new product's market newness.

H6: There is a positive relationship between design's influence and new products' financial performance.

4.3.3 Marketing-design connectedness

Although evidence for the benefits of integrating marketing and design is mixed within the literature, most of the studies concerning the marketing and design interface indicate a strong interdependent relationship between the two functions

(Cooper, 1994; Moll, et al., 2007). In addition, research into NPD success factors show functional integration and alignment as key determinants of process and product effectiveness (Rothwell, 1994). Together, these arguments provide support for the position adopted in this study that better integration of marketing and design leads to beneficial outcomes for the firm.

In one of the few empirical studies of the relationship between marketing and design, Moll et al. (2007) found a dyadic relationship between the two, which meant that firms with a strong orientation in one discipline also exhibited strong orientation in the other. Other studies that pointed to an interdependent relationship between marketing and design included Kristensen and Gronhaug (2007), where the integration of marketing and design was seen to enhance products' marketability and customer appeal. Similarly, Veryzer and Mozota (2005) found that the alignment of marketing and design allowed for products to be developed with maximum creativity and user appeal. Together, these studies suggested a complementary relationship between marketing and design, as well as the possibility of synergy effects achieved through their integration. As a result, this study hypothesised that:

H7: There is a positive relationship between marketing-design connectedness and NPD process proficiency.

H8: There is a positive relationship between marketing-design connectedness and new products' market newness.

H9: There is a positive relationship between marketing-design connectedness and new products' financial performance.

4.4 Scale development

4.4.1 Marketing and design's influence

As discussed within the literature review, the role of marketing within the organisation is dependent upon a number of factors. Although the same type of research in design had been scant, approaches undertaken to examine marketing's

influence offered a good foundation for the assessment of design's influence within the firm.

Developing a comprehensive measure for functional influence was a major challenge of this study. Firstly, the measure had to capture the key roles played by marketing and design throughout the NPD process. Secondly, it had to reflect the degree of influence held by these functions. In order to achieve this, the current study looked to a number of studies examining the influence of marketing and design. In general, it was found that research in marketing influence was far more established than research in design influence. As a result, a set of measures was formed by synthesising various marketing influence measures, which were subsequently modified to fit design.

Figure 4.3 depicts the four facets of marketing and design influence respectively selected for the study. These included top management support, communication link, certainty provider, and functional uniqueness.

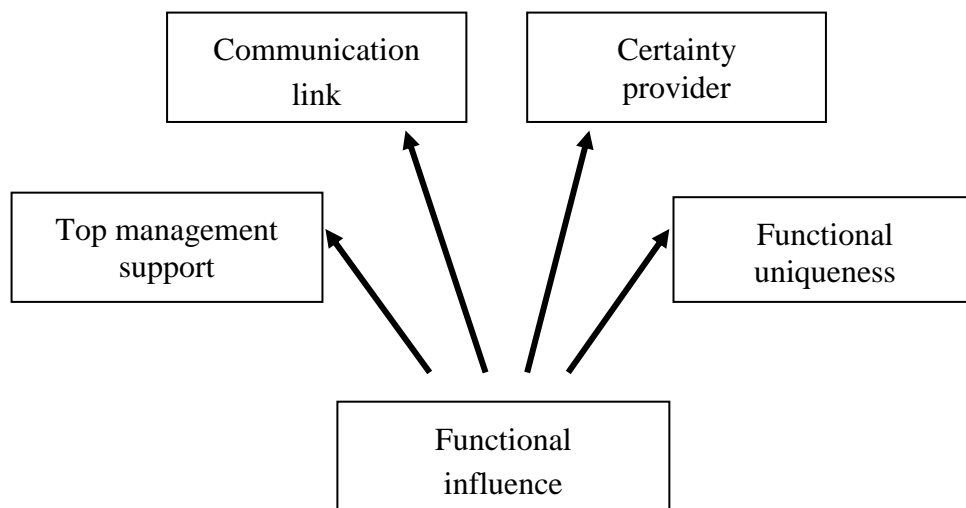


Figure 4.3 Dimensions of functional influence

Top management support was measured using four items and established from works of Merlo (2011), Verhoef and Leeflang (2009), and Homburg et al. (1999). Homburg et al. (1999) was one of the first studies to show top management background as having a direct impact on marketing's influence within the firm. Similarly, Verhoef and Leeflang (2009) found the level of functional respect held by top management to be a key determinant of functional power. Merlo (2011) examined the effect of power on marketing influence. Within the four facets of power, bureaucratic power was found to have a significant effect on the power of marketing within the firm. According to Merlo (2011) and others, subunits within high echelons in the organisation are more influential as they have a higher level of perceived legitimacy. Similarly, Enz (1986) contends that by holding official positions within the firm, functions are assigned with a certain level of right to exercise their power. As noted by Pfeffer and Salancik (1974), apart from obtaining rights and power, functions that are recognised at the board level are also better resourced and protected. This ensures functional issues are prioritised and solved promptly, and that the function is less likely to receive budget cuts during times of financial hardship. In support of these arguments, the current study used two items to measure top management's support of the importance of marketing and design. These included top management's acknowledgement of the strategic importance of marketing and design, and the level of investment into marketing and design functions.

In comparison with top management support, communication link refers to marketing and design's ability to act as networkers and boundary spanners throughout the NPD process (Atuahene-Gima & Li, 2000; Merlo, 2011; Merlo, et al., 2011). As shown in the literature review, studies in marketing and design had pointed to the need for firms to adopt a more holistic view of these disciplines, which included diversifying the roles of marketing and design, as well as encouraging marketers and designers to broaden knowledge beyond their specialised fields (e.g. T. Brown, 2009; Bruning & Lockshin, 1994; Perks, et al., 2005; Srivastava, et al., 1999). Merlo (2011) applied the concept of 'network power' to examine marketing's influence through its centrality within the workflow of activities and its ability to act as a conduit for communication with key organisational personnel. Similarly, Atuahene-Gima and Luca (2008) used the term 'information power' to describe the ability of functions to serve as a link among key stakeholders. The current study

combined three items from the literature to measure the degree to which marketing and design were disseminated throughout NPD. These measures included the ability of marketing and design to serve as a communication link between customers and the organisation, between members within the NPD team, and the degree to which marketing and design were connected with other NPD functions.

The third facet of marketing and design's influence was certainty provider. Items assessing this aspect of functional influence were selected in order capture marketing and design's ability to provide valuable information that addresses uncertainties within the marketplace. According to Merlo (2011), successful demonstrations of coping with uncertainty, substitutability and centrality are key determinants of power. This echoes the resource dependence view of power which suggests the ability of subunits to provide critical and important resources is of particularly importance to their position within the firm (Salancik & Pfeffer, 1974). The need for marketing and design to offer valuable information was also evident in the works concerning the roles of marketing and design. Homburg et al. (1999) for example, found marketing's influence was particularly strong among firms with high market uncertainties. Similarly, a number of researchers had advocated the use of design methods during problem identification and idea generation (Beverland & Farrelly, 2007; Clark & Fujimoto, 1990; Krippendorff, 2011). Together, these studies illustrated the importance of placing marketing and design at the forefront of the NPD process, which included greater influence and involvement from these functions. Based on these studies, the current research used four items to measure the degree to which marketing and design were seen as functions capable of addressing market uncertainties. These were marketing and design's understanding of the holistic business environment, their effectiveness at providing information that clarifies uncertainties in the marketplace (two items), and their ability to provide important strategic advice.

The final facet of functional influence was functional uniqueness, which when combined with certainty provider formed the basis for contingency power (Hinings, Hickson, Pennings, & Schneck, 1974; Lachman, 1989). As discussed by Merlo (2011), functional uniqueness (which he referred to as 'non-substitutability') is the extent to which a functional activity is difficult to replace and obtain from other

functions. In other words, when a function's contribution is considered to be unique to the organisation, it has the ability to exercise greater influence (Merlo, 2011). The current study measured functional uniqueness with two items: the extent to which inputs from the marketing/design functions were considered to be more important than other functions, and the extent to which the technical expertise from marketing/design was considered to be difficult to obtain from other departments.

4.4.2 Marketing-design connectedness

The subject of cross-functional interaction has received some attention within the NPD literature, although few measures have been developed to examine marketing-design interaction. Kahn (1996) and Kahn and Mentzer (1998) believed interdepartmental interaction was directly related to information and knowledge sharing. Verhoef and Leeflang (2009) assessed cross-functional integration by measuring the degree to which two functions hindered each other's performance and the problems that arose from their integration. Within the context of NPD, measures for marketing-R&D interaction were considered to provide a good foundation for assessing marketing-design interaction as R&D and design were often seen to be responsible for the technical aspects of product development, whereas marketing was mostly viewed as a function for product commercialisation (Sherman, Berkowitz, & Souder, 2005). In their study examining cross-functional integration, Sherman et al (2005) examined the level of contact, information sharing, and joint problem identification between marketing and R&D, however their measures were not specific to the NPD context. As a result, the current study borrowed measures of R&D-marketing interaction seen in Atuahene-Gima and De Luca (2008) and moderated them to measure the level of marketing-design interaction throughout the NPD process. This set of items was selected because of its focus on NPD. It contained four items that captured functional connectedness throughout a number of key phases in the NPD process: customer needs analysis, business environment scanning, market analysis, and product development.

4.4.3 Process development proficiency

Research into NPD shows the NPD process to be a combination of various activities. Booz et al. (1968) for example, identified six NPD steps: new product idea exploration, screening, business analysis, development, testing, and commercialisation. The authors later introduced ‘new product strategic development’ as an initial stage to NPD (Booz, Allen, & Hamilton, 1982). In comparison with Booz et al (1968), Cooper and Kleinschmidt’s stage-gate model (discussed earlier) contained a more comprehensive list of NPD phases, which included initial screening, preliminary assessments, various types of research and analysis, as well as tests, trials, production, and launch (R Cooper & Kleinschmidt, 1986). In addition to the activities involved in the development of products, a number of academics have argued that the fuzzy front end of the NPD process (e.g. idea and problem identification and concept generation) is of particular importance to product success (Kane, 1984; McQuarrie & McIntyre, 1986; Von Hippel, 1986). Millson and Wilemon (2002) combined a number of studies surrounding activities in NPD and formed a comprehensive list of 24 NPD activities that constituted three key phases: pre-development, development and launch, and post-launch stage. Respondents were asked to indicate on a scale of 1 (very poor) to 7 (excellent) how well each NPD task was performed regarding the firm’s most successful new product. The current study adopted the same approach as Millson and Wilemon (2002) but reduced the large list of 24 activities to eight. This decision was made as Millson and Wilemon’s (2002) list included post-development phases which were beyond the scope of the study. Furthermore, a number of NPD phases were also found to be highly similar, which the researcher believed could cause confusion for the respondents. As a result, the development process in this study was reduced to consist of idea generation and problem identification, initial market assessment and concept evaluation, business analysis, product development and testing, prototype testing, market testing, production, and launch. Although this list contained fewer stages, it was still believed to be highly representative of the key activities involved in the NPD process.

4.4.4 Market newness and financial performance

As already noted, an underlying rationale for the studies surrounding new product success had been a tendency to treat product performance as a multi-faceted concept (Danneels & Kleinschmidt, 2001). Cooper and Kleinschmidt (1987) conducted factor analysis on a total of ten product measures and identified three distinct performance indicators: financial performance, opportunity window, and market share. In comparison, Griffin and Page (1993) characterised product success as consumer, financial, and technical or process-based. According to Johne and Snelson (1988), a major difference between NPD and product development is in the essence of creating new opportunities for the organisation. The innovation aspect of NPD has also been reported as one of the major reasons behind firms' decisions to undertake NPD. Product innovativeness, which was often used to describe the degree to which the product provided firms with new market and technical opportunities, had been found to be a contributor to product success (Kleinschmidt & Cooper, 1991; Tuominen & Anttila, 2006). This was also reflected in Pattikawa et al. (2006) who made the major point that product success should be measured at the project and organisational level. The authors contended: 'A new product may be a failure at the project level but the learning effects from the project may bring forth strategic capabilities at the firm level which improve overall organisational performance' (p. 1179).

In support of these studies, the current study measured two facets of new product outcome. Firstly, market newness was measured using three items adapted from Danneels and Kleinschmidt (2001), and consisted of the degree to which the product provided the firms with new competitors, new consumer needs, and new product categories. Secondly, two items assessing the degree to which the new product had met its sales and profit objectives were selected to measure products' financial performances (see: Rochford & Rudelius, 1997). The full list of items could be found in the research questionnaire presented under Appendix A.

5. METHODOLOGY

5.1 Research context

The current study selected New Zealand as the research context because most studies concerning marketing and design in NPD had originated in Europe and America. Unlike those regions, which have large corporations and domestic markets, the New Zealand market consists mostly of small and medium enterprises (SMEs) that engage in domestic and export trade (Zahra & Covin, 1995). These unique characteristics were particularly important to this study as they provided insights into how marketing and design operated under different conditions. For instance, studies had shown that New Zealand firms exhibited high levels of innovativeness, including an eagerness to adopt new technologies (Cameron & Massey, 1999). Others had found that New Zealand firms possessed strong levels of market orientation compared with their American counterparts (Souder, et al., 1997).

Aside from innovation and marketing, another factor that made New Zealand a viable context for the subject of this research was the country's focus on design. For example, the Labour Government's 'Heart of the Nation' report released in 2000, included a strong vision for strengthening the creative industry sector (Heart of the Nation Project Team, 2000). Design also became a recognised tertiary qualification taught in New Zealand polytechnics and universities within the last fifteen years (Matheson, 2006). New Zealand had also embraced the strategic importance of design at the business level, with groups such as Better by Design and Design Works offering assistance for firms hoping to achieve success through design (Designworks, 2012; New Zealand Trade and Enterprise, 2011a). In particular, the 'CEO Summit' organised by Better by Design is a biannual event supported by New Zealand Trade and Enterprise that gathers business and design experts from around the globe to discuss the latest developments within the field of innovation and design (New Zealand Trade and Enterprise, 2011b).

Given the increased emphasis upon design within New Zealand over the past decade, it was seen as timely to conduct a study that specifically examined the role, character and impact of design among SMEs. Design appears to have reached a sufficient stage of maturity within New Zealand to warrant an assessment of its present place and impact. Yet it is early enough in its development as a management discipline that insights gained in relation to the objectives of this study are likely to be beneficial to other SMEs seeking to extend the role and scope of design within the context of NPD.

5.2 Sample

5.2.1 Target population

New Zealand manufacturing firms that performed marketing and design during NPD were selected as the target population. Similar to earlier studies concerning the role of marketing and design in NPD, the manufacturing industry was selected for its strong focus on product development (see: Chiva & Alegre, 2009; Gemser & Leenders, 2001; Song, Souder, & Dyer, 1997). The focus upon marketing and design further required that firms with both of these functions present were chosen as the population of interest. In other words, the purpose of the study is not to describe the uptake and place of marketing and design across all manufacturing firms, but only those that had commitment to both marketing and design within their NPD programme.

According to the 2009 innovation report generated by Statistics New Zealand (2010), 46% of businesses in New Zealand undertook innovation in 2009, from which 41% of the innovations were implemented. Amongst these innovations, the goods or services innovation rate was 26%, which was lower than Australia (29%), Finland (31%), and Ireland (28%) but higher than Denmark (22%) and Norway (21%). The manufacturing industry was found to be the largest group taking part in the survey, with an innovation rate ranging between 44% and 75% amongst its sub-industries.

Given that the current study aimed to explore marketing and design within the context of NPD, only firms that had undertaken goods or services innovation were

considered. Furthermore, whilst studies have found significant differences between the nature of goods and services innovation (Calantone, et al., 2002; Yazdani, 1999), the current study focused more on the development of tangible goods by looking specifically at organisations that were predominantly goods manufacturing-oriented. According to Statistics New Zealand (2010), the manufacturing industry had an overall innovation rate of 57% in 2009, which contributed the most to gross domestic product with 14%.

In addition to being product-oriented, the target population for the current study was also required to demonstrate the use of marketing and design during NPD. Within the manufacturing industry, 19% of product development expenditures were reported to be on design. By comparison, 21% of product development expenditures were found to be on marketing. According to the report, a total of 2220 firms in the New Zealand manufacturing industry were found to have invested in design and marketing, as well as other disciplines during product development, thus making this the population size for the study (Statistics New Zealand, 2010).

5.2.2 Sampling

Although the innovation report provided an estimation of the sample size, the names and contact details of the companies were not provided. To ensure that the firms included in the study were able to provide information on the role of marketing and design in NPD, judgement and stratified sampling methods were used and two sampling frames were selected.

The first sampling frame consisted of 100 firms involved with Better by Design, a group within New Zealand Trade and Enterprise that specialised in providing professional assistance and funding to firms hoping to achieve success through strategic design and design thinking. The names of the 100 firms were obtained from the Better by Design website. Judgement sampling was used in the selection of this sampling frame as companies associated with Better by Design were believed to have a particularly strong commitment to design. The Design 360 Audit offered by the group for example, is a company assessment and consultation process that helps connect companies to industry leaders and design specialists during strategy

development. According to Cavana et al. (2001) judgement sampling is a non-probability and purposive sampling method where participants are selected for their ability to offer the researcher information required for the purposes of the study. This approach is mostly used when the sample is required to meet certain conditions in order to provide valid information on the research subject. Judgement sampling was considered to be appropriate for this study as previous research had found design to be a less-adopted discipline within the organisation. Because of this, it was believed that firms involved with Better by Design would provide particularly valuable insights into the strategic role of design. The use of judgement sampling was also evident in Bruce et al. (1995), whose study on the role of design was conducted among companies that had participated in the Department of Trade and Industry/Design Council's Funded Consultancy Scheme as well as Support for Design programme.

In addition to the Better by Design sample, stratified sampling was used to gather information from a second sampling frame through the company database software Kompass. By identifying companies in New Zealand that operated within the manufacturing industry, the search resulted in 2500 firms. Apart from developing a good sized sampling frame, the Kompass sample was also seen to be more representative of the manufacturing industry, given the small proportion of firms associated with Better by Design. Through the inclusion of firms from Kompass, it was believed that the results would be more generalisable and representative of design's presence across New Zealand manufacturing firms.

To ensure all firms completing the survey would be able to provide the information required, a screening question on the first page of the survey meant that firms with no NPD, marketing, or design activities were precluded. As the survey was self-selective (i.e. the respondents were given the choice to participate after reading about the purpose of the study), only 13 responding firms were screened out due to not performing any product development, marketing, or design activities.

5.3 Method

The research was conducted using an anonymous and voluntary web-based survey. The questionnaire consisted of approximately 20 questions which took around ten to 15 minutes to complete. An interactive survey design was used, where questions were displayed in a screen-by-screen fashion. This approach was selected to minimise discomfort for the respondents as well as the risk of missed questions – two issues often associated with scrolling survey designs (Couper, Traugott, & Lamias, 2001). A progress bar was included in the survey to inform participants of their progress (Crawford et al., 2000), and a reminder was set on all questions to alert respondents to any unanswered questions. At the end of the survey, respondents were redirected to a link that enabled them to make a request for a summarised report of the study.

5.3.1 *Online survey*

In their review, Evans and Mathur (2005) identified 16 strengths and nine weaknesses of online surveys. Within the strengths, speed and timeliness, convenience, ease of data entry and analysis, and low administration cost were the most applicable for the purpose of this study.

Speed and timeliness refers to an online survey's ability to gather real-time data, and broadband access has also contributed to this (Evans & Mathur, 2005). Various studies comparing the response time between internet-based and postal surveys found that the former generated faster responses (Dillman, Tortora, Conradt, & Bowker, 1998; Pealer, Weiler, Pigg Jr, Miller, & Dorman, 2001; Tse, 1998). In addition to speed, online surveying is also considered to be more convenient as participants are given the freedom to respond to the survey according their preferences (Evans & Mathur, 2005). For this study, time and costs were reduced as the researcher was not required to be present at the time of survey completion. Furthermore, during the analysis phase, all data was directly imported into analysing software. Finally, because the online survey was created by computer software and sent to participants via the Internet, efficiency was also achieved through the elimination of survey printing and posting (Evans & Mathur, 2003).

As well as advantages, Internet-based surveys have also been found to have disadvantage, however. Firstly, a number of studies have questioned the convergence of the Internet population, that is, how representative they are of the general population (Evans & Mathur, 2005; Gruber, Szmigin, Reppel, & Voss, 2008). This issue should not play a significant role for the target population of this study as all firms were found to have websites and company emails. Another disadvantage suggested by the authors was privacy concerns. However, because data generated by this study was stored in a password-secured account and could only be accessed by the researcher, the information was secure and this reassurance was provided to the respondents.

5.3.2 Survey participation request

Survey participation was obtained by emails addressed to the CEOs or managing directors of the companies. The emails consisted of a letter specifying the purpose of the study, as well as the survey link. For the Better by Design sample, the company list of 100 firms from the company's website was used as the contact list. Initial contact was made through the companies' general e-mail addresses and phone numbers to gather the names and email addresses of the CEOs or managers who oversaw the NPD process. Following this, survey requests containing the link were sent directly to the person identified through the email addresses provided. Ten emails were immediately returned due to invalid email addresses. For the Kompass sample, 460 out of 2500 firms from the search contained details of the names of CEOs/managers and their personal email addresses. Based on this list, the request letter with the survey link was sent via email to all 460 firms, out of which 60 were immediately returned due to invalid email addresses.

As suggested by Scott and Edwards (2006), questionnaires personally addressed to managers were more likely to be returned; as a result, all participation requests were sent using mail merge to ensure each letter was personally addressed to the identified candidate. The recipients were given the option of filling out the survey themselves or to forward the letter along with the link to a person in their company whom they felt had a good understanding of how marketing and design operated in relation to

the company's NPD activities. Two weeks after the first requests were sent, a follow-up request was sent to gather additional responses. The participation request letters (including follow-up letters) are attached in Appendices B and C.

5.4 Respondent characteristics

5.4.1 Response rate

Overall, the study sent out 560 survey requests, 70 of which failed to reach respondents due to invalid e-mail addresses. From the remaining 490 requests, a total of 175 responses were received, out of which 102 were completed. As intended, the vast majority of the completed questionnaires came from firms that performed NPD with both marketing and design functions (N=91). Whilst the response rate of 20% compares fairly well with standards, it was believed to be particularly favourable in this study given that only 19% of manufacturing firms in New Zealand were reported to have invested in marketing and design (Statistics NZ, 2010). The screening questions were found to be effective at excluding firms that did not meet the sample criteria as only five firms were screened out due to having no product development, marketing, or design activities. It was also believed that the self-selection nature of the survey was a contributor to the high percentage of useful responses, as firms with no interest in product development, marketing, or design would have chosen not to participate in the study.

5.4.2 Sample description

Table 5.1 displays the profile of the main sample. The sample size of 91 was favourable, given the specific scope of the study. It was also larger than a number of previous studies in design, particularly those exploring the relationship between design and organisational performance (see: Gemser and Leenders, 2001; Mozota, 2002).

The frequencies of company type, nature and scope of business, and firm size are shown in Table 5.1. The two samples derived from Kompas and Better by Design were found to contain 58 and 33 companies respectively. Given that the study focused specifically on the development of tangible products, most firms involved in the study were product development oriented, with only three firms reporting to be primarily service-oriented. A large majority of the firms were found to operate domestically and internationally, and over 80% of firms had fewer than 150 full-time employees.

		Frequency (N=93)	Percentage
Company type	Kompas	58	63.7
	Better by Design	33	36.3
Nature of business	Products only	27	29.7
	Primarily products	23	25.3
	Products and services	38	41.8
	Primarily services	3	3.3
Scope of business	Domestic only	4	4.4
	Primarily domestic	25	27.5
	Domestic and export	28	30.8
	Primarily export	34	37.4
Firm size (full-time employees)	Less than 10	5	5.5
	10-29	29	31.9
	30-49	9	9.9
	50-69	9	9.9
	70-99	16	17.6
	100-149	8	8.8
	150 and above	15	16.5

Table 5.1 Firm characteristics

The study was also able to obtain a wide variety of firms within the manufacturing industry, with the largest groups being transport equipment, machinery, and equipment manufacturing, metal products manufacturing, and food beverage and tobacco manufacturing. As shown in Table 5.2, the sample was slightly under represented in the food beverage and tobacco industry. This could be explained by the industry's low design rate, which was found to be 5% compared with 19% for the

overall manufacturing industry (Statistics NZ, 2010). The sample was also slightly over-represented in the wood and paper products industry. Upon further inspection it was found that over half of these firms were furniture manufacturers, which may have held a particular interest in design. Overall, the comparisons raised no major concerns regarding non-response bias.

Sub-industries	Sample		Across industry ²		Invested in M or D during innovation ³	
	#	%	#	%	#	%
Food, beverage and tobacco	10	11.0	942	17.8	450	20.0
Metal products	15	16.5	954	18.0	318	14.3
Petroleum, chemical, polymer and rubber products	9	10.0	414	7.8	252	11.3
Printing	2	2.2	330	6.2	90	4.0
Textile, leather, clothing and footwear	7	7.7	393	7.4	174	7.9
Transport equipment, machinery, and equipment	18	19.8	894	16.9	402	18.1
Wood and paper products	14	15.2	570	10.8	147	8.2
Other	16	17.6	624	11.8	311	14.0

Table 5.2 Industry representation

5.5 Data analysis

The current research took an exploratory quantitative research approach with deductive reasoning where research questions and hypotheses were developed based on the evaluation of existing literature (Cavana, et al., 2001). The quantitative approach seeks to identify and justify underlying relationships between variables in the hope of providing generalisable laws to explain human behaviour (Cavana, et al., 2001). Within this paradigm, construct relationships are explored through various

² Total number of firms in each sub-industry according to Statistics New Zealand, 2010

³ Total number of firms that had invested in marketing or design during their innovation activities according to Statistics New Zealand, 2010

statistical tests and the results are interpreted within the positivist paradigm which centres on objectivity – the existence of a true reality (Hudson & Ozanne, 1988).

According to Hair and colleagues (2006), although quantitative methods are often explanatory in nature, they could also include descriptive aspects directed at enriching less-developed research domains. This view ran parallel to the exploratory aspect of this study, which was to provide insights into the presence of marketing and design among firms as well as the effect of marketing and design on NPD outcomes. All statistical analyses were tested using SPSS 18.0.

6. RESULTS

6.1 Scale reliability and validity

All measurement variables were examined for validity and reliability. According to Kaplan (1964), constructs contain both systematic and observational meanings, implying they must be grounded in theory and be operationalisable. All constructs are required to meet convergent and discriminant validity requirements, where items measuring the same construct are correlated, but un-correlated with items of different measures.

6.1.1 Data skewness and kurtosis

Before any tests could be performed, all construct averages were tested for normality through skewness and kurtosis. The results in Table 6.1 show all variables to have skewness between -2 and 2 and kurtosis between -3 and 3, which suggests reasonable data normality (Curran et al., 1997).

(N=91)	Mean	Std. Deviation	Skewness	Kurtosis
Top management support – Marketing (TP_M)	5.89	0.95	-1.11	1.39
Communication link – Marketing (CL_M)	5.42	0.99	-0.51	-0.24
Certainty provider – Marketing (CP_M)	5.48	0.89	-1.29	2.43
Functional uniqueness – Marketing (U_M)	4.38	1.25	-0.52	-0.13
Total marketing influence (Tote_M)⁴	5.29	0.74	-0.60	0.30
Top management support – Design (TP_D)	6.04	0.98	-0.91	0.16
Communication link – Design (CL_D)	5.26	1.09	-0.84	0.91
Certainty provider – Design (CP_D)	4.89	1.10	-0.62	0.26
Functional uniqueness – Design (U_D)	5.10	1.15	-0.60	-0.01
Total design influence (Tote_D)⁵	5.32	0.81	-0.69	0.36
Connectedness	5.38	1.23	-0.97	0.21
Process proficiency	4.79	0.67	-0.58	-0.15
Market newness	3.45	0.93	-0.65	0.50
Financial outcome	3.44	0.85	-0.51	0.57

Table 6.1 Data skewness and kurtosis

6.1.2 Functional influence

A summated scale containing 11 items drawn from four dimensions of functional influence was used to assess the total influence of marketing and design.

Similar to other scale forms, summated scales must demonstrate content validity, dimensionality, reliability, and validity (Hair et al., 2005). Content validity, or face validity, refers to the correspondence of the variables to its conceptual definition. In this case, all items were adapted from the field of functional influence and power.

⁴ Calculated through averaging the aggregate mean of the four functional influence dimensions

⁵ See Footnote 4

Dimensionality refers to the number of dimensions present within a single scale. Under normal circumstances, scales should be one-dimensional. However, as the current study had identified functional influence as a four-dimensional construct, a confirmatory factor analysis was thus conducted to ensure all items had loaded onto the expected factor.

Using data reduction with PROMAX rotation, four factors were set to be extracted through factor analysis. As noted by Hair et al. (2005), the selection of rotational techniques should be dependent on the needs of the research. For this study, an oblique rotation was selected as the four factors chosen represent different facets of one construct (functional influence), therefore should, in theory, share some commonality.

The analysis generated KMO values of 0.78 for marketing and 0.84 for design, which suggested the data was suitable for factor analysis. In total, the factors were found to explain 71% of variance for marketing and 76% for design. The first factor was seen to account for 39% of variance for marketing, and 45% of variance for design. By comparison, the remaining factors were found to explain less variance (around 10%).

Tables 6.2 and 6.3 contain the item loadings and Cronbach's Alphas generated for the individual measures of marketing and design influence. The pattern matrix and structure matrix were both consulted for factor loadings and no significant differences were found between the two matrixes. For marketing, all items were found to load into the corresponding factors, with loading scores ranging from 0.66 to 0.88. For design, the majority of items had loaded correctly, with scores ranging from 0.72 to 0.87. The item 'Design is closely connected with other functions involved in the new product development process' (i.e. CL_D3) was initially selected as a communication link measure, however was found to load on certainty provider. After comparing the values of Cronbach's Alphas by including and excluding the item with other certainty provider measures, the decision was made to omit the item.

Marketing	Factor 1	Factor 2	Factor 3	Factor 4
Top management support Cronbach's $\alpha = 0.56$ TP_M1 TP_M2			0.83 0.85	
Communication link Cronbach's $\alpha = 0.64$ CL_M1 CL_M2 CL_M3		0.67 0.83 0.76		
Certainty provider Cronbach's $\alpha = 0.88$ CP_M1 CP_M2 CP_M3 CP_M4	0.76 0.92 0.88 0.86			
Functional uniqueness Cronbach's $\alpha = 0.56$ U_M1 U_M2				0.79 0.83

Table 6.2 Factor loadings for marketing influence

Design	Factor 1	Factor 2	Factor 3	Factor 4
Top management support Cronbach's $\alpha = 0.74$ TP_D1 TP_D2		0.88 0.86		
Communication link Cronbach's $\alpha = 0.65$ CL_D1 CL_D2				0.88 0.81
Certainty provider Cronbach's $\alpha = 0.85$ CP_D1 CP_D2 CP_D3 CP_D4	0.85 0.88 0.89 0.80			
Functional uniqueness Cronbach's $\alpha = 0.69$ U_D1 U_D2			0.84 0.89	

Table 6.3 Factor loading for design influence

By looking at the relationships between the four factors, the component correlation matrixes displayed in Tables 6.4 and 6.5 show positive correlations across all four dimensions of marketing/design influence. Most correlations were found to be around 0.30 for marketing and around 0.40 for design. These figures are favourable as they suggest all factors were able to capture a certain aspect of functional influence, yet not so much to suggest duplication.

Component	1	2	3	4
1	1.00	0.35	0.38	0.35
2		1.00	0.33	0.25
3			1.00	0.15
4				1.00

Table 6.4 Component correlation matrix – Marketing

Component	1	2	3	4
1	1.00	0.39	0.41	0.49
2		1.00	0.40	0.41
3			1.00	0.37
4				1.00

Table 6.5 Component correlation matrix – Design

The Cronbach's Alpha for the summated scales was 0.82 for marketing and 0.87 for design. Together, these findings confirmed high scale reliability.

Finally, as another test of construct validity, replacement variables (i.e. Tote_M and Tote_D) were first calculated by taking the average from the four influence measures (Hair, William, Barry, Rolph, & Ronald, 2010). This figure (which ranged between 1 and 7) was then correlated with a self-evaluation question that asked firms to identify how influential marketing and design were in their NPD activities. The question 'Please select the one statement below which most accurately reflects how marketing/design is positioned in your company' was accompanied by seven answers

where 1 represented the weakest influence and 7 represented the strongest influence (see Questions 9 and 11 in Appendix A for details of this question). The results found Spearman's correlations of 0.67 for marketing and 0.61 for design.

To further confirm that each point of the self-evaluation question illustrated a change in the level of functional influence, line graphs were drawn between firm scores in the summated scale (Y axis) and their response to the self-evaluation question (X axis). The line graphs depicted in Figures 6.1 and 6.2 show an overall positive relationship between the two variables. There was a slight jump within the graph for design. Upon further inspection, it was found that this result was provided by just one firm, but not considered to be an outlier. Apart from this instance, these findings support the view that the summated scale represented viable measures of the overall influence of marketing and design respectively within organisational NPD.

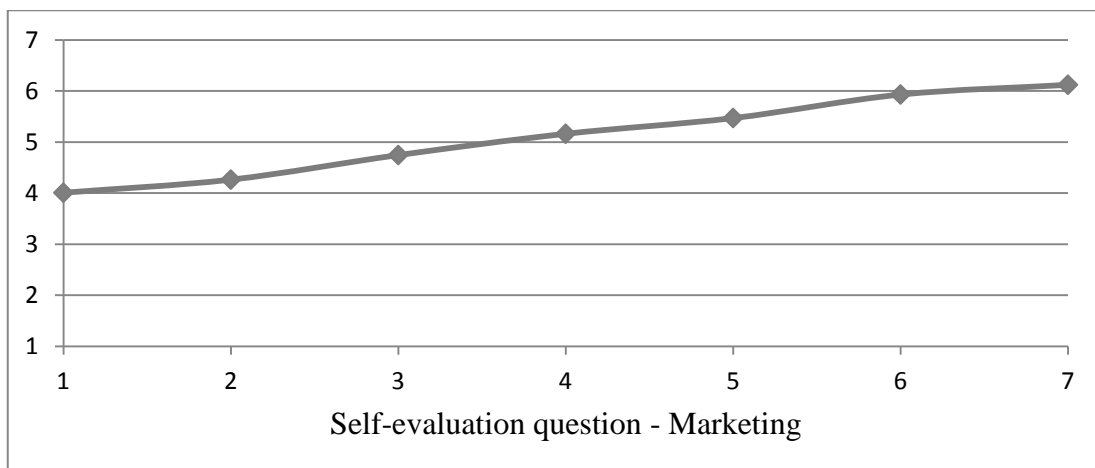


Figure 6.1 Correlation between marketing influence measures

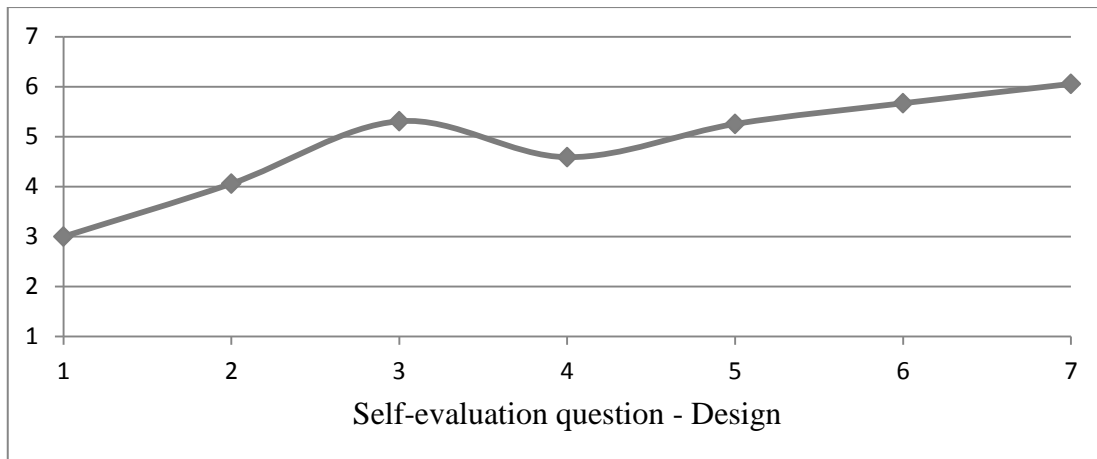


Figure 6.2 Correlation between design influence measures

Whilst the results above helped to justify the use of summated scales to assess marketing and design's influence within the firm, merit was also seen in retaining a degree of disaggregation in the four components of the marketing and design influence measure. As a highly significant phenomenon, the combined influence marketing and design has not been well-researched in earlier work. Furthermore, the correlations between the four influence dimensions were all found from the factor analysis to be moderate, which suggested that each dimension, when connected, was also conceptually distinct. Given that the aim of the study was to provide more insights into the co-existence of marketing and design, it was believed that by assessing the individual functional influence elements separately, the study would be able to offer diagnostic information that extends beyond simple recognitions of marketing and design's significance. As a result, the reliability and validity of each sub-dimension was also assessed.

The Cronbach's Alphas for each functional influence measure revealed some differences in scale reliability between marketing and design, particularly for top management support and functional uniqueness (see Table 3 on page 57). For design, all scale reliability scores were above 0.60, which was within the acceptable range for exploratory research (Nummally & Bernstein, 1978). The reliability for top management support and functional uniqueness generated from marketing were below 0.60, which suggested potential differences in the way in which the two measures were interpreted amongst the two disciplines.

Top management was measured by two items: recognition of functional importance and functional investment. The correlation between the two items was 0.41 for marketing and 0.61 for design. While the inter-item correlation result for marketing was moderate, the stronger correlation in design may suggest that top management's recognition of design's importance was more likely to be translated into the level of investment made to design.

Marketing and design's role as a communication link within the organisation was measured using three items. The inter-item correlation for marketing ranged between 0.33 and 0.51. As mentioned above, the question concerning design's connection with other functions in the NPD process was found to be highly correlated with questions associated with certainty provider. Because of this, the item was eliminated from this measure for design. The remaining two items were found to have a correlation of 0.48.

Certainty provider was measured using four items. Inter-item correlations were found to range from 0.50 to 0.82 for marketing, and 0.54 to 0.79 for design. High factor loadings were also obtained for this construct, which ranged from 0.72 to 0.88 for marketing and 0.72 to 0.85 for design.

Finally, functional uniqueness was measured using two items. The correlations between the two questions were 0.42 for marketing and 0.58 for design. Factor loading scores generated for the questions were 0.72 and 0.82 for marketing, and 0.80 and 0.87 for design.

Overall, the results showed the summated scales for overall marketing and design influence to possess good scale reliability and validity. Furthermore, all four dimensions of functional influence were shown to meet reliability and validity conditions.

6.1.3 Marketing and design connectedness

The four items measuring marketing and design connectedness generated a Cronbach's Alpha of 0.92. All inter-item correlations were found to be at a favourable level between 0.64 and 0.89 using VARIMAX rotation. Factor loadings

for the items ranged between 0.74 and 0.90, and the single factor explained 81% of variance.

6.1.4 Process development proficiency

The process development proficiency measure was extracted from previously developed scales of 24 items. Through factor analysis with VARIMAX rotation, inter-item correlations were found to be between 0.19 and 0.69. The lower correlations were found to lie between launch and business analysis (0.19), launch and product development and testing (0.21), and launch and prototype testing (0.26), but they all shared a positive correlation significant within the $p < 0.10$ level (with most at the $p < 0.05$ level). The single factor emerged with the Eigen value of 4.55 that explained 50% of variance.

The low correlations found between launch and other NPD phases may indicate that the phase is not considered to provide a good representation of the development process. Although this contradicts with most research within the field of NPD, a number of earlier studies did exhibit the tendency to view launch as being separate from NPD. Calantone and Cooper (1981) for example, referred to the NPD activity as 'NPD and launch', hence distinguishing launch from the rest of the NPD process. In this study however, product launch is considered to be a valid NPD activity given that the majority of NPD literature has recognised it as an important part of the NPD process. Furthermore, The Cronbach's Alpha was 0.87 which suggested high scale reliability. Factor loadings for the measure ranged from 0.55 to 0.80.

6.1.5 Market newness

The two items used to measure market newness were found to explain 58% of variance. Both items generated loadings of 0.81. The Cronbach's Alpha for the scale was 0.65. Together, these results suggested good scale validity and reliability.

6.1.6 Financial performance

Both items measuring financial performance were found to yield high factor loadings of 0.94. The scale was found to explain 89% of variance. The Cronbach's Alpha was found to be 0.88, which suggested high scale reliability.

Table 6.6 below provides a summary of the validity and reliability of all constructs. The following sections of result analysis will present findings on each research question.

	No. of items	Variance explained	Loading range	Cronbach's Alpha
Marketing influence	11	0.71	0.66-0.88	0.82
Design influence	10	0.76	0.72-0.87	0.87
Connectedness	4	0.81	0.74-0.90	0.92
Process proficiency	9	0.50	0.55-0.80	0.85
Market newness	2	0.58	0.81	0.65
Financial outcome	2	0.89	0.94	0.88

Table 6.6 Summary of scale validity and reliability

6.2 The presence of marketing and design functions

This section of the analysis aims to address the first research objective, which is to present findings that contribute to a better understanding of how marketing and design are positioned within companies.

6.2.1 Functional configuration

Before firms were asked to provide details on marketing and design's involvement and functional influence, they were asked to identify the size of their marketing/design functions and the titles of their most senior marketing/design personnel. These questions were intended to provide an overall picture of how marketing and design were configured within the organisation, which was then used

as a backdrop for interpreting marketing and design's functional influence and involvement in NPD.

The size of marketing and design functions was measured using the number of employees working full-time in each unit. The average number of employees in marketing functions was 4.35, compared with 9.60 obtained for design functions (see Table 6.7). Although the two figures differed significantly, frequency count results showed that both functions mostly consisted of between one and ten members. Given that the large majority of the firms in the study were SMEs, a functional size ranging from one to ten members may be seen as relatively substantial, given the diverse range of activities companies must perform. The high mean value generated for design functions was due to five firms that reported having particularly large design functions. These included two firms with 50 members, one firm with 80 members, and two firms with 100 members. By removing these five firms, the average number of employees in design groups was reduced to 5.74. Together, these results indicated that the presence of marketing and design (in terms of functional size) was relatively even across New Zealand manufacturing firms that had both marketing and design functions in operation.

	Frequency	Percentage
Size of marketing group (M=4.35, SD=4.56)		
1-5	73	80.2
6-10	12	13.2
11-15	3	3.3
16-20	1	1.1
21-25	1	1.1
26-30	1	1.1
Size of design group (M=9.60, SD=17.74)		
1-5	61	67.0
6-10	12	13.2
11-15	9	9.9
16-20	1	1.1
21-25	2	2.2
26-30	1	1.1
More than 30	5	5.5

Table 6.7 Function size

Table 6.8 contains the titles of firms' most senior marketing and design personnel. The most popular senior marketing titles were found to be Marketing Director or Manager, and General Manager. For design, the most popular titles were Senior Designer, Head of Design, Product/R&D manager, and Engineering or Technical Manager. The Marketing Manager was also the most senior design person in a small number of firms, which suggested that design may either have been lower in the organisational hierarchy when compared with marketing, or seen as integral to the marketing function itself.

	Frequency	Percentage
Senior marketing personnel		
Marketing Manager/Director	72	79.1
General Manager	13	14.3
CEO/Owner	3	3.3
Other	3	3.3
Senior design personnel		
Senior Designer/Head of Design	39	42.9
Product Development/R&D Manager	20	22.0
Engineering or Technical Manager	12	13.2
General Manager	9	9.9
Marketing Manager	5	5.5
Other	6	6.6

Table 6.8 Senior functional personnel

6.2.2 Functional involvement in NPD

The degree to which marketing and design are involved in the NPD process is central to their presence within the organisation. Having already obtained some understanding of the characteristics of the marketing and design functions, the study asked the respondents to identify the function with the main accountability for 16 NPD activities adapted from Millson and Wilemon (2002) (see Question 13 in Appendix A for details of this question). Figure 6.3 depicts the distribution of the main accountability between marketing and design across each NPD phase.

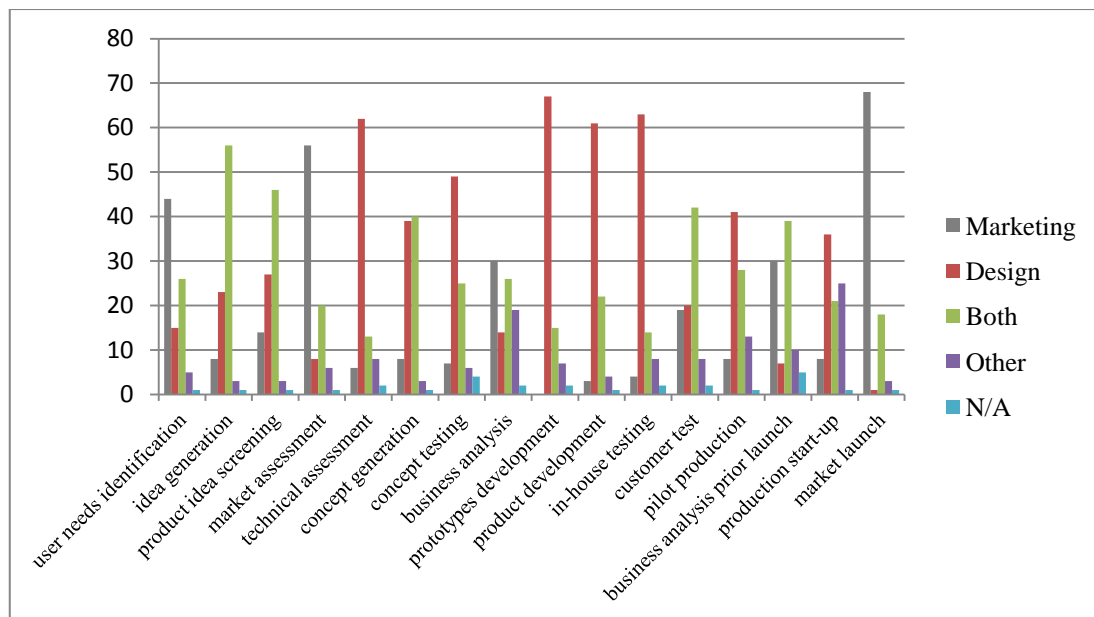


Figure 6.3 NPD accountability distributions

In general, most firms were found to rely on some degree of marketing and design for each phase of NPD. Very few phases were found to be held accountable by functions other than marketing and design, which, combined with the size and management background of the marketing and design functions identified earlier, provided a clear indication of marketing and design's strategic importance in organisational innovation and NPD.

The study found a good level of shared responsibility between marketing and design during a number of NPD phases (see the green bar). For example 66% of firms selected marketing and design to have the main accountability for idea generation. This figure was 48.5% for initial screening of product idea, 44% for concept testing, 46.2% for customer test/field trial, and 43% for pre-commercialisation business analysis prior to launch. These results were particularly interesting as they showed that a significant number of firms relied on both marketing and design during the early stages of NPD; activities that were seen to be the most complex and central to the success of NPD projects.

Whilst some firms relied on the combined leadership of marketing and design, the study also found many NPD phases to remain specialised for one function.

Marketing for example, was found to be the most accountable for user needs identification (47.5%), preliminary market assessment (63.6%), and market launch (72.2%). By comparison, design was found to hold more accountability during the technical phases of NPD, including preliminary technical assessment (64.4%), concept generation (40%), concept testing (51.5%), prototypes and pilot models development (69.7%), product development (64.6%), in-house testing (67.3%), pilot or trial production (43.4%), and production start-up (40.4%).

6.2.3 Functional influence

Table 6.9 contains the descriptive results generated from the four facets of functional influence. These include how marketing and design were perceived by top management, their role as a communication link and information provider, and their functional uniqueness within the organisation.

	No. of items	Min	Max	Mean	Std. Deviation
Top management support – Marketing (TP_M)	2	2.50	7.00	5.89	0.95
Communication link – Marketing (CL_M)	3	2.67	7.00	5.42	0.99
Certainty provider – Marketing (CP_M)	4	2.00	7.00	5.48	0.89
Functional uniqueness – Marketing (U_M)	2	1.00	6.50	4.38	1.25
Total marketing influence (Tote_M)	11	3.13	6.75	5.30	0.74
Top management support – Design (TP_D)	2	3.00	7.00	6.04	0.98
Communication link – Design (CL_D)	3	2.00	7.00	5.26	1.09
Certainty provider – Design (CP_D)	4	2.00	7.00	4.89	1.10
Functional uniqueness – Design (U_D)	2	2.00	7.00	5.10	1.15
Total design influence (Tote_D)	10	3.00	6.94	5.32	0.81

Table 6.9 Descriptive results for functional influence

For marketing, top management support was found to have the highest mean value with 5.89, followed by certainty provider (M=5.48) and communication link (M=5.42). Marketing's uniqueness by comparison, was found to be lower than the other indicators, with an average value of 4.38. These results may indicate that while marketing was considered to be important, its capabilities were not perceived to be distinct to the marketing function. The overall mean of marketing influence was found to be 5.3, which suggested a relatively high level of influence.

The influence of design was found to be the highest in top management support (M=6.04), followed by communication link (M=5.26) and uniqueness (M=5.10). The ability for design to provide information to address market uncertainties was found to be slightly lower, with a mean of 4.89. This finding may suggest that design has yet to be considered by most firms to be a viable function to gather market information and opportunities. The total influence of design across the four dimensions was 5.3, the same as marketing.

The findings above suggested marketing and design had equal levels of overall influence. However, given that the distribution of influence for the two disciplines differed across each dimension, it could be argued that the way in which marketing and design's functional influences were practiced was specific to each discipline. To further explore this, a paired-sample t-test was performed to compare marketing and design's influence across each influence dimension. The results displayed in Table 6.10 offered some confirmation of this proposition, as significant differences were found in certainty provider and functional uniqueness at the $p < 0.01$ level. Certainty provider was found to be significantly higher in marketing, which may suggest that the discipline was used more for gathering information to address market uncertainties than design. By comparison, design was seen to be a function that was believed to be more distinctive and non-substitutable than marketing.

	Mean Difference	Std. Deviation	Std. Error Mean	t	df	Sig. (2- tailed)
TP_M - TP_D	-0.15	1.10	0.12	-0.13	90	.20
CL_M - CL_D	0.16	1.33	0.14	1.14	90	.26
CP_M - CP_D	0.59	1.06	0.11	5.27	90	.00
U_M - U_D	-0.72	1.51	0.16	-4.55	90	.00
Tote_M - Tote_D	-0.03	0.91	0.10	-0.32	90	.75

Table 6.10 Paired sample t-test results on functional influence

Although no significant differences were found between other functional influence indicators, top management's support was found to be higher for design. The functional role of communication link on the other hand, was found to be higher in marketing. Again, these results suggested potential differences in the nature of marketing and design's functional influence. In other words, whilst marketing and design seemed to hold similar aggregate levels of overall influence within the firm, the pattern of influence across different responsibility areas in practice differed between the two disciplines.

6.3 Marketing-design relationship

The previous section presented evidence on the presence of marketing and design as individual functions within the organisation. This part of the analysis focuses on addressing the second research objective, and presents findings on the relationship between marketing and design. In particular, it explores the interplay between marketing and design during NPD, and the relationship between their functional influences.

6.3.1 Marketing-design connectedness

The marketing-design connectedness scale was used to gain initial insight into the relationship between marketing and design (see Table 6.11). The overall measure was found to have a mean of 5.38, which was above the median of 4. By looking at the scores for each item within the scale, it was evident that a relatively high level of marketing-design connectedness was present during a number of NPD decisions. In particular, decisions related to what new products were needed in the future or what existing products should be improved was found to contain the highest level of marketing-design connectedness. This may suggest that marketers and designers were required to work more closely together in the early phases of NPD, particularly during the generation and selection of product ideas.

	N	Min	Max	Mean	Std. Deviation
Overall marketing-design connectedness	91	2.00	7.00	5.38	1.23
Determine new product and improve existing products	91	2.00	7.00	5.69	1.21
Discuss market trends and developments	91	2.00	7.00	5.29	1.39
Plan responses to changes in the business environment	91	2.00	7.00	5.19	1.43
Review product development efforts	91	2.00	7.00	5.34	1.42

Table 6.11 Descriptive results for marketing-design connectedness

A regression analysis was also performed to assess the relationship between marketing and design's functional influence and their connectedness. The regression model generated an F value of 23.869 significant at the $p < 0.01$ level. The model helped explain 33.7% of variance. Both marketing ($\beta = 0.597$) and design ($\beta = 0.572$) were found to positively affect connectedness at the $p < 0.01$ level. Together, these findings showed that the degree of marketing and design connectedness was partially affected by how influential both functions were in the organisation.

6.3.2 Functional involvement in NPD

Figure 6.4 depicts the most common distribution of marketing and design's main NPD accountability seen in firms involved in the study⁶. Firstly, the conjoint leadership of marketing and design was found to lie during idea generation, preliminary market assessment, concept testing, customer test/field trial of product, and pre-commercialisation prior to decision to launch. Together, these findings showed the collaboration between the two functions to be spread out across the entire NPD process.

In contrast to joint leadership, marketing in general was seen to dominate the front end, analytical, and final phases of NPD, whereas design was found to be responsible mostly for the middle phases. These findings may indicate that the two functions were still divided in terms of their responsibilities and specialities during NPD. However, given that firms were asked to identify the function with the main accountability during each NPD phase, a meaningful connection between marketing and design is likely to exist even within phases led by one function.

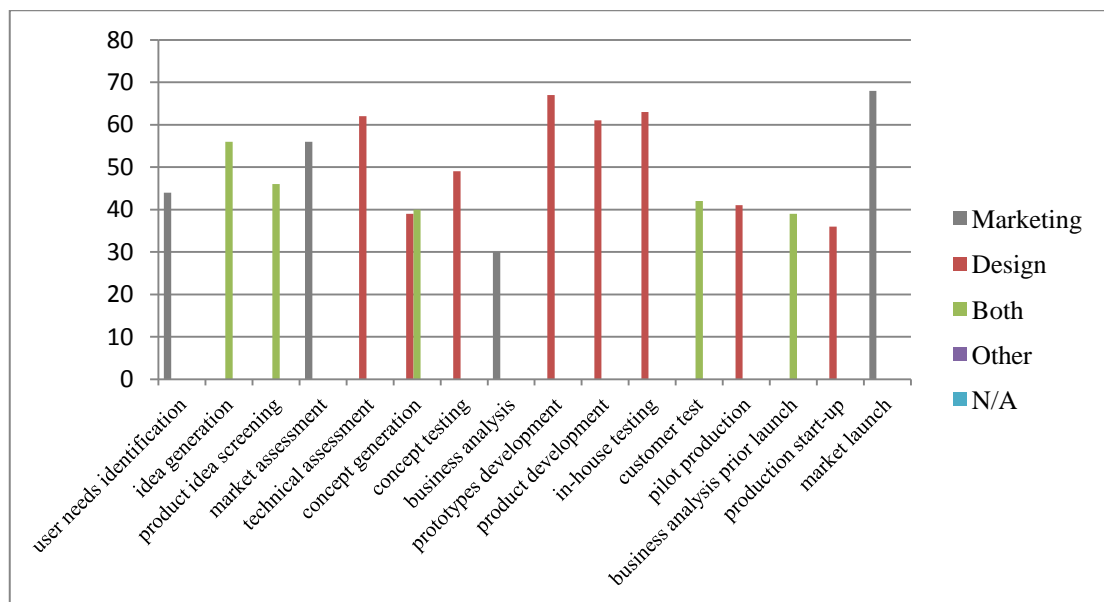


Figure 6.4 Common NPD process

⁶ The most common NPD process was generated by identifying the function that received the most votes by firms for each NPD activity.

6.3.3 Functional influence

The literature is divided on whether marketing and design are positively related within an organisational setting. While some studies show increase in one disciplinary orientation lead to an increase in the other, other studies show that the two functions move in opposite directions. The current study found a positive correlation between the overall influence of marketing and design $r = 0.31$, $p < 0.01$. Furthermore, positive relationships were found across each influence dimension (see Table 6.12). For example, there was a correlation of 0.26 in top management support; 0.21 for communication links; 0.37 in certainty provider; and 0.24 in functional uniqueness. Other significant correlations included those between the design's certainty providing ability with all other marketing influence factors, and the overall average of design influence with all marketing influence factors. Together, these findings showed firms with influential marketing functions also had relatively more influential design functions.

		TP_D	CL_D	CP_D	U_D	Tote_D
TP_M	Pearson Correlation	0.35***	0.08	0.21**	0.08	0.23**
	Sig. (2-tailed)	.00	.47	.04	.43	.03
CL_M	Pearson Correlation	0.13	0.18*	0.31***	0.13	0.25**
	Sig. (2-tailed)	.22	.10	.00	.23	.02
CP_M	Pearson Correlation	0.11	0.07	0.45***	-0.03	0.20*
	Sig. (2-tailed)	.30	.51	.00	.75	.06
U_M	Pearson Correlation	-0.01	0.15	0.28***	0.21*	0.22**
	Sig. (2-tailed)	.93	.16	.01	.05	.04
Tote_M	Pearson Correlation	0.19*	0.17	0.43***	0.15	0.31***
	Sig. (2-tailed)	.08	.11	.00	.16	.00

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6.12 Correlations between marketing and design influence

In summary, this section of the analysis found a moderate level of connectedness between marketing and design. The relationship between marketing and design's functional influence was also found to vary according to firms' levels of marketing-design connectedness. The paired-sample t-test comparing marketing and design's functional influence found differences in the distribution of influence, which suggested potential differences in the way each discipline was practiced among firms. The next section assesses the effect of marketing and design influence on NPD outcome.

6.4 Effect of marketing, design, and connectedness on NPD outcome

Multiple regressions were used to examine the effect of marketing and design's influence on NPD outcome. As discussed during the tests for scale validity and reliability, the summated scales were seen to offer parsimonious and concise representations of marketing and design's influence within the firm. However, as merits were also seen in the assessment of individual influence dimensions, detailed regressions were also performed between the four influence dimensions and each NPD outcome. As Section 6.5.5 shows, some dimensions were found to be more salient than others, hence supporting the approach of examining functional influence at both the aggregate and individual level.

6.4.1 Process proficiency

Table 6.13 contains the results of the multiple regression analysis used to examine the effect of marketing and design and their connectedness on process proficiency. The model generated an F ratio of 4.18, significant at the $p < 0.01$ level. The model generated an adjusted R² value of 0.096, hence explaining 9.6% of variance. Whilst no significant effects were found between marketing influence and process proficiency, the factors were found to share a significant correlation that warrants further research. The analysis also found a significantly positive relationship between design influence and process proficiency ($\beta = 0.29$). These findings did not offer

support for H1 and H7 but offered support for H4. They suggest firms with more influential design functions were also more likely to have effective development processes.

	Correlation	Unstandardised coefficient	t-statistic
Marketing influence	0.18*	0.13	1.24
Design influence	0.32***	0.29***	3.03
Connectedness	0.09	-0.08	-1.15

***p<0.01, *p<0.10

Table 6.13 Regression results for process proficiency

6.4.2 Market newness

The regression model testing the effect of marketing and design's influence and their connectedness on market newness was found to generate an F value of 3.50, significant at the p<0.05 level. The model helped explain 7.7% of variance (see Table 6.14). Although no significant effects were found in design's influence and marketing-design connectedness, both constructs were found to share a positive correlation with market newness. Marketing influence was found to have a positive effect on market newness significant at the p<0.10 level ($\beta=0.25$). These results suggested firms with more influential marketing functions were also more likely to develop products that addressed new market needs. Together, the findings offered support for H2 but not for H5 and H8.

	Correlation	Unstandardised coefficient	t-statistic
Marketing influence	0.27***	0.25*	1.70
Design influence	0.25**	0.04	0.42
Connectedness	0.23**	0.19	1.43

***p<0.01, **p<0.05, *p<0.10

Table 6.14 Regression analysis results for market newness

6.4.3 Financial outcome

The regression model for financial outcome generated an F value of 2.42, significant at the $p < 0.10$ level. Design's influence was the only factor found to have a significant effect on the construct ($\beta = 0.29$) (see Table 6.15). The model generated an R² value of 0.25, hence explaining 4.5% of total variance. Together, these findings showed firms with more influential design functions were more likely to enjoy higher product sales and profits. These results did not offer support for H3 and H9 but supported H6.

	Correlation	Unstandardised coefficient	t-statistic
Marketing influence	0.03	-0.84	-0.07
Design influence	0.27***	0.29**	2.31
Connectedness	0.14	0.03	0.30

*** $p < 0.01$, ** $p < 0.05$

Table 6.15 Regression results for financial outcome

6.4.4 Significance of individual influence dimensions

The regression analyses above found marketing and design to affect different aspects of NPD performance. Despite this, little was known about how these effects were distributed between the different influence dimensions. In order to develop a better understanding of the significance of marketing and design, detailed regression analyses were performed between the individual functional influence dimensions and each NPD performance measure.

Marketing's overall influence was found to have a positive effect on market newness. The detailed regression analysis containing the four influence measures generated an F value of 2.788 significant at the $p < 0.05$ level. The model helped explain 7.4% of variance. The results revealed that marketing's role as a communication link had the strongest effect on market newness ($\beta = 0.22$) followed by top management support ($\beta = 0.19$). These results indicated that in order for marketing to affect market newness, the function must become a boundary spanner within the NPD team, and be

acknowledged and well-resourced. No significant effects were found in certainty provider and functional uniqueness.

Design's overall influence was found to have a positive effect on process proficiency. The detailed regression analysis found top management support ($\beta=0.15$) and certainty provider ($\beta=0.14$) to be the only two measures of functional influence to have a significantly positive effect on process proficiency. The regression model was found to generate an F value of 3.34, significant at the $p<0.05$ level. The model helped explain 9.4% of variance. These findings suggested that in order for design to enhance the effectiveness of the development process, it must be well acknowledged and equipped by top management and be effective at addressing market uncertainties.

Product financial performance was also found to be positively affected by the overall influence of design. The detailed regression model generated an F value of 2.46, significant at the $p<0.10$ level. The results showed top management support ($\beta=0.22$) to be the only measure of design's influence to have a significant effect on financial performance. The model generated an adjusted R square value of 0.06, hence explaining 6% of variance. This finding showed firms that acknowledged and supported the strategic importance of design were also more likely to enjoy higher product sales and profits.

Finally, whilst no significant relationship was identified between the overall influence of design and market newness, the detailed regression analysis found design's effectiveness as a certainty provider to have a significantly positive effect on market newness ($\beta=0.10$). The regression model generated an F value of 2.44, significant at the $p<0.10$ level and helped explain 6% of variance. This result suggested design's ability to address market uncertainties would enhance a product's ability to capture new market opportunities. Table 6.16 provides a summary of hypotheses testing results.

Hypotheses	Results	Dimensions significant
Marketing → Process proficiency	Not supported	None
Marketing → Market newness	Supported	Top management support, communication link
Marketing → Financial performance	Not supported	None
Design → Process proficiency	Supported	Top management support, certainty provider
Design → Market newness	Not supported	Certainty provider
Design → Financial performance	Supported	Top management support
Connectedness → Process proficiency	Not supported	N/A
Connectedness → Market newness	Not supported	N/A
Connectedness → Financial performance	Not supported	N/A

Table 6.16 Hypotheses testing summary

6.5 Chapter conclusion

This section of the thesis has presented findings on the three research objectives and their corresponding research questions. Firstly, the presence of the marketing and design functions were explored. In addition to being similar in size and having similar types of personnel heading the function, the study found marketing and design to be two highly involved functions during the NPD process. Marketing was seen to take more leadership during the market assessment and launch phases of NPD, whereas design tended to dominate the technical phases.

Marketing and design were found to hold similar levels of functional influence within the firm (mean of 5.3). Upon comparing the functional influence between marketing and design, the results found certainty provider to be significantly higher in marketing and functional uniqueness to be significantly higher in design. Together, these findings suggested potential differences in the way in which marketing and design's functional influences were perceived within the organisation.

To explore the relationship between marketing and design, the marketing-design connected scale was first consulted. The results revealed a moderate level of connection between the two functions during a number of NPD decisions ($M=5.38$,

SD=1.23). One of the key findings generated from the study was a positive relationship between marketing and design's functional influence. A positive relationship was also established between marketing and design's functional influence and their level of connectedness.

The effect of marketing and design's functional influence on NPD performance was assessed through multiple regressions. In general, marketing was found to positively affect market newness. After the assessment of the individual effects of each influence dimension, the results further revealed that this effect was mainly contributed by top management support and communication link. The overall influence of design was found to positively affect process proficiency. The detailed regression analysis found this relationship to come from top management support and certainty provider. Top management support in design was also found to have a significant influence on products' financial outcome. Finally, although no significant relationship was identified between design's overall influence and market newness, design's effectiveness as a certainty provider was found to have a significantly positive effect on market newness.

Together, the results showed marketing and design to be two highly valuable functions within the organisation. This was evident from their involvement in the NPD process as well as their level of influence and effect on NPD outcome. The following section will discuss the implications of these findings in relation to the literature.

7. DISCUSSION

This chapter presents a discussion on the findings generated from the study. Firstly, the results of each research question are discussed in relation to the existing literature. This includes the presence of marketing and design functions (including their involvement in NPD and functional influence), the positive association between marketing and design's functional influences, and the effects of marketing and design and their connectedness on NPD. This is followed by an overall discussion, which combines the findings and discusses how they contribute to the understanding of marketing and design in NPD.

7.1 Marketing and design's presence in the organisation and NPD

Literature concerning the strategic importance of marketing and design has suggested that the two disciplines play prominent roles during organisational innovation (Hurley & Hult, 1998; Mozota, 2002; Siguaw et al., 2006; Sinkula, 2005; Veryzer, 2005). Despite this, limited research has been directed at exploring how marketing and design are involved in NPD and their levels of influence as strategic units within the organisation. With the aim of addressing this gap within the literature, the study's first objective was to assess the presence of marketing and design within the organisation.

7.1.1 Size and configuration of marketing and design functions

In order to better understand the presence of marketing and design, the study first asked firms to provide details on the size of their marketing and design functions as well as the title of the most senior marketing and design personnel. The study found that both functions mostly consisted of between one and five members, and a small

number of firms were also found to have particularly large design functions. For marketing, the size of the marketing function was plausible, given that the discipline had become a widely adopted practice among organisations. The size of the design function was higher than anticipated, especially as previous studies had shown the function to be marginalised within the organisational hierarchy (Bruce et al., 1995; Mozota, 2002). One possible explanation of this outcome may be that the firms involved in the study already had a particular interest in design, therefore would have already invested in the development of proper design functions. Another reason may be that as these firms engaged in NPD, there was also the tendency to develop in-house design capabilities (given design's involvement in the NPD process). Nevertheless, the results of the study showed that the presence of design (in terms of functional size) was similar to marketing, which offered support for studies that argued design had become a distinct function in its own right (Mukhopadhyay & Gupta, 1998).

In comparison with functional size, marketing and design's configuration within the organisation was reflected in the title of the most senior marketing/design personnel. The differences in the senior design titles in particular, offered some confirmation for research that defined design as a multidimensional discipline. More importantly, the results suggested that design's involvement in the organisation had extended beyond the traditional 'styling' roles to encompass engineering, R&D, and technological development (Cooper & Jones, 1994; Shirley; 1988). These findings reflected Ulrich and Eppinger's (2007) view of design, which included a combination of both engineering and industrial design.

7.1.2 The role of marketing and design in NPD

As discussed in the literature review, NPD is a complex and multidisciplinary process which consists of various stages. Each stage also requires different functional inputs and involves the making of different decisions.

Overall, the study found marketing and design to be two functions highly involved in NPD. Marketing's main accountability was found to be the most frequent during user needs identification, preliminary market assessment, and market launch. These

findings echoed the work of Moorman and Rust (1999) and others (e.g. Bruce & Daly, 2007; Luo, et al., 2005; Mukhopadhyay & Gupta, 1998) who believed marketing's role should centre on the management of the marketing-design interface. Marketing's involvement in user needs identification in particular, supported the view that the function should be positioned at the forefront of organisational innovation and be responsible for initiating NPD activities (Verhoef & Leeflang, 2009).

In comparison with marketing, design's main accountability during the NPD process was found to be concentrated within the technical phases. Similar to its configuration, design's leadership was found to be present in a broad range of NPD activities including technical assessment, concept testing, prototype development, and production. According to Cooper (2001), technical assessment requires firms to translate consumer needs into feasible solutions, a process that may require preliminary design work. By comparison, prototype development and testing requires the definition of product specifications, development of prototype plans, and the evaluation of test outcomes (Krishnan & Ulrich, 2001). By assigning design with the main accountability for these phases, the results showed that the role of design in organisational NPD had grown significantly from 'styling'. In fact, the current study found that design took on more of an integrative role discussed in Perks et al. (2005), where design's role included the sensing, interpreting, and translating of information between functions in the NPD team (Perks et al., 2005).

In addition to sole accountability, the study found marketing and design also shared the main accountability across a number of NPD phases. This conjoint responsibility was the most frequent during idea generation, product idea screening, concept generation, customer test, and business analysis prior to launch. According to Krishnan and Ulrich (2001), a product concept contains customer attributes and engineering or technical characteristics, which suggests that marketing and design may be treated as two functions responsible for managing product's marketability and feasibility. This view was also reflected by Hegarty and Hoffman (1987), whose study found that the marketing department engaged more in market scanning, while R&D and production were found to engage more in technological scanning. This division of responsibility could also be used to explain the phases of customer test

and business analysis prior to launch. According to Kline and Rosenberg (1986), the final phases of NPD often take the form of ‘design-build-test-redesign’, which requires frequent forward and backward communication between marketing and R&D to ensure all feedback is properly assessed and translated into the final product.

7.1.3 Marketing and design’s functional influence

In support of research that recognised the importance of marketing and design in organisational innovation, the current study found both functions to hold high levels of influence within the firm. Marketing was found to have an overall influence of 5.3, which was higher than the 4.48 obtained by Hegarty and Hoffman (1987)⁷, 4.93 by Homburg et al. (1999), and 3.69 by Verhoef and Leeflang (2009). Design’s overall level of influence was also shown to be 5.3. Despite the lack of evidence that could be used for direct comparisons, the figure compared favourably with Hegarty and Hoffman’s study where product management and R&D departments were found to have an overall influence of 4.48 and 3.92 respectively on organisational decision-making⁸. Research by Mozota (2002) also provided a frame of reference as the firms in her study considered design to be fundamental to the development of competitive advantages and core competencies (5.39 and 5.12 out of 6 respectively).

The high level of marketing and design’s functional influence may be explained by their involvement in the NPD process. As discussed in Li et al. (1999), marketing’s participation in NPD is an antecedent to its influence as the discipline must first engage in the process in order to have a bearing over its direction. In other words, as marketing and design become more involved in the NPD process, they also gain greater levels of influence over the direction of the NPD project.

By looking at the individual measures of functional influence, the study found that both marketing and design scored highly on top management support. Within the context of NPD, top management support included commitment, resource allocation and acquisition, and willingness to undertake risks (Benson, 1975; French & Raven, 2001). Under the theory of bureaucratic power, recognition from top management

⁷ Scores were initially given on a 5-point scale and were re-calculated to fit a 7-point scale to offer a direct comparison to the results found in this study

⁸ See Footnote 7

also indicated higher hierarchical positions (Blau & Schoenherr, 1971; Pugh, Hickson, Hinings, & Turner, 1968). As proposed by Green (1995), top management support in NPD projects is affected by the project's expected contribution, size of investment, innovativeness, and business advocacy. Within this list, expected contribution and innovativeness in particular, suggested that marketing and design were considered to be two functions that possessed the ability to provide the firm with valuable contributions and new market opportunities.

Similar to top management support, marketing and design were also found to score highly on communication link. Together, these findings offered confirmation for research that believed marketing and design had become more disseminated throughout the organisation. For marketing, this outcome reinforced the discipline's role as a boundary spanner within the organisation (Day, 2004; Moorman and Rust, 1999). For design, the results illustrated the discipline's growth and maturity in the organisation. They also offered support for Sisodia (1992) and Mozota (2006) who believed design possessed integrative abilities. Sisodia (1992) for example, used the term 'process basics' to describe design's ability to coordinate and align units involved in NPD. Mozota (2006) on the other hand, referred to design as a resource that contained co-ordination and integrative capabilities; enabling firms to develop competitive advantages.

The study found marketing scored significantly higher in certainty provider when compared with design, which indicated that the discipline was still viewed by many to be the more viable function for addressing market uncertainties. This outcome corresponded to early evidence found in Hegarty and Hoffman (1987), where marketing departments were reported as having the highest influence over product-market decisions (higher than product management, R&D, and production). The tendency to position marketing at the forefront of innovation was also evident in more recent research. Webster et al. (2005) for example, found that most CEOs hold marketing accountable for firms' levels of innovation. By comparison, Verhoef and Leeflang (2009) found a positive relationship between a marketing department's innovativeness and its influence in the firm. According to Menon and colleagues (1999), firms should encourage marketing's involvement in innovation as innovation itself represents marketing strategy development. This was later reflected in a

McKinsey (2004) study, where many CEOs expressed the desire for marketing to become more involved in new business development.

Compared with marketing, design was considered by firms to be less effective at addressing market uncertainties. This result did not indicate that design's certainty providing capabilities were ineffective (in fact, the study found a positive relationship between this factor and NPD performance), but that this ability had not become fully acknowledged by firms. Indeed, design's methods of obtaining market information contain many advantages, yet these methods have been found to differ significantly from most traditional market research tools (Cagan & Vogel, 2002; Kelley, 2001; Pullman et al., 2002). As a result, in order for firms to use design for opportunity sensing, they must first be willing to undergo change and take on risks. Given that a strong left-brain business culture had been found to limit design practices (Workman, 1993), it could be argued that design's low score in certainty provider showed that most firms were hesitant about its ability to capture new market opportunities. This was also evident from marketing and design's involvement in the NPD process, which saw most firms relying on marketing's leadership during user-needs identification, whereas design was brought in later during idea generation.

Finally, design's functional uniqueness was found to be significantly higher than marketing. This finding may illustrate a difference in the maturity of marketing and design as a culture within the organisation. Developments in marketing theory have long pushed for the discipline to become disseminated throughout the organisation. The concept of market orientation, for example, encourages other functions in the organisation to perform activities such as market surveillance and customer relationship management (Kohli & Jaworski, 1990; Moorman & Rust, 1999; Ruekert, 1992). Although the design theory has also undergone similar transformations (e.g. silent design), it could be argued that this development has not yet become mainstream among organisations. This was also reflected in the discipline's involvement in the NPD process, which mostly revolved around specialised technical activities.

7.2 The marketing-design relationship

The study's second research objective was to explore the marketing-design relationship among firms. This was achieved firstly by assessing marketing and design's interplay during the NPD process, followed by the relationship between both function's level of influence.

7.2.1 Marketing-design relationship during NPD

By assessing the degree of connectedness between marketing and design as well as their involvement in the NPD process, the current study found that the two functions shared a close relationship. Some examples of this connection included marketing's involvement in user-needs identification and launch, and design's involvement in concept development and testing. Together, these findings offered support for research that defined marketing's role as a bridge between the customers and design (Luo, et al., 2005; Mukhopadhyay & Gupta, 1998), and design's role as a translator for marketing (Cooper, 1994; Olins, 1990). Marketing and design's connectedness was also shown to be affected by marketing and design's functional influence. This finding further highlighted the importance of cross-functional integration, as influential functions must develop the capabilities required to communicate and work with other functions involved in the NPD team (Day, 2004; Teece, 2007).

In addition to guiding each other's work, the study also found that marketing and design shared the main accountability during idea generation, concept generation, customer test, and business analysis prior to launch. This was a particularly interesting finding as it demonstrated the 'coupling' of marketing and design discussed in Walsh (1996). Under this approach, marketing and design are required to combine their efforts in addition to exchanges of information. According to Kahn (1996), the combination of communication and collaboration could enhance the benefit of integration as synergy effects are generated. Under this rationale, the NPD phases that require the conjoint leadership of marketing and design would also require a stronger cross-functional relationship. Indeed, given the inputs required to implement each of these NPD activities, marketing and design must successfully combine their efforts to ensure that the outcome of each phase (i.e. the product idea,

product concept, and final product) achieves the right balance between market needs and technical feasibility.

Although the study was able to identify some conjoint leadership between marketing and design, the overall NPD process was still found to be dominated by phases led by either marketing or design. This finding may suggest that the decision to ‘couple’ marketing and design’s leadership throughout the entire NPD process was still considered by managers to be challenging. However, it could also be argued that such a strong collaboration was seen to be unnecessary, as a single function could be more effective at managing certain NPD phases alone. According to Troy et al. (2008) and Song et al. (1998), whilst cross-functional integration benefits certain NPD phases by providing new perspectives, it could also have negative effects on phases that require specialised knowledge. Their argument offers a more plausible explanation to the results as marketing and design were each shown to lead phases that most reflected their specialties (i.e. with marketing in charge of market-related stages, and design in charge of technical stages).

7.2.2 Relationship between marketing and design’s functional influence

The study found a positive relationship between the influence of marketing and design, which suggested firms with influential marketing functions also had more influential design functions. Given that the marketing-design relationship had received little theoretical discussion, the study was only able to make the conclusion that the two functions were closely associated and seemed to move together within the organisation.

Despite a lack of evidence that pointed to a causal relationship between the influence of marketing and design, research into the marketing-design relationship offered some evidence to suggest the potential of a dyadic effect. Moll and Montana (2007) were amongst the first researchers to explore the relationship between marketing and design’s strategic importance. Their case studies revealed that firms that were able to harness design as a strategic asset also demonstrated signs of market orientation including greater emphasis on clients, higher levels of market sensing, and stronger inter-functional coordination. The authors concluded: ‘If companies with a strong

orientation towards design also develop a broad orientation towards the market, we can affirm that design orientation favours market orientation' (p.873). This tendency to view design as a contributor to marketing was also reflected in other studies. Walsh and Roy (1983) for example, referred to designers as the gatekeepers of user needs, which implied that designers could be equally market oriented when compared with marketers. Similarly, Kristensen and Gronhaug (2007) believed that the combination of marketing and design could enhance firms' market sensing, communication, and product distribution strategies. Within the design discipline, the strong user-focus also points to a positive relationship between marketing and design. Concepts such as 'empathetic design', 'user-oriented design', and 'second order understanding' all suggest designers possess capabilities traditionally required of marketers (Leonard-Barton, 1992).

Whilst the above line of research proposed that a stronger influence from design could enhance firms' marketing capabilities, the current study argues that marketing could also affect design's position within the organisation. This proposition is established by the works of Bruce and Daly (2007), whose study found marketing and design to be interconnected. While the authors acknowledged design's ability to enhance marketing benefits such as product quality, differentiation, company image, and intellectual property, their study also found that more market oriented firms adopted more holistic approaches to design (e.g. involving the discipline in market research and concept development). These findings therefore suggest that more market oriented firms are also more willing and able to harness design as a strategic asset. Grinyer (2001) for example, considered designers to be a creative resource that must be properly managed by the organisation. Kotler and Rath (1989) also believed that a lack of design in organisations was the result of firms' myopic goals and risk avoidance. Together, these arguments show that firms with stronger marketing capabilities (including those that focus on long-term strategic development and are more willing to engage in innovation) should also be more willing to prioritise design in their strategy development.

7.3 Effect of marketing, design and connectedness on NPD performance

One of the key contributions the study sought to make was to provide empirical evidence of the effect of marketing and design on NPD performance. The regression analyses results were able to identify a number of positive effects that marketing and design had on NPD performance. More specifically, each of these effects was found to be influenced by different influence dimensions.

7.3.1 Effect of marketing

The strategic importance of marketing in organisational innovation and NPD has promoted some discussion, although few studies have directly examined the effect of marketing's influence on NPD performance. The current study found that the overall influence of marketing had a positive correlation with process proficiency as well as a significantly positive effect on products' market newness.

Although no significant relationships were found between marketing influence and process proficiency, it was believed that the significantly positive correlation between the two factors suggested the presence of an interesting dynamic that warrants further research. For instance, marketing's role as a market sensor has been discussed in relations to the innovation process. As argued by Li and Atuahene-Gima (1999), marketing's involvement during the early phases of the NPD process (i.e. user needs identification and idea generation) enhances timeliness of development as issues pertinent to the consumers are addressed earlier in the development process. This view was also shared by Srivastava et al. (2001), who believed that marketing's relationships with stakeholders and customers were valuable assets that helped the organisation to detect environmental changes.

The significance of marketing's influence on market newness showed marketing to be a function that was capable of capturing new market opportunities. In particular, the significance of top management support and communication link showed that the function's presence within the organisation was central to its effect on NPD performance. For top management support, Song et al. (1996) found marketing's

ability to make critical decisions was enhanced when the function was well resourced. Atuahene-Gima and Li (2000) by comparison, found that a stronger support from top management increased the likelihood of marketing's opinions being accepted by other functions. Compared with top management support, the significance of communication link offered support for the importance of marketing as a boundary spanner. According to Atuahene-Gima and Li (2003), marketing strengthens its influence in the NPD process by providing general market information and building alliances with co-works and other departments. Merlo (2011) also found that marketing's network power was particularly relied upon during NPD as the need for information gathering and dissemination was heightened due to high market uncertainties. These findings, therefore, show that marketing's ability to capture new market opportunities lies within its ability to gather and transfer market information.

No significant effect and correlation was found between marketing influence and new product financial outcome. Whilst this finding did not offer much support for earlier research, Baker and Sinkula (2005) did generate similar findings where the effect of market orientation on organisational profitability was mediated by market share. Although the authors also found that market orientation affected new product success, upon further examination, it was found that the measures the authors adopted to assess new product success did not include financial measures. These findings thus suggest that marketing's effect on firms' financial performance could be mediated by other factors. As put by Baker and Sinkula (2005): 'Firms must be able to screen new product programmes not only on the basis of their likely acceptance by their targets but also on their ability to convert new product and line extension sales into market share gains' (p. 497). Based on this finding, the study believes that the marketing- financial performance relationship may be mediated by perceived value. In other words, it is only when marketing is able to enhance the perceived value of a new product, that it enhances product sales and profits.

7.3.2 Effect of design

Whilst design research had continuously found that the discipline played a vital role in organisational innovation and NPD, few of these studies had empirically examined

the effect of design on NPD performance. Using quantitative research methods, the current study found that design had a positive effect on NPD process proficiency and product financial performance, and was positively associated with market newness.

The effect of design's influence on process proficiency offered support for studies that argued design enhanced the effectiveness of the product development process. The significance of top management support and certainty provider further suggested that the function must be acknowledged by top management and directed towards addressing market uncertainties. According to Cooper (2001) and others (e.g. Brunner et al., 2008; Jang et al., 2009; Kelley, 2001), designers' use of visual representations during concept generation and development reduces cross-functional confusions. Wainwright (1995) also proposed that given design's influence over product configuration and cost, a proper design infrastructure could assist firms in the selection of more effective and efficient manufacturing facilities. Despite these advantages, other research had shown that a strong business culture hindered the adoption of design practices (Workman, 1993). As a result, the significance of top management support indicated that design practices (e.g. visualisations) must first be acknowledged and adopted within the organisation. The significance of certainty provider, on the other hand, showed that design must also develop the skills to address uncertainties during the development process in order for it to enhance process effectiveness.

Design's ability to address market uncertainties was particularly evident in market newness. Whilst its overall influence was only found to have a positive correlation with market newness, a significant effect was found in its effectiveness as a certainty provider. This was a particularly interesting finding as it helped validate design's ability to stimulate product innovativeness (Beverland & Farrelly, 2007; T. Brown; 2009; Verganti, 2008). While most research in NPD remains favourable towards marketing, studies exploring design-oriented firms have argued that design is more effective at initiating radical innovations. Brunner et al. (2008), for example, believed designers' use of observations during market sensing allows firms to capture latent consumer needs. This was reinforced by Bettencourt (2008), who found that most customers' core values are embedded in behaviour rather than speech. Verganti (2008) contended that design-driven firms seek inspiration beyond

the market. By gathering information from multiple stakeholders such as other designers, artists, suppliers, and media sources, design-driven firms are able to anticipate market trends and develop market-driving innovations.

The positive effect of design on firms' financial performance had been noted in previous studies. Roy (1994), for example, found firms that were more 'design-conscious' enjoyed a higher return on capital. Hertenstein and et al. (2005) reported that firms with more effective design capabilities achieved higher financial performance, including sales. Earlier research in design found that design's involvement in the development of product form and packaging added value to pre-existing product ideas (Bloch, 1995; Burns & Waterhouse, 1975). Furthermore, recent studies pushing for a more strategic view of design also showed that design's approach to capturing and translating consumer needs into products generated product ideas containing higher customer value (T. Brown, 2009; Gallo, 2011). The significance of top management support found in this study further reinforced these studies by suggesting that design must be well-equipped in order to perform these tasks and have its abilities acknowledged within the organisation.

7.3.3 Effect of connectedness

Compared with studies that found strong cross-functional integration enhanced NPD performance, the current study failed to establish significant relationships between the level of marketing-design connectedness and process proficiency, market newness, and financial outcome. Whilst these findings were surprising at first, upon further examination it was decided that the insignificant results may be caused by the connectedness scale the study selected to assess marketing-design integration. According to Kahn (1996), there are two dimensions to functional influence, namely interaction and collaboration. Whilst the former refers to the level of information exchange (e.g. through meetings), the latter requires resource sharing and team work. In this study, the connectedness scale reflected only interaction, which has been found to insufficiently explain organisational performance (Gomes, de Weerd-Nederhof, Pearson, & Cunha, 2003; Kahn, 1996; Kahn & Mentzer, 1998).

Despite no significant effects, marketing-design connectedness was shown to have a positive correlation with market newness. This finding indicated that firms with frequent marketing-design connections were also more innovative with their new products. Since it has been argued that marketing and design adopt different approaches to identifying market needs, one possible explanation of this outcome is that their union exposes the firm to a broader range of opportunities (Bruce & Bessant, 2002). Day (2004) refers to this as a ‘multisource approach’, in which firms seek information from various channels. Kristensen and Gronhaug (2007) also proposed that better integration between marketing and design could enhance firms’ market surveillance abilities, a capability that is central to the development of innovative products.

7.4 Overall discussion

The current study has explored the presence of marketing and design, their relationship, and their effect on NPD performance. This section of the discussion looks at how each of these topics had contributed to the overall understanding of marketing, design, and NPD.

7.4.1 Presence of marketing and design in NPD

After assessing the roles of marketing and design, as well as their influences, the study found both functions to be highly influential within the organisation. Whilst marketing was found to take the main accountability during only a small proportion of NPD phases, it is argued that the phases in which the discipline was involved constituted some of the most prominent NPD activities. For instance, marketing’s leadership in user needs identification and market sensing showed that the function had maintained a position that oversaw the direction of the NPD project. These findings validated marketing’s importance in NPD, and provided a positive outlook for the future development of the marketing function within the organisation.

The study also found design to be highly influential in organisational NPD. As a function that held the main accountability during technical assessment, concept generation, and concept testing, the results had shown that most firms involved in this study maintained good design consciousness. These results were also in sharp contrast to those generated from earlier research, which saw graphics design to be the most widely performed design activity within the organisation (Bruce et al., 1995; Mozota, 2002). Furthermore, as found in the specific dimensions of design's functional influence, the results also suggested that the design discipline had become well respected by top management and disseminated throughout the organisation (including the NPD team). In general, all of the results found in this study pointed to a rise in design's presence within the organisation.

The study believes that the decision to introduce design earlier in the NPD process was a key indication of design's growing importance within the organisation. Given the complexities and significance of front end development activities, it could be argued that design's involvement during these phases reflected a high level of top management support and trust for the discipline. One possible explanation for firms assigning design with more responsibilities during NPD may be that the traditional business-dominated strategies were no longer considered to be effective at providing the competitive edge required for success. Indeed, recent studies have pointed out that an over-reliance on traditional marketing research methods can trap firms in a cycle of creating incremental innovations (Bettencourt, 2009; Cagan & Vogel, 2002; Christensen, 2003). Others have also argued that the complexity of today's marketplace requires firms to redefine and re-evaluate traditional business principles. Esslinger (2011) for example, stated: 'We've realised that the traditional indicators of economic success might not have been giving us the whole story. We've seen the powerful influence of design on the business model, and how strong leadership shapes and implements creative, innovation-driven strategies to achieve most sustainable profitability'. Under this view, it could be argued that design's rising importance within the organisation could assist firms with overcoming the limitations associated with traditional business practices.

7.4.2 Marketing-design relationship

Whilst marketing and design were found to hold a strong presence within the organisation, their involvement in the NPD process still suggested that both disciplines remained rooted in their own disciplinary area.

The way in which marketing and design were configured during the early phases of NPD (i.e. user needs identification, idea generation, and product idea screening) could be characterised as an intermediate strategy discussed in Kotler and Rath (1984). According to the authors, there are three approaches to managing marketing and design in the organisation. The marketing-dominated strategy represents the most traditional approach where market research (performed by marketing) is used to guide the works of design. Conversely, the design-dominated strategy provides designers with absolute freedom with no market data boundaries. Finally, the intermediate strategy argues that design need not be market sourced but should be market tested (Kotler & Rath, 1984). This approach captured marketing and design's configuration during the earlier NPD phases, as design was not involved in user needs identification but included in idea generation. The advantage associated with the intermediate strategy is that it enables firms to include ideas not identified by marketers during market research (Kotler & Rath, 1984).

In comparison with the front end of the development process, the rest of the NPD process saw marketing and design remain relatively divided, with the exception of concept generation, customer test, and business analysis prior to launch. This study argues that the decision to divide NPD responsibilities between marketing and design could be beneficial to the firm as it creates a healthy balance between the two disciplines. More importantly, it helps to explain the dyadic relationship between marketing and design, which could also be viewed as an interdependent relationship. According to Bitar and Hafsi (2007), the development of organisational capabilities is a strategic decision. Given that firms often have limited resources, this decision often lies with the capability that is perceived to be the strongest in the firm. However, as Ho et al. (2011) pointed out, if two capabilities both prove to be highly important, such a trade-off could be bypassed as firms adopt an ambidextrous strategy (i.e. the pursuit of two types of capabilities). For this study, it is believed that as marketing and design were responsible for different aspects of NPD (with

marketing focusing mostly on the market and customer aspects and design focusing on the technical aspects), both groups of capabilities were considered to be important as both would need to be properly developed to ensure successful NPD. Song et al. (1998) referred to this NPD approach as the function-specific and stage-specific pattern of cross-functional integration, where different functions were involved in different phases of NPD. Their study found this form of integration to be more productive, compared with those that aim to integrate all functions during all NPD stages.

7.4.3 Effect of marketing and design on NPD outcome

Finally, the results pertaining to the significance of marketing, design, and connectedness on NPD performance offered a number of invaluable insights into the nature of marketing and design in NPD. One of the most prominent findings generated from this objective was the significance of design on NPD performance. This finding not only helped validate the strategic importance of the design discipline, but also contributed to the growing body of literature pushing for firms to become more oriented towards design and design-thinking.

Whilst the insignificance of marketing-design connectedness as an antecedent to NPD performance was believed to have been affected by the selection of measure, the limited significance of marketing was somewhat unexpected given the solid foundation marketing theory has established in the innovation literature. The current study argues that this outcome does not suggest marketing to be ineffective in NPD but that its role may be more subtle in comparison to design. Furthermore, it is believed that as design becomes more involved in organisational innovation, it also begins to develop marketing capabilities.

One of the key indicators of marketing's underlying presence in design is the broadening of designers' roles. In this study, this was illustrated in design's involvement in the NPD process, which saw the function to hold the main accountability in a number of key stages such as concept generation, technical assessment, and concept testing. In their discussion of designers' roles in the organisation, Cooper and Press (2003) defined the designer as a combination of a

crafts maker, cultural intermediary, and opportunistic entrepreneur. Their definition thus illustrates a shift in design theory from arts and crafts to business and strategy. The inclusion of the latter two roles also implies that design has transformed into a bridge between society and people, and a contributor to the sustainable well-being of enterprises and society (Cooper & Press, 2003; Esslinger, 2011). Other evidence that shows design's significance to be reflective of marketing-related capabilities and responsibilities include: (1) the use of ethnographic tools to perform market sensing (which has been shown to enhance product innovativeness and product value) (Bucolo & Matthews, 2011); (2) the delivery of customer experiences (which has been found to be the driving force behind industry leading firms such as Apple) (Gallo, 2011; Ward, Runcie, & Morris, 2009); and (3) the development of negotiation and persuasion skills (which has helped the discipline to strengthen its position within the organisation) (Alvesson, 2004). In a recent study of design agencies, Sunley et al. (2009) also found that design firms took on relationship management roles including market segmentation and customer servicing. Together, these findings show that the effect of design no longer lies solely within the design discipline, but that design has begun to merge its own theories and practices with those of marketing. This relationship was best described by Esslinger (2011), who asserted: 'The belief that design can save the world without a coherent set of ideas represents a type of progressivism that is naïve at best... that is why designers rely on strong alliances with marketing leaders to devise sustainable strategies that will succeed in the world as it is, while helping to shape the world as we want it to be'.

7.5 Chapter conclusion

This section of the thesis has discussed the results of the study in relation to the extant literature. In general, the results helped confirm the importance of marketing and design in organisational NPD. The influence and significance of design also offered invaluable evidence to suggest that the discipline has established a strong presence within the organisation.

The positive relationship between marketing and design's functional influences was discussed in relation to their configuration in the NPD process. In particular, their interdependent relationship was believed to have been affected by their equal level of significance in the organisation.

Finally, the effect of marketing, design, and their connectedness on NPD performance was shown to contain limitations as well as new insights. The significance of design helped to provide empirical evidence of the benefits associated with developing a design function. Although the significance of marketing was less salient, it was believed that marketing theories and capabilities were largely reflected in the significance of design.

8. CONCLUSIONS, IMPLICATIONS AND FUTURE RESEARCH

8.1 Conclusions

This thesis set out to explore the place of both marketing and design within New Zealand manufacturing firms known to be engaged in NPD and shown to have made some commitment to design. The study is important because a number of commentators have observed that all firms will need to improve their innovative capacity to maintain a competitive position in the future, yet little research has been undertaken to assess how marketing and design should be managed within the NPD context. This chapter summarises the main objectives of the research undertaken, which consisted of: (1) developing a better understanding of marketing and design's presence within the organisation and NPD; (2) exploring their relationship during NPD; and (3) and assessing their effect on NPD performance. The study was set within the New Zealand manufacturing industry context, and was conducted using a quantitative research approach.

There has been debate within the literature about the presence of marketing and design within the organisation. With regard to marketing, research has consistently highlighted the discipline's importance in organisational innovation, although its relationship with design has been seldom explored. By comparison, research in design has found the discipline to be highly underrepresented in theory and practice, despite its importance in organisational innovation. The findings from the current study contributed to these debates by identifying marketing and design as two of the most involved and influential functions within organisational NPD. Corresponding with earlier research, the results found that marketing has maintained its dominance over many key NPD phases including user needs identification, market assessment, and launch. The function also scored highly in top management support, communication link, and certainty provider, all of which pointed to a strong functional presence. Similarly, design's involvement in NPD was found to extend

beyond traditional styling roles. Furthermore, the function was found to have good levels of top management support, which also showed that the discipline had become more acknowledged by organisations.

As two highly influential functions within the organisation and the NPD process, marketing and design were found to share a strong connection. Unlike many studies that had proposed a dichotomous relationship between marketing and design, the current study found the two disciplines to be interdependent. On the one hand it was argued that firms with strong design-orientation were also more market oriented. On the other hand, it was believed that firms with strong market orientation would also be more capable of harnessing design as a strategic tool. Regardless of the direction of the relationship, these results highlighted the importance of firms effectively managing the co-existence of marketing and design in NPD. In particular, they suggested that firms must aim to develop marketing and design capabilities simultaneously (i.e. through the adoption of an ambidextrous strategy), and position marketing and design in a way that fosters the individual and conjoint growth of both disciplines.

Finally, the study found that both marketing and design to contribute to NPD performance. In particular, marketing was found to enhance market newness (through top management support and communication link), while design was found to improve process proficiency (through top management support and certainty provider) and financial outcome (through top management support). Together, these findings showed that marketing and design contribute to different aspects of NPD, and that these effects are achieved through different functional capabilities. From these findings, it can be concluded that marketing and design are both important to organisational innovation, and should be simultaneously developed to ensure successful NPD.

8.2 Implications

The findings generated from the study contained a number of implications for academics and practitioners. This section discusses these implications in accordance with theory, methodology, and practice.

8.2.1 *Theory*

Among the findings obtained by the study, two contribute to theory-building. Firstly, the presence and significance of design in the organisation contain major implications for theory-building in NPD and design. From its involvement and effect on NPD, design was shown to be a multi-dimensional discipline whose contribution has extended beyond arts and graphics. Furthermore, the significance of top management support and certainty provider also indicated that in order for design to realise its full potential within the organisation, it must gain strong appreciation at the board level and develop the capabilities required to address market uncertainties. For NPD, these findings helped highlight the importance of design management. For design, the findings contributed to the growing scope of the design discipline, the definition of design, as well as the value of design as a strategic unit within the organisation.

The second theoretical implication the findings provide is in relation to the marketing-design interface. The current study found that marketing and design share a close connection and are interdependent within the organisation. This relationship has major implications for marketing and design as the marketing-design interface has received little examination. Furthermore, whilst previous studies have proposed a dichotomous relationship between marketing and design, the findings from the current study suggested otherwise. Looking at the roles played by design during NPD, it could be argued that research into the marketing-R&D interface may contain elements that could be adapted to explain the marketing-design relationship. However, as design has become more involved in strategy development and innovation, the domain would also benefit from theories that specifically address the dynamics of the marketing-design interface.

8.2.2 Methodological

The study also contains three methodological implications. Firstly, the time and context of the study has offered invaluable insights into the presence of marketing and design in firms operating under differing conditions. The role of design, in particular, was shown to be in sharp contrast to earlier studies, where the function was seen to be highly marginalised. In addition, the New Zealand context also provided an interesting perspective on the nature of marketing and design. For example, the firms involved in this study were shown to maintain a good level of design consciousness and a strong marketing-design relationship. These results not only compare favourably with studies conducted in Europe and America, but also demonstrate the importance of marketing and design among smaller firms operating in export-dominated economies.

Secondly, in support of studies that defined NPD performance as a multi-faceted construct, the study adopted three different indicators of NPD performance. By assessing performance at the process and product level, the study showed each indicator to be affected by different factors. These results helped enrich the extant research into NPD success factors, which is important as studies have shown that financial performance alone does not always fully capture the rewards of product development projects.

The third methodological implication lies with the research approach undertaken by the study. By exploring how marketing and design were configured during the process, the study was able to draw on the roles of marketing and design when explaining their relationship and effects on NPD performance. This approach helped create a bridge between theory and practice, as the theoretical benefits of marketing and design were able to be discussed in relation to how both functions were adopted in practice. This approach is a leap forward for NPD research, as few studies have specifically identified how marketing and design are positioned during the NPD process.

8.2.3 *Managerial*

The study contains a number of managerial implications. Firstly, marketing influence was found to directly enhance market newness through top management support and communication link. These findings thus suggest firms must continue to embrace the strategic importance of marketing at the board level, keep the function well-resourced to carry out its roles, and position the function as a boundary spanner in the organisation and during NPD.

Design was found to affect process proficiency, market newness, and financial performance through top management support and certainty provider. Similar to marketing, these findings highlight the need for design to be acknowledged and well-resourced within the organisation. Unlike marketing however, the findings show that design must also develop the capabilities associated with becoming a certainty provider. The findings from the current study showed that firms remain hesitant about design's ability to address market uncertainties, which may be an indication of limited design knowledge. In this case, firms should consider the use of design champions or seek professional assistance from strategic design consultancies. This decision should also be supported by top management, as the development of any capability involves commitment and risk-taking.

Finally, the results showed that different marketing and design factors affected different aspects of NPD success. This suggests that firms must clearly define their objectives before making a decision about which marketing or design capability to invest in. If the aim is to enhance the effectiveness of the development process, efforts should be focused on strengthening design's position and its certainty providing capabilities. If the objective is to capture new market needs, marketing should become more resourced and informed within the organisation, and investment needs to be made in developing design's certainty-providing capabilities. Finally, if firms wish to improve new product sales and profit, design must be acknowledged more by top management and be well-equipped to carry out its roles.

8.3 Limitations and future research

The study has several limitations that future research could seek to address. Firstly, the study explored marketing and design's involvement in the NPD process and their functional influence. Whilst these results provided some insights into the way in which marketing and design were adopted within the organisation, most of this information was gathered at the functional level. Given that research in marketing and design has shown both disciplines to be the most beneficial when incorporated into the organisational culture and philosophy, future research should investigate how firms with marketing and/or design cultures use the two disciplines to guide the overall direction of their innovation and NPD strategies. This may include exploring how marketing and/or design-thinking guides the works of the NPD team.

Secondly, the study found marketing and design to be closely connected during NPD. However, due to the limited amount of literature surrounding the marketing-design relationship, no causal relationships were able to be established between the two disciplines. Drawing on the existing literature, the study suggested the possibility of a dyadic relationship; however, this proposition requires further validation from future research. The same proposition could also be assessed at the cultural level, where focus is placed on the relationship between market-orientation and design-orientation.

Thirdly, in addition to obtaining more insights into the marketing-design relationship, future research should also investigate the nature of this cross-functional integration. The current study found that by assessing integration through marketing-design connectedness alone, only one aspect of integration was assessed, namely information exchange. Future research should look deeper into the marketing-design relationship and adopt more comprehensive measures such as a combination of information exchange and collaboration. Furthermore, as studies have pointed out that cross-functional integration could occur at different levels of the organisation, research should also assess how the marketing-design relationship differs at the project and organisational level. This is important as differences in these factors could also affect marketing and design's influence on NPD performance. Integration has also been found to take place during formal meetings and informal conversations.

Future research could also assess how these integration types contribute to the dynamics of the marketing-design interface.

Finally, despite the study's unique context (i.e. New Zealand manufacturing firms), the nature of the sample requires caution throughout the interpretation and generalisation of the results. Firstly, the study was carried out among manufacturing firms; therefore, the results could not be extended to other industries. Future research could adopt similar approaches to examine the roles and effects of marketing and design in other industry types. Given that service development has become an emerging topic in organisational innovation (Olson, et al., 1995), the way in which marketing and design contribute to service innovation could be a fruitful area of research. Secondly, all firms involved in the study reported having both marketing and design functions. This means that the findings could not be generalised to explain the behaviour of firms with either marketing or design functions. Future research could assess whether firms with both functions perform more effectively than those with only one function, or if all approaches could result in success with the adoption of the correct strategies.

8.4 Final remarks

Marketing and design are two highly valuable disciplines in organisational innovation. They possess distinct principles and capabilities central to the development of successful products and processes. The present study looked at the roles of marketing and design in NPD and the nature of their contributions towards ongoing business success among New Zealand manufacturing firms. The results demonstrated the importance for firms to recognise, harness, and manage marketing and design during their NPD programmes. It is hoped that the study has enriched academics' current understanding of marketing and design, and provided guidance for managers seeking to extend the role and scope of these disciplines during NPD.

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APPENDICES

Appendix A: Research questionnaire

1. Your company has...

	Yes	No
At least one person responsible for marketing		
At least one person responsible for design		
Product development activities		

For firms that selected 'No' for any of the three criteria were directed to the statement: 'Thank you for your interest, but this survey is developed for companies that perform marketing, design and new product development. Please press NEXT to exit the survey', and directed towards the end of the survey.

2. How many people are there in your marketing group?

3. What is the title of your most senior marketing person?

- ☐ Chief Marketing Officer
- ☐ Senior Marketing Executive
- ☐ Vice President of Marketing
- ☐ Marketing Director
- ☐ Head of Marketing
- ☐ Marketing Manager
- ☐ Group Marketing Managing
- ☐ Other (please specify)

4. To whom does this person report?

5. How many people are there in your design group?

6. What is the title of your most senior design person?

- Chief Design Officer
- Senior Design Executive
- Vice President of Design
- Design Director
- Head of Design
- Design Manager
- Senior Graphics Designer
- Senior Design Engineer
- Other (please specify)

7. To whom does this person report?

8. This part of the survey aims to explore how marketing is positioned within your company. Please indicate your level of agreement with the following statements.

	Strongly disagree				Strongly agree			
	1	2	3	4	5	6	7	
Top management within your company recognises the strategic importance of marketing	1	2	3	4	5	6	7	
Top management within our company invests heavily in marketing	1	2	3	4	5	6	7	
Marketing serves as a communication link between the customers and the company	1	2	3	4	5	6	7	
Marketing serves as a communication link among the members of the new product development team	1	2	3	4	5	6	7	
Marketing is closely connected with other functions involved in the new product development process	1	2	3	4	5	6	7	
Marketing people here have a good understanding of the business and its external environment	1	2	3	4	5	6	7	
The marketing group is effective at providing information on customer needs	1	2	3	4	5	6	7	
The marketing group is effective at providing clarity when there is uncertainty in the marketplace	1	2	3	4	5	6	7	
Marketing people here provide important strategic advice	1	2	3	4	5	6	7	
Inputs made by the marketing group to the new product development process are more crucial than inputs by other departments	1	2	3	4	5	6	7	
The technical expertise of the marketing group is difficult to obtain from other departments	1	2	3	4	5	6	7	

9. Please select the one state below which most accurately reflects how marketing is positioned in your company
1. Marketing is a moderately important function in our company with little or no involvement in the new product development process
 2. Marketing is a moderately important function in our company with some involvement in the new product development process
 3. Marketing is an important function in our company but only modestly involved with the new product development process
 4. Marketing is an important function in our company with significant input to the new product development process
 5. Marketing is a very important function in our company and participates heavily in new product development
 6. Marketing is a critical function in our company which guides and oversees the new product development process
 7. Marketing is a highly strategic function in our company and directly responsible for all aspects of new product development
10. This part of the survey aims to explore how design is positioned within your company. Please indicate your level of agreement with the following statements.

	Strongly disagree					Strongly agree	
	1	2	3	4	5	6	7
Top management within your company recognises the strategic importance of design	1	2	3	4	5	6	7
Top management within our company invests heavily in design	1	2	3	4	5	6	7
Design serves as a communication link between the customers and the company	1	2	3	4	5	6	7
Design serves as a communication link among the members of the new product development team	1	2	3	4	5	6	7
Design is closely connected with other functions involved in the new product development process	1	2	3	4	5	6	7
Design people here have a good understanding of the business and its external environment	1	2	3	4	5	6	7
The design group is effective at providing information on customer needs	1	2	3	4	5	6	7
The design group is effective at providing clarity when there is uncertainty in the marketplace	1	2	3	4	5	6	7
Design people here provide important strategic advice	1	2	3	4	5	6	7
Inputs made by the design group to the new product development process are more crucial than inputs by other departments	1	2	3	4	5	6	7
The technical expertise of the design group is difficult to obtain from other departments	1	2	3	4	5	6	7

11. Please select the one state below which most accurately reflects how design is positioned in your company
1. Design is a moderately important function in our company with little or no involvement in the new product development process
 2. Design is a moderately important function in our company with some involvement in the new product development process
 3. Design is an important function in our company but only modestly involved with the new product development process
 4. Design is an important function in our company with significant input to the new product development process
 5. Design is a very important function in our company and participates heavily in new product development
 6. Design is a critical function in our company which guides and oversees the new product development process
 7. Design is a highly strategic function in our company and directly responsible for all aspects of new product development
12. This part of the survey aims to explore the interaction between marketing and design within your company. Please select your level of agreement with the following statements.

	Strongly disagree				Strongly agree			
	1	2	3	4	5	6	7	
The marketing group interacts with the design group regularly to determine what products they would need in the future and how to improve existing products								
The marketing group meets frequently with the design group to discuss market trends and developments								
The marketing group frequently gets together with the design group to plan response to changes taking place in the business environment								
The marketing group periodically reviews product development efforts with the design group to ensure that they are in line with what customers want								

13. Which function(s) has the main accountability for the following new product development activities? (Select the option that applies)

	Marketing	Design	Both	Other	N/A
User needs identification					
Idea generation					
Initial screening of product ideas					
Preliminary market assessment					
Preliminary technical assessment					
Concept generation					
Concept testing					
Business and financial analysis prior development					
Prototypes and pilot models development					
Product development					
In-house testing					
Customer test/field trial of product					
Pilot or trial production					
Pre-commercialization business analysis prior to decision to launch					
Production start-up					
Market launch					

14. The next part of the survey requires you to think back to the most significant new product developed by your company within the last 3 years. This product must:

- Have a development process that you are familiar with
- Have been on the market for a minimum of 6 months

Please indicate how well each NPD task was performed during the development of this product

	Done extremely poorly					Done extremely well		
User needs identification	1	2	3	4	5	6	7	
Idea generation	1	2	3	4	5	6	7	
Initial market assessment and concept evaluation	1	2	3	4	5	6	7	
Business analysis	1	2	3	4	5	6	7	
Product development and testing	1	2	3	4	5	6	7	
Prototype testing	1	2	3	4	5	6	7	
Market testing	1	2	3	4	5	6	7	
Production	1	2	3	4	5	6	7	
Launch	1	2	3	4	5	6	7	

	Not at all				To a very great extent
To what extent did this product cater to new customer needs?	1	2	3	4	5
To what extent did this product represent a new product category?	1	2	3	4	5
To what extent did the new product meet the sales objectives?	1	2	3	4	5
To what extent did the new product meet the profit objectives?	1	2	3	4	5

15. Which industry does your company primarily compete in?

- ☐ Food, beverage and tobacco product manufacturing
- ☐ Textile, leather, clothing and footwear manufacturing
- ☐ Wood and paper products manufacturing
- ☐ Printing
- ☐ Petroleum, chemical, polymer and rubber product manufacturing
- ☐ Non-metallic mineral product manufacturing
- ☐ Metal product manufacturing
- ☐ Transport equipment, machinery and equipment manufacturing
- ☐ Furniture manufacturing
- ☐ Other (please specify)

16. What is the nature of your business?

- ☐ Products only
- ☐ Primarily products
- ☐ Products and services
- ☐ Primarily services
- ☐ Services only

17. Please indicate the approximate mix of domestic and export sales

- ☐ Domestic only
- ☐ Primarily domestic
- ☐ Domestic and export
- ☐ Primarily export
- ☐ Export only

18. How many full time equivalent employees does your company have?

- ☐ Less than 10
- ☐ 10 – 29
- ☐ 30 – 49
- ☐ 50 – 69
- ☐ 77 – 99
- ☐ 100 – 149
- ☐ 150 and above

Appendix B: Cover letter for survey

Thank you for agreeing to participate. The purpose of this research is to examine the role of marketing and design in new product development among New Zealand firms.

The survey should take around about 10 minutes to complete, and all data collected will be reported in aggregate form. No information will be traceable to your organisation. The data for this survey will be stored in a secure fashion and will only be accessed by myself and my supervisor.

Requests for a summarised result report can be made at the end of the survey.

If you have any questions, or require any further information please feel free to contact me at: susan.sun@vuw.ac.nz or contact my supervisor Professor Peter Thirkell at: peter.thirkell@vuw.ac.nz

Please click NEXT to begin the survey.

Yours sincerely,

Susan Sun
BCA, BCA(Hon)
School of Marketing and International Business
Victoria University of Wellington

Appendix C: Participation request letter – first round

Dear <<name>>:

I write seeking your support for a research project being conducted as a part of my Master's degree in marketing. The project looks at the role of marketing and design in new product development, and the nature of their contribution towards ongoing business success among New Zealand firms.

I will be sending a summary report of the main findings to all participating firms that would like a copy. The report will provide insights and recommendations for managers seeking to improve new product outcomes through effectively aligning their marketing and design functions.

Just to reassure you, published results from this project will be in aggregated form only, and no specific information will be traceable back to your firm.

Ideally it would be great if you could complete the questionnaire yourself. It takes about 15 minutes in total, and others have commented that the very process of going through the survey allows some self-reflection on how you think about the role of marketing and design within your firm.

If you are unable to complete the survey yourself, then I would be grateful if you could forward this request to the person who best understands how design and marketing operate in relation to new product development. Ideally, this would be the person who manages or oversees your new product development activities. If you have any questions please feel free to email me at susan.sun@vuw.ac.nz, or my supervisor Professor Peter Thirkell at peter.thirkell@vuw.ac.nz.

To begin the research, please click here:
http://vuw.qualtrics.com/SE/?SID=SV_01ZCBoXckptaT2Y

Thank you for your attention.

Sincerely,

Susan Sun
BCA, BCA(Hon)
School of Marketing and International Business
Victoria University of Wellington

Appendix D: Participation request letter – follow up

Dear <<name>>:

Recently you would have received an email from one of our graduate students, Susan Sun, requesting your involvement in a national survey on marketing and design. If you have already replied then please accept my sincere thanks and you need take no further action. If you feel that the subject of this study does not apply to your firm (e.g. if your firm does not perform any marketing or new product development), you also need take no further action.

The survey is designed to provide some useful managerial insights into the interplay between design and marketing within a new product development setting, and how this relates to subsequent market performance. I would be grateful if you could take a few minutes to complete the survey during the next few days, or else forward this request to the person in your firm who manages or oversees your new product development activities.

A summary of the main findings will be provided to all participating firms that would like to receive a copy.

The survey link is: http://vuw.qualtrics.com/SE/?SID=SV_01ZCBoXckptaT2Y

Thank you for considering.

Kind regards

Peter Thirkell
Professor of Marketing
Victoria University of Wellington