Creativity in Product Design Strategies

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DECLARATION OF ORIGINAL AUTHORSHIP

With this, I certify that the work embodied in this thesis, ***Creativity in Product Design Strategies,*** has not been submitted for any other higher degree to any other university or institution other than Macquarie University. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made. The co-authors included in earlier versions of Chapters 2, 3, and 4 were involved in the research at a supervisory and consultancy level. The research presented in this thesis was approved by the Macquarie University Ethics committee (Reference number: 5201949617366 and ID: 4961, on 1st March 2019, and Reference number: 52019565610285 and ID: 5656, on 9th September 2019).

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GENERAL ABSTRACT

In recent years product design has been among the essential issues in marketing studies. This is because customer behaviour has been changed with product design, becoming a necessary driver of purchase beyond just price and even quality. Many marketing studies have considered product design as a vital element in communicating product creativity (idea) and/or innovativeness (implementation) and relied on that as a strategic resource for competitive advantage.

This thesis (By Publication Thesis, including three research articles) aims at shedding light on creative/innovative product design's attributes and processes to explore more strategic knowledge, thus, contributes to the literature by offering a new way of strategic thinking in product marketing. This will pave avenues for future research in fields of Business-to-Business (B2B) and Business-to-Consumer (B2C) studies and help marketing and product managers and even designers to make more effective use of product design in an ever increasingly competitive market.

Keywords: *Product Development Strategy, Product Design Strategy, Product Design Creativity, Product Design Innovation, New Product Development Process, Strategic Marketing Thinking, Design Thinking, Managerial Thinking*

CHAPTER 1: INTRODUCTION

1.1 Abstract

Product design or product development by design is a crucial topic in marketing. All product designers, marketers, scholars, and consumers unanimously believe product design is highly determinant and influential in the perception of creativity and innovation and, subsequently, the success or failure of product marketing.

Design involves a variety of fields, also numerous visual and nonvisual aspects. In product development, the design communicates the product's characteristics by different attributes. It is a complicated communication that finally should lead to success in a competitive market. Product marketers and designers know that a creative idea behind the design innovativeness will assure success, however, finding the idea is a difficult job. What the creativity and innovation are, is the problem that product marketers and designers would deal with. The solution forms successful approaches, which can create creative strategies. To find such strategies, we need to increase our knowledge in the product design/development process.

By Increasing the knowledge in the product development process, the radical and paradigm-changing studies that are presented in this thesis, offer a new philosophy and pave a wide path for future consumer behaviour research and help product managers, marketers, and product designers manage creativity and innovation more effectively and strategically in the product development process to achieve more competitive market success.

1.2 Introduction

Design is a significant driver of product characteristics (Govers & Schoormans, 2005) such as creativity and innovation, also is a strategic source of competitive advantage in marketing (C. A. Di Benedetto, 2012). Many researchers suggest product marketing strategy should focus on design as a significant intangible source (e.g., Moon, Miller, & Kim, 2013), because the product is judged based on its design quality (i.e., form and function) (Chitturi, Raghunathan, & Mahajan, 2007, 2008). Creative design strategies can be the path to achieve innovative design goals, and ultimately, a competitive marketing strategy (Bruce & Daly, 2007; Y. Hsu, 2011), since many scholars believe that creativity is a central element of marketing strategy (e.g., Y. Hsu, 2011; B. Kim, Han, & Yoon, 2010; Slater, Hult, & Olson, 2010). Similarly, Luchs, Swan, and Creusen (2016) argue that innovative product success is directly linked to marketing strategy and firm performance.

Design based on creative ideation is an integral part of a firm's innovation process (Montaña, Guzmán, & Moll, 2007) and is essential to business competitiveness and success (Bloch, 1995; Bruce & Daly, 2007; Y. Hsu, 2011). Marketing strategy, as the heart of an organization to obtain a competitive edge (López-Gamero & Molina-Azorín, 2016), can benefit from innovative product design as an effective communication medium to influence consumers' hearts and minds (Kristensen & Grønhaug, 2007). It is because the ultimate goal of marketing strategy is to positively influence consumers' preferences, intentions, and choices (Noble & Kumar, 2010; Saran, Morris, & Minor, 2017). Thus, product design could be seen as a strategic tool to achieve a sustainable competitive advantage by understanding consumer preferences and needs, and reflecting on product design (C. Anthony Di Benedetto, 2012; Hoegg, Alba, & Dahl, 2010; van Rompay & Pruyn, 2011).

The arguments show that product success is dependent on a strategy that incorporates creativity of the idea and innovative implementation of the idea into a product design. The

product development process has been seen from different perspectives. Product marketers and designers develop the product, consumers respond to its design, and scholars analyse this process.

However, while designers and product managers try to communicate individual personalities in their products (Mugge, Govers, & Schoormans, 2009); consumers may perceive the design elements variedly and respond differently. Yet, the primary perceived product personality in the eye of consumers that designers should aim for is product creativity (idea) and innovation (implementation of the creative idea). Im, Bhat, and Lee (2015) also argue that new products must be creative/innovative to launch in the market successfully.

1.3 Research Background

Research in product marketing talks about managers', designers', researchers', and consumers' views. Most of the research focuses on consumers and a few of those considers designers. What is more, it seems the scholars' opinions are shaped based on the managers' views (Deighton, Mela, & Moorman, 2020). To find more about product designers, we should refer to industrial and engineering studies. However, the relationship between product marketers and designers is an important B2B relationship that affects the product development outcomes and consumers' responses towards the product design.

Finding an ideal design over time for products is a central goal for product designers and product managers (Bloch, 1995) because design is a significant driver of product characteristics (Govers & Schoormans, 2005) such as creativity and innovativeness, and is a strategic source for achieving the competitive advantage in product marketing (C. Anthony Di Benedetto, 2012). Many scholars suggest the product's marketing strategy should focus on design as a pivotal intangible source (e.g., Moon et al., 2013; Reimann, Zaichkowsky, Neuhaus,

Bender, & Weber, 2010) for creativity and innovation (see Gemser & Barczak, 2020). In this vain, design strategy can be the path to achieve innovative design goals and finally, a competitive marketing strategy (Bruce & Daly, 2007; Y. Hsu, 2011), as many scholars believe that creativity or innovativeness is a central element of marketing strategy (B. Kim et al., 2010; Slater et al., 2010). Similarly, it is argued that creative/innovative product success is directly linked with the success of marketing strategy and performance of the firm (Luchs et al., 2016).

Several studies have been done on product design, mostly from the consumer's perspective (e.g., Bloch, 1995, 2011; Homburg, Schwemmle, & Kuehnl, 2015; Noble & Kumar, 2010), while studies that have focused on product/marketing managers and product designers are quite scarce. Interestingly, when scholars talk about designers, they often focus on the design team with an engineering perspective (e.g., Dorst & Cross, 2001; Sleeswijk Visser, van der Lugt, & Stappers, 2007; Yilmaz & Seifert, 2011). The research on product design creativity with engineering or industrial view mostly focuses on TRIZ, Kansei engineering, techniques like brainstorming (C. C. Lin & Luh, 2009), SCAMPER, morphological analysis, Gordon's synectics framework (Yilmaz & Seifert, 2011), mind mapping, lateral thinking (Haupt, 2018), etc., with somewhat non-marketing perspectives. Among those, the studies more related to marketing, also, were not similar to the extant research purposes.

Reviewing the consumers' responses to the product design, also analysing the product managers/marketers and product designers, would open a window to view the path from product design or development process to the market outcomes. This path shows us the possible strategies and creative thinking in product development in order to gain success. Therefore, this thesis integrates consumers' responses to the product design, as well as product marketers' and designers' practices in the product design/development process. This will be insightful for devising more creative strategies to design more innovative and successful products.

1.4 Research Gaps and Objectives

The design needs strategy (Leo, 2020; Ravasi & Lojacono, 2005), and this research aims at formulating a plan for design creativity, innovativeness, and success. However, product design is an art, this is an art associated with business, and creative design should solve users and business problems with innovative solutions. Thus, the system serves business and society. Yet, this field lacks theoretical and strategical frameworks (Cash, 2018, 2020; Gemser & Barczak, 2020; Nagaraj, Berente, Lyytinen, & Gaskin, 2020) and needs more managerial research to formulate creative/innovative design strategies to achieving more and continuous success in the competitive market. The body of literature on product marketing is fraught with scholars' opinions towards the product design and development process, and the managerial viewpoint influences their perspectives on product design (Deighton et al., 2020). However, designers' attitudes should be added to the literature to cover the extant gaps. This research tries to consider both managerial and scholarly views also designers' opinions on product design's topics and the processes' factors to incorporate their perspectives for providing more practical and creative/innovative strategies. A neglected integrated view that ultimately results in more market success.

1.5 Research Contributions

This research makes several theoretical and practical contributions by providing new insights to better understand creativity and innovation, "strategically", in the new product development process to obtain success in the market. As unique research in marketing concentrates on theory-building and formulating/codifying design for more successful outcomes, the extant research covers many gaps in the literature by adding designers' attitudes towards the literature

topics. This research critically analyses the extant literature and reveals and bridges scholars', managers', and designers' views to improve their product design insights as a strategic tool for creative problem-solving by design. Moreover, this research prepares a strong basis for future consumer studies. In particular, this research focuses more on product designers' views, as they play the leading role in product design, which can improve our knowledge about the new product development process and is highly helpful for devising more proper creative strategies.

This unique research also is a great source for the theories and strategies in the product design and product development fields, and through compiling all the topics in the related literature, can be a strong reference point for future research in product design/development. This research strengthens the insights of product marketing scholars, product marketers, and product designers, also is a start point for opening a strategic view to creative/innovative product design to success.

1.6 Research Methods

To meet the objectives of this thesis, both qualitative and quantitative data have been collected, and mixed methods have been applied for data analysis. For qualitative research and reviewing the literature, a "fit for purpose" methodology, "meta-narrative" approach, and multiple coding techniques were used. Further, Repertory Grid Analysis (RGA), in-depth interviews, numerous regressions, correlations, Structural Equation Modeling (SEM), Factor Analysis (FA), and many other methods and techniques have been applied for qualitative and quantitative studies.

1.7 A Synopsis of Articles/Papers

Article/Paper 1 is a comprehensive literature review on product design. Literature related to product design, New Product Development (NPD), product creativity and innovation, product attributes, product design process, product personality, and consumer response to product design has been thoroughly reviewed. All the involved variables, theories, and strategies also have been extracted from the literature, and their interrelationships have been investigated. This article is a valuable source for future product design studies. By compiling all the influential variables, theories, and strategies on consumers' responses to product design, this research forms scholars' strategic views on product development by design.

Article/Paper 2 is qualitative research, applying face-to-face in-depth interviews with 32 professional award-winning product designers in Australia to explore their views on creative design and compare their attitude towards the literature topics for covering the gaps. Combining Repertory Grid Analysis RGA with a comprehensive semi-structured questionnaire, this study attempts to find how professional designers perceive creative design and compare that with scholars' views. By gathering all the topics in the field, Paper 1 helped this study comprehensively investigate the designers' perspectives and approaches. This article improves scholars' views on problem-solving by creative design and measuring the product design creativity more precisely.

Article/Paper 3 is a worldwide survey on 420 professional and award-winning product designers and 402 professional marketing/product managers involved in the product development process. As paper one and paper two have compiled all the variables/factors associated with product design attributes and methods, this study has been established on those papers, with a B2B perspective and focusing on the relationship between product managers/marketers and designers. In addition to its remarkable contribution in the

management theories—bridging the theory of bounded rationality and professional-principal theory based on managerial thinking and design thinking—this unique quantitative study attempts to find the role of the variables related to the new product development process and product design attributes on the success of products. In comparing design thinking and managerial thinking, this unique study provides excellent insights for both managers/marketers and designers involved in the new product development process. It paves a unique and original path for further research focusing on designers' roles, an influential group that has not been studied in-depth.

1.8 Outline of the Thesis

The thesis incorporates five chapters. Chapter 1 is an introduction to the main field of research on product design, the importance of this field, and the research key purposes. Chapter 2 includes paper 1 that is a comprehensive literature review on product design studies, chapter 3 represents paper 2 that compares product design scholars' views with product designers' opinions towards creative design, and chapter 4 contains paper 3 that investigates the product design/development process from both product managers' and designers' viewpoints. Then, in chapter 5, a general conclusion of the thesis has been incorporated.

1.9 Conclusion

By focusing on the industrial design from a marketing viewpoint also concentrating on product designers and the extant literature, the current thesis expands the knowledge of the field and helps product design/development scholars, product marketers/managers and product designers to improve their insights and, subsequently, the quality and success of the product design by

focusing on both B2B factors and design attributes. All the influential factors, variables, attributes, theories, strategies on product design/development have been studied in this thesis, which improves our knowledge in the field and helps us to see product design/development more strategically and creatively. By integration of scholarly thinking, managerial thinking, and design thinking, this highly radical/atypical thesis provides a creative strategic view on product development by creative design. Changing the current paradigms in design is what this thesis attempts to do. Product designers see the process through an artistic lens, product managers view that from a business angle, and scholars behold the process critically. Integration of these ways of thinkings constitutes strategic marketing thinking. Thus such a new view, informs product design/ development scholars, product managers, and product designers of each others' ways of thinking and strengthens their understandings and collaborations, as a result, increases the market innovation, pioneering, and success.

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CHAPTER 2: PAPER/ARTICLE 1

The Missing Link in a Product's Design Evolution

ABSTRACT

The literature on product design has attempted to understand the consumer but has lacked a clearly written set of related theories about how to improve design paradigms. However, only theories can provide appropriate insights into product design strategies. A theoretical approach is also conducive to a process of academic and practical evolution. Thus, this study aimed to compile and link the main topics in the field of product design to create a foundation for the strategic development of design paradigms.

There is a need for product design strategy based on a clear understanding of many variables: the consumer; the complex interrelations among a product's values, dimensions, and personalities; product design theories; and other related factors. Such a strategy could act as a healing elixir for the challenges associated with product designers' and product marketers' different "thought worlds". This strategy could also assist with the regulation of intuitive or capricious designs.

This research adopted a "fit for purpose" methodology and a meta-narrative approach. These choices were appropriate for reviewing research in the field of product design, as this field involves complex topics and areas in which the literature is still developing.

This study found that product design studies should concentrate more on codifying product design strategies to enhance product development success. This is particularly important in view of consumers' varied and changeable tastes in the global market and the differing insights of managers and designers.

This comprehensive review is a unique study that contributes to future consumer research by compiling scattered and hidden theories, strategies, and variables in the product design literature. In addition, this study has gathered the managerial and practical strategic insights of managers and designers to enhance the quality of product design/development.

Keywords: *Product Design Strategy, Product Design, New Product Development, Product Management, Design Management, Innovation Management, Consumer Behaviour*

INTRODUCTION

A quest to understand what drives success for organizations selling consumer products has led researchers to question what lies beneath consumer perceptions and responses to individual products (N. G. Gilal, Zhang, & Gilal, 2018a; Gök, Ersoy, & Börühan, 2019; Naderi, Naderi, & Balakrishnan, 2020). This extensive review presents two main strands of research within the Product Design literature, both complex and interrelated. In addition, some scholars have improved the literature by borrowing theoretical approaches from other disciplines, most particularly consumer psychology. These will be examined as well.

The first and most dominant strand in the literature has dealt with product design values and their dimensions. These values have been theoretically described as utilitarian and hedonic (Chitturi et al., 2008; Das, Mukherjee, & Smith, 2018; Wiecek, Wentzel, & Erkin, 2020). The utilitarian value is driven by functional and ergonomic dimensions (usually called "function"), while the hedonic value is associated with aesthetic and symbolic dimensions (often called "form") (Bloch, 2011; Hoegg & Alba, 2011).

These values and their dimensions holistically communicate a product's personality and crucially influence consumer perceptions and responses (Luchs et al., 2016). However, the importance of each can vary based on the nature of the product (Okada, 2005).

The second strand in the literature, which operates synergistically with the first, has examined a large number of other interrelated variables in the field of product design. The categories investigated in the literature include dependent variables (attitudinal, behavioural, and financial) and independent variables (which are mostly linked with visual and non-visual aspects of design). Both of these strands in the product design literature, which were explored holistically in this study, provide key insights for product designers into the nature and personality of products, including the choices consumers make, their perceptions, and their responses. Although these factors are key influencers of product success or failure, an in-depth understanding of consumers and the markets in which they exist are only part of the equation that describes a successful product design process. The understanding of non-market tensions and challenges facing designers and marketers is also important.

Whilst designers and marketers have experienced market tensions due to increasing globalization, the design world has also been captivated by non-market tensions (Micheli, Jaina, Goffin, Lemke, & Verganti, 2012). This situation has resulted in "different thought worlds" (Beverland, Micheli, & Farrelly, 2016) on the part of designers, marketers, and other involved parties, which can impede the evolution of a product design (Micheli et al., 2012).

These different "thought worlds" can reduce the sharing of knowledge between the different parties involved in the product design process, resulting in deficit rather than enhancement of the new product development (NPD) process. Therefore, despite the heavy cost of research and development (R&D), many products fail in the market (Karande & Gopinath, 2019; Pitta & Pitta, 2012).

This review determined that, although product design enjoys a mature and extensive literature, it still lacks a comprehensive set of related theories that can provide appropriate strategies for the NPD process. Surprisingly, a few theories have dominated the literature. All of these dominant theories focus on consumer behaviour; the other theories that have been used sporadically have mostly been the focus of business-to-business (B2B) studies (e.g., social exchange, coevolution, path-goal theories) (see Cash, 2020). Most studies on product design have concentrated on consumer-, brand-, innovation-, and success-related variables. Few studies have built upon the prevailing theories to develop a more comprehensive theoretical framework for product design or devised applicable product design strategies from a theoretical basis. In such a situation, compiling and categorizing the main topics in the product design literature and determining the links among them can be useful. Enhancing the knowledge base about product design values and their dimensions, as well as their roles in consumer responses, in addition to codifying and devising practical strategies based on related theories and variables, could help scholars to fill the gaps in the literature and help create a comprehensive theoretical basis for future research. Furthermore, it could help designers and marketers to regulate intuitive and capricious designs, which would positively affect consumer responses and, hence, product innovation success (see Garrido-Rubio & Polo-Redondo, 2005; Leo, 2020; Ravasi & Lojacono, 2005).

Therefore, this study contributes to the product design literature through compiling, categorizing, and finding the linkages among the main topics in this area. It also attempts to

identify and explore the key variables discussed in this literature to establish a strategic basis for dealing with the two main challenges that designers and marketers face (understanding and interpreting the complex interrelationships among consumer factors, and the tensions that can be attributed to their different "thought worlds"). Besides, it suggests a way forward for future research to address these strategy-related gaps.

An analytical review of the product design literature with a focus on the influential roles of design values and their dimensions, as well as their influences on consumer responses through creating a product's personality, yielded four main topics. The existing literature has discussed (1) product design values and their dimensions that endow personality to a product, (2) theories related to the influence of product design and its values on consumers' responses, (3) the interrelationships among the variables involved in the product design process, and (4) strategies or approaches linked with product design and consumer responses. Appendix 1 gives an overview of these topics by listings a set of 42 most relevant articles and the product design values and/or their dimensions they cover—the essential variables in this study.

Table 1 shows the four main topics in the product design literature; each one will be discussed and analyzed later in detail, in the "Theoretical Framework" section. Then, the "Discussion and Future Research Agenda" and "Implications" will center around these topics.

PD values, their dimensions, and product personality	Theories related to PD and consumers' responses	Variables related to PD and consumers' responses	Strategies related to PD and consumers' responses
• Hedonic value (aesthetics and symbolic dimensions) • Utilitarian value (functional and ergonomic dimensions) • Product personality	• Related theories that have been mentioned in the literature	• All types of variables including dependent, independent, mediator, and moderator that have been mentioned in the literature	• Potential strategies that directly or indirectly have been mentioned in the literature

Table 1: The Main Topics in Product Design Literature

METHODOLOGY

Empirical and descriptive methods were applied to construct the research framework (Paul & Rosenbaum, 2020). We adopted a "fit for purpose" methodology (Ravasi & Stigliani, 2012) and a meta-narrative approach (Jamal, Bertotti, Lorenc, & Harden, 2013). These methods are appropriate for reviewing fields involving complex topics and areas where the literature is still developing (see Mukendi, Davies, Glozer, & McDonagh, 2020).

Firstly, using a fit-for-purpose method, we guided and controlled a systematic review to reach a core set of relatively homogenous studies (Macpherson & Jones, 2010; Ravasi & Stigliani, 2012) on product design by focusing on two pervasive dimensions or attributes of product design: "form" and "function" (e.g., Bornemann, Schöler, & Homburg, 2015; Chitturi et al., 2007; Hagtvedt & Patrick, 2014). We also focused on product design values or benefits (i.e., hedonic and utilitarian) and product design dimensions (i.e., aesthetics, symbolism, functionality, and ergonomics), and their synonyms (e.g., appearance and performance). With this protocol, we specified our research boundaries to select the main sources (Dabić et al., 2020; Mingione, 2015; Ravasi & Stigliani, 2012) that, in one way or another, pointed to the form and/or function of product design (Ravasi & Stigliani, 2012). We followed this protocol to confine our research span because product design has often been approached from different perspectives (e.g., engineering design and design process) (Alcaide-Marzal, Diego-Mas, & Acosta-Zazueta, 2020; Moon et al., 2013; Noble & Kumar, 2008) depending on the outcomes desired by particular researchers (Corciolani, Grayson, & Humphreys, 2020; Luchs et al., 2016; Ravasi & Stigliani, 2012), while form and function have been the bases for most of the theories, variables, and strategies that are related to our research purpose.

Secondly, through a meta-narrative approach, we were able to narratively compare, contrast, and link the treatment of our proposed topics (product design-related theories, strategies, and variables) within various studies with heterogeneous objectives (see

MacDonald, O'Leary, Stockwell, Reist, & on behalf of the Clearing the Air project, 2016). This approach is recommended in a situation where the heterogeneity of studies complicates the use of a traditional systematic review approach (Gough, 2013; T. Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004; MacDonald et al., 2016). It allows the synthesis of different sources based on a storyline (Gough, 2013; Trisha Greenhalgh et al., 2005; Wong, Greenhalgh, Westhorp, Buckingham, & Pawson, 2013) while a traditional systematic review synthesizes different sources based on specific variable(s) (e.g., Childs, 2017; Osuna Ramírez, Veloutsou, & Morgan-Thomas, 2019; Saleem & Iglesias, 2016).

Finally, a cross-referencing method (Micheli, Wilner, Bhatti, Mura, & Beverland, 2019; Mingione, 2015; Ravasi & Stigliani, 2012), was allowed us to add missing sources and finalize the list of studies included in this review.

This review began with Bloch's seminal paper (Bloch (1995), as Bloch's work is considered to cover all related previous studies in product design and has been suggested as a starting point for understanding the topic (e.g., Luchs & Swan, 2011; Luchs et al., 2016). This review was then broadened to include recently published articles (see Mukendi et al., 2020; Osorio, Centeno, & Cambra-Fierro, 2020).

Searching and Selecting References

Through the fit-for-purpose method and meta-narrative review, we combined a protocol-driven methodology (where, at the beginning of the study, the strategy is clear) with a cross-referencing method (where the strategy partly emerges during the study) (Micheli et al., 2019; Mingione, 2015; Ravasi & Stigliani, 2012) to find the most appropriate references to review.

Consistent with similar studies (see Micheli et al., 2019; Ravasi & Stigliani, 2012), we searched for English resources in the "Business Economics" area of the Social Sciences

Citation Index (SSCI) through the Web of Science core collection (see N. G. Gilal et al., 2018a; P. Gupta, Chauhan, Paul, & Jaiswal, 2020) and in the "Business, Management, and Accounting" area of Scopus (see Chandra, Paul, & Chavan, 2020; A. Kumar, Paul, & Unnithan, 2020), as they are the most comprehensive and relevant scientific databases for our field of study. We searched the sources' titles, abstracts, and keywords by using the keyword "product design" for the 25-year period between the beginning of January, 1995, and at the end of January, 2021. In addition, to prevent any bias, we did not limit our primary pool to specific journals. This criterion resulted in an initial set of 4,076 available scientific sources, including 895 sources from SSCI via the Web of Science (e.g., journal articles, reviews, editorials, conference papers, and books) and 3,181 articles from Scopus. It should be noted that we retrieved only journal articles from Scopus in order to ensure that our sources were highly scientific) (see Appendix 2).

Firstly, we refined the pool of sources by reading the titles and publication information and omitting irrelevant or duplicated sources. This stage yielded a total of 1,238 sources. Then, after reading the abstracts and excluding sources related to engineering design, the design process, design education, and other topics unrelated to this study's scope, and after reviewing the texts for relevance (see Luchs et al., 2016; Ravasi & Stigliani, 2012), we obtained 273 articles and three books to review thoroughly and analyze precisely. As previously discussed, this screening process was carried out by focusing on product design's form and function, as well as hedonic and utilitarian values, their dimensions, and their synonyms. Then, by carefully reading the texts, open coding, and conducting affinity analysis through comparing the sources' similarities and differences in content (see P. Gupta et al., 2020), we further refined the pool and selected 139 highly relevant articles as the main references for our study.

In the next stage, we adopted a cross-referencing method (Micheli et al., 2019; Mingione, 2015; Ravasi & Stigliani, 2012) to capture resources that might have been missed in the first

round or omitted mistakenly. This round yielded 24 additional articles, one book, and one thesis. Therefore, our final selection for thematic coding and in-depth analytical review (see Vaughn and Turner, 2016) included 163 articles, one book, and one thesis. We explored these publications and extracted the main product design-related topics from them (values, dimensions, elements, theories, strategies, and variables). In the process of conducting this review, however, we did not restrict ourselves exclusively to the references in the pool; we used the Web of Science, Scopus, and Google Scholar to retrieve further sources that could expand on the topics that emerged during the analysis by searching for various keywords in titles, abstracts, and keywords (e.g., "product involvement", "product diversification", and "brand equity", and their synonyms). This step added a further 51 journal articles to our list of references. Figure 1 summarizes the search phases used to retrieve scientific sources to include in this study. Before submitting this article, we also asked three scholars who were highly acquainted with the field to ensure all notable sources had been included.
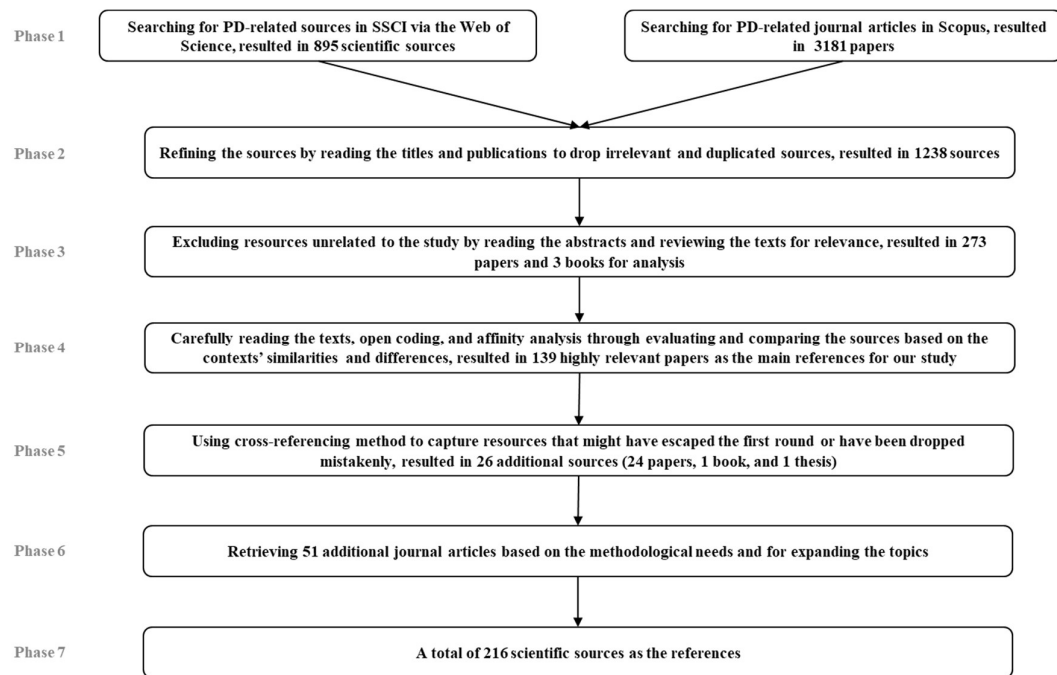
Figure 1: Search Phases Used for Retrieving Scientific Sources in this Study

THEORETICAL FRAMEWORK

Studies on product design have been extensive but scattered. The integration of the key theories, variables, and (tacit/hidden) strategies covered in previous studies and the identification of the relationships between them can help uncover the "missing link" in the evolution of product design "strategy". Appendix 1 gives an overview of the main topics covered in this review by listing 42 most relevant articles and the product design "values and/or dimensions" they cover—the fundamental variables in this study.

In the sections below, we examine the four main topics relevant to product design and consumer responses that this review uncovered (as shown in Table 1) (1) product design values and their dimensions, which endow personality to a product, (2) theories related to product design and consumer responses, (3) variables related to product design and consumer responses, and (4) strategies or approaches related to product design and consumer responses.

Product Design Values and Dimensions

Consumer perception and response to a product are affected by the product's holistic design (M. Kumar, Townsend, & Vorhies, 2015; Luchs et al., 2016) or the nature of the product (Okada, 2005). Theoretically, product design can be described in terms of the product's values and dimensions. The product's values can be classified as hedonic or utilitarian (Chitturi et al., 2008; Hoyer & Stokburger-Sauer, 2012; H.-C. Lin, Bruning, & Swarna, 2018) and the product's dimensions further describe these values. The hedonic value of product design encompasses attributes such as being fun, amusing, thrilling, exciting, delightful, playful, pleasant, sensuous, enjoyable, playful, or able to deliver happiness or enjoyment (Sundar, Tamul, & Wu, 2014; Voss, Spangenberg, & Grohmann, 2003). This value is derived from the "aesthetic and symbolic" dimensions (the form) of product design. The utilitarian value of product design has a problem-solving aspect: the product is helpful, beneficial, sensible, useful,

handy, functional, practical, innately effective, or even necessary (Voss et al., 2003). This value refers to the "functional and ergonomic" dimensions (or function) of product design. In brief, aesthetics is associated with the attractiveness or beauty of a product (Homburg et al., 2015) and works alongside symbolism to communicate the product's meaning and message (Bloch, 1995; Chen, 2018; C.-L. Hsu, Chen, Yang, Lin, & Liu, 2018). Contrary to this symbolic dimension, which communicates something about the product owner/user, functionality talks mostly about the product itself and its own performance or usefulness (Crilly, Moultrie, & Clarkson, 2004). Finally, ergonomics, in a synergistic cooperation with functionality (Jindal, Sarangee, Echambadi, & Sangwon, 2016), tries to enhance the match between a product and the capabilities of target users through maximizing aspects such as product safety, comfort, and ease/efficiency of use (Noble & Kumar, 2010). For instance, customization options for the adjustment of a chair are linked with its functionality, while the options' user-friendliness or convenience of use is related to ergonomics (cf., Homburg et al., 2015). Together, these hedonic and utilitarian values and their descriptive dimensions communicate the product's attributes (Amatulli, De Angelis, & Donato, 2020; Chitturi et al., 2008) and characteristics, or personality, to consumers (Noble & Kumar, 2010).

Whilst product design values and their dimensions play key roles in creating a holistic perception of product characteristics, and all influence consumer responses (C.-L. Hsu et al., 2018; Okada, 2005), a particular product may reflect multiple values and dimensions to differing degrees (Okada, 2005). As product design is a combination of the aforementioned values and their dimensions, hedonic products may also possess utilitarian features and vice versa (Alba & Williams, 2013). In this respect, research has shown that when a base level of the utilitarian value is met, the importance of the hedonic value usually increases for consumers (Chitturi et al., 2007; Srinivasan, Lilien, Rangaswamy, Pingitore, & Seldin, 2012), as people, by nature, want to have fun and experience enjoyment (Okada, 2005).

Product Personality and Consumer Responses to the Holistic Perception

of Product Design

The complex and crucial concept of holistic perception in product design must be understood in both its passive and active states. product design elicits holistic perceptions in the eyes of consumers (e.g., Bloch, 1995; Candi, Jae, Makarem, & Mohan, 2017; Homburg et al., 2015); such perceptions stem from every dimension of product design viewed together as a holistic bundle (Noble & Kumar, 2008, 2010). In this interconnected process, the personality of a product is communicated to beholders (Brunner, Ullrich, Jungen, & Esch, 2016; C.-L. Hsu et al., 2018). However, the characteristics of the beholders affect their perceptions in a much more active way (Buettner, 2017; Crilly, Good, Matravers, & Clarkson, 2008).

Designers passively communicate their intended meanings through product design (Crilly et al., 2008; Crilly & Moroşanu Firth, 2019), whereas consumers interpret products actively and evaluate product personality based on their own personalities and tastes (Crilly et al., 2008; Mugge et al., 2009). The research suggests that an individual will choose to own a product with a personality that matches their self-image—so-called "personality congruence" (Govers, 2004; Govers & Schoormans, 2005). The product assists the consumer to show their personality or favorable characteristics to others; they can have input into how others see them and even influence how they see themselves (Noh & Mosier, 2014; Sundar et al., 2014). In other words, product personality as a means of consumer self-expression can help the consumer to express their actual self, ideal self, or particular aspects of the self (Swaminathan, Stilley, & Ahluwalia, 2009). Design endows personality to products via numerous visual and non-visual elements (eg., colour, style, shape, material, texture)—that shape the dimensions associated with hedonic and utilitarian values—and through which the product can speak to consumers (Mugge et al., 2009). These values, in turn, can be actively interpreted by the consumer who uses the product as a means of self-expression. Thus, design serves product designers in the

market by penetrating consumers' minds and hearts to capture their positive responses (Dell'Era & Verganti, 2007). Scholars believe symbolism can be more influential than other dimensions in endowing personality to a product (Desmet, Ortíz Nicolás, & Schoormans, 2008; Srinivasan et al., 2012); however, all the dimensions associated with hedonic and utilitarian values play pivotal roles in generating the perception (Noble & Kumar, 2008, 2010) of product personality (C.-L. Hsu et al., 2018).

Therefore, product design—as a combination of hedonic and utilitarian values, their dimensions, and visual and non-visual elements—affects consumer responses and behaviours (e.g., Candi et al., 2017) through generating a holistic perception (e.g., Noble and Kumar, 2010) of product personality. Figure 2 illustrates this process, which involves many variables. Furthermore, the related literature has discussed some major theories justifying consumers' responses to product design and some strategies for maximizing desirable responses, which will be discussed in the following sections.
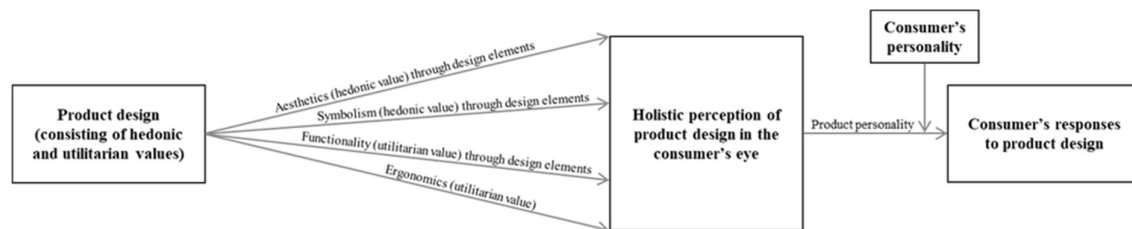
Figure 2: The Effect of Product Design on Consumer's Responses Through Product Personality

Theories Related to Product Design and Consumer Responses

Although several theories can be seen in the literature, after omitting theories that are common to various B2B studies (e.g., absorptive capacity and social exchange), we were surprised to find that product design studies have been dominated by only a few theories. Most of the theories that are fully relevant to product design have been in some way associated with

"processing-fluency", "Gestalt", "appearance bias", "categorization", and "personality congruence" (listed in Table 2).

Theory
• Processing-fluency (holistic information processing) and visual complexity (number of product elements, components, the extent of interactions among components, and the degree of product novelty)
• Holistic perception of product design (Gestalt)
• Appearance and judgment biases (influence of product visual attractiveness on overall judgments of product design)
• Categorization and signaling theories (using signals to transfer product quality to consumers, e.g., price and brand)
• Personality congruence or self-congruity

Table 2: The Main Theories Related to Product Design and Consumer Responses in the Literature

- **Processing Fluency (Holistic Information Processing) and Visual Complexity**

Studies have indicated that the processing fluency of product design positively affects consumers' preferences and responses (Althuizen, 2021; Landwehr, Wentzel, & Herrmann, 2013; van Rompay & Pruyn, 2011). This conclusion is based on conceptual and perceptual fluency/complexity theories that postulate that design can conceptually (through the design's meaning) and perceptually (through the visual elements of design) influence consumers' recognition of, categorization of, and opinion about the product (Miceli, Scopelliti, Raimondo, & Donato, 2014; S. Shapiro, 1999). Processing fluency involves the proper combination of design visual elements that lead consumers to adopt a quick, effortless, holistic, and spontaneous judgment process, whereas a lack of fluency is characterized by systematic processing and elaboration, due to difficulty with visual information processing (Brakus, Bernd, & Shi, 2014).

Whilst fluency enhances the attractiveness of visual design and consumer pleasure (Landwehr, Mayer, & Landwehr, 2018; Orth & Wirtz, 2014) and positively influences perceived innovation (Luchs et al., 2016) and ease of categorization (Brakus et al., 2014; Luchs et al., 2016), visual complexity acts in the opposite way (Grein, Wiecek, & Wentzel, 2020; J. E. Lee & Shin, 2020). Visual complexity is linked with some visual elements of design that

have negative effects: irregularity; dissimilarity; asymmetry; complicated details, colours, and contrast variations (Orth & Wirtz, 2014); and the number of product components and the extent of the interactions among them (Luchs et al., 2016). Visual complexity, which reduces the attractiveness of the product design (Bloch, 1995; Luchs & Swan, 2011), also negatively influences processing fluency and its positive outcomes such as perceived innovation and ease of categorization (Luchs et al., 2016).

In the body of product design literature, only a few studies have considered processing fluency and visual complexity in relation to the holistic perception of a design and its ease of categorization (e.g., Brakus et al., 2014; Landwehr et al., 2013; van Rompay & Pruyn, 2011). However, this theoretical approach can be a strong basis for product design strategies to effectively communicate product messages such as product personality. Further studies and analytical examinations are needed to assess the exact roles of the visual elements of design, and subsequently, the role played by various design dimensions in the creation of processing fluency and in stimulating desirable consumer perceptions and responses.

- **Holistic Perception of Product Design (Gestalt)**

This theory proposes that people perceive objects holistically and postulates that the whole is more than the sum of its parts (Bloch, 1995; Homburg et al., 2015; Orth & Malkewitz, 2008). On this basis, it suggests that product design dimensions will be viewed holistically (e.g., Candi et al., 2017; Crilly et al., 2004; A. Mishra, 2016) and regards products as bundles of discrete attributes (e.g., product design values, dimensions, and elements) to be holistically evaluated by their users (H. K. Lee & Choo, 2019; Noble & Kumar, 2008, 2010). The gestalt theory or holistic perception of product design contains a bias towards the whole, as it posits that the holistic impression a product makes has great influence over consumers' responses (Schreiner, Fandrich, Heitmann, & Talke, 2017; R. Smith, Faro, & Burson, 2013) and is interconnected

with appearance and judgment biases. Moreover, the gestalt theory is the basis for the categorization process and, like the categorization theory, is affected by processing fluency in product design (Mas, Bolls, Rodero, Barreda-Ángeles, & Churchill, 2020).

- **Appearance and Judgment Biases (Influence of Visual Attractiveness on Overall Judgments)**

This theory purports that visual design influences consumer evaluation and perception of a product's overall quality (Hoegg & Alba, 2011; Mugge, Dahl, & Schoormans, 2018; C. Townsend & Shu, 2010). More specifically, it suggests consumers often rely on product appearance to evaluate and judge performance quality (de Burgh-Woodman, Furner, Kim, & Zinko, 2021; Mugge & Schoormans, 2012; Park, Spence, Ishii, & Togawa, 2021). While performance or functionality may be more perceivable during use and play a more influential role in the post-purchasing process (Luchs et al., 2016; Wan, Chen, & Liyin, 2017), especially for consumer goods (see Wiecek, Wentzel, & Landwehr, 2019), research has proposed that a product's visual form or appearance—evidenced by its design elements—influences consumers' holistic judgment and perception of product functional performance through a halo effect (Hoegg & Alba, 2011; Hoegg et al., 2010; Sauer & Sonderegger, 2011). This follows the social psychology of personal appearance wherein personal attractiveness or unattractiveness can impact overall judgments about other features/aspects of a person (Hoegg & Alba, 2011; C. Townsend & Shu, 2010).

This theory states that, if two similar products are compared, the product with a more attractive visual form will be judged as the product with a better performance; this is true even for some technical products (Haug, 2016; Wiecek et al., 2019), like operating room equipment. However, it depends on the nature of the product nature and may not apply to some highly functional products (Hagtvedt & Patrick, 2014) like power saws and drills, where aesthetic

appearance might be perceived to impede functionality and represent the product as decorative (Hagtvedt & Patrick, 2014; Hoegg et al., 2010; Wu, Samper, Morales, & Fitzsimons, 2017). Therefore, it seems a good product design should be a smart combination of design elements and dimensions that take into account the product's nature (Hagtvedt & Patrick, 2014). Appearance and judgment biases are related to the gestalt theory of holistic perception of product design and affect the ease of categorization with the assistance of processing fluency.

- **Categorization and Signaling Theories**

An immediate neural categorization process starts when a person sees either something or somebody. This categorization process can be linked back to product design values and their dimensions as they are reflected by design elements (Garaus & Halkias, 2020). Although this categorization process is not only limited to the visual sense, this field of study has examined how consumers categorize products neurally based on the visual elements of product design (Garaus & Halkias, 2020; Radford & Bloch, 2011; Reimann et al., 2010), which represent product design values and their dimensions (Crilly et al., 2004; Ravasi & Stigliani, 2012). Categorization is one type of cognitive response to product design (Forehand, Dagogo-Jack, & Forehand, 2018) in which consumers try to holistically interpret a product by placing it within an existing mental category with items that are the same or proximal (Bloch, 1995; Radford & Bloch, 2011) or on a "shelf in the brain" (Reimann et al., 2010). Meanwhile, the processing fluency of product design, using visual elements, can facilitate the categorization process (Brakus et al., 2014). Another important point in favor of this theory is that the categorization of product design is interconnected with product innovation and product involvement (Candi et al., 2017). The existing literature has proposed that product creativity and the level of perceived product newness should not be so high that it harms consumers' instinctive categorization and the feeling of familiarity (Walter, Hildebrand, Häubl, & Herrmann, 2020)

or involvement with the product (e.g., Micheli & Gemser, 2016; Mugge & Dahl, 2013; Schmidt & Frieze, 1997).

High levels of product creativity and design newness (e.g., Goode, Dahl, & Moreau, 2013; Micheli & Gemser, 2016) negatively affect the level of product involvement (Candi et al., 2017) and can be risky (Talke, Müller, & Wieringa, 2017). When the visual design newness is "atypical", "disruptive", or "radical" (versus incremental), consumers cannot easily draw inference and categorize the product into a specific product category already stored in their memory (Mugge & Dahl, 2013). Thus, the success of product design innovation is not only linked with its creativity and newness, but also simultaneously relies on the ease of the categorization process (Candi, 2010; Yan Liu, Li, Chen, & Balachander, 2017; Moon, Park, & Kim, 2015) and the meaningfulness of the creativity (see Nakata et al., 2018; Xu, 2020).

Signaling theory is a subset of categorization theory mentioned in the literature, which posits that product design signals product quality. Additional factors such as price, brand, and country-of-origin also signal the product quality (Micheli & Gemser, 2016); however, these factors are not related to the study objectives.

Crucially, although product categorization is central to all product design-related strategies, besides being a key theory related to product design values and their dimensions, product personality inference, and consumers' attitudinal responses to product design, the literature associated with the application of categorization theory in product design is limited. For instance, it is not clear how categorization might interact with consumers' personality and how the theory affects consumers' responses (both attitudinal and behavioural) towards varied products with diverse personalities and different levels of involvement, diversification, differentiation, and innovation. In addition, few studies have considered the various individual and situational factors that could affect categorization. Investigation into how marketing

science can devise practical product design strategies based on this pivotal theory would be beneficial.

- **Personality Congruence**

Consumers of a particular product may not all have the same inferences and perceptions of the product's personality (Schmitt, 2012). Consumer mindsets and characteristics (influenced by individual, situational, and socio-cultural factors) play pivotal roles in consumer perception and experience of a product (Murphy & Dweck, 2016). According to the implicit self-theory of ability (i.e., entity and incremental theories), product personality can boost users' self-efficacy and improve their self-perceptions about their personal qualities and personality traits (Ji Kyung & Roedder John, 2014). The literature on product design and product personality avers that consumers prefer products that match well with themselves, so-called "personality congruence or self-congruity" (e.g., Buettner, 2017; Confente, Scarpi, & Russo, 2020; Govers, 2004; Govers & Schoormans, 2005). Research shows all dimensions of product design, particularly the symbolism that uses the visual elements of design, communicate product personality, which, if matched with a user's preferred personality, can help consumers to reflect their actual or ideal self-image or self-concept through ownership (C.-L. Hsu et al., 2018; M. Kumar & Noble, 2016). As previously discussed, because the conceptual fluency of design is associated with the design's meaning, it directly affects this personality congruence; consumers engage with products through mental familiarity and involvement (Candi et al., 2017; Walter et al., 2020). In the meantime, perceptual fluency also influences personality congruence via visual elements, shaping the design typicality and consumer involvement (Miceli et al., 2014; S. Shapiro, 1999).

Whilst this important theory has been studied in some research, it needs greater consideration in product design studies because personality congruence based on consumer

self-image can be an important anchor for product categorization and, subsequently, stimulation of consumers' positive (behavioural) responses (see Forehand et al., 2018).

Variables and Their Relationships Within Product Design and Consumer Responses

<table>
<tr><td rowspan="11">Dependent Variables</td><td>Attitudinal</td></tr>
<tr><td>• Consumer psychological responses (cognitive/instrumental and affective/emotional responses) (e.g., C. Anthony Di Benedetto, 2012; J.-H. Lee & Chang, 2010; Noble & Kumar, 2010; Radford & Bloch, 2011; Rindova & Petkova, 2007; R. W. Veryzer, Jr. & Hutchinson, 1998).</td></tr>
<tr><td>• Consumer perception (e.g., Alba & Williams, 2013; Goode et al., 2013; Im et al., 2015; Srinivasan et al., 2012).</td></tr>
<tr><td>• Consumer evaluation, judgment, and choice (e.g., Candi et al., 2017; Goode et al., 2013; Yan Liu et al., 2017; Luo, Kannan, & Ratchford, 2008).</td></tr>
<tr><td>• Willingness to pay (WTP) (e.g., Chitturi et al., 2007; Dahl & Moreau, 2002; F. G. Gilal, Zhang, Gilal, & Gilal, 2018; Homburg et al., 2015; Maeng & Aggarwal, 2018).</td></tr>
<tr><td>• Consumer experience (e.g., Brakus et al., 2014; Candi et al., 2017; Chien, Kerh, Lin, & Yu, 2016; K.-Y. Lin, Chien, & Kerh, 2016).</td></tr>
<tr><td>• Consumer satisfaction and loyalty (e.g., Alba & Williams, 2013; Benhabib, Bilgihan, Madanoglu, & Menidjel, 2020; Bloch, Brunel, & Arnold, 2003; Chitturi et al., 2008; Sabir, 2020; Srinivasan et al., 2012).</td></tr>
<tr><td>• Brand attitude, perception, value, and image (e.g., Brexendorf, Bayus, & Keller, 2015; Brunner et al., 2016; Chan, Boksem, & Smidts, 2018; Y. Chang, Li, Yan, & Kumar, 2019; Creusen, 2011; Homburg et al., 2015; Limon, Kahle, & Orth, 2009; Sonnier & Ainslie, 2011; Voss et al., 2003).</td></tr>
<tr><td>• Brand affection or emotional branding (e.g., Aboulnasr & Tran, 2019; M. Kumar et al., 2015; Thompson, Rindfleisch, & Arsel, 2006; Vredeveld, 2018).</td></tr>
<tr><td>• Brand development (e.g., Luchs & Swan, 2011; Luchs et al., 2016; van Rompay & Pruyn, 2011).</td></tr>
<tr><td>• Brand equity (e.g., Heitmann, Landwehr, Schreiner, & van Heerde, 2020; A. Mishra, 2016; A. Mishra, Dash, Malhotra, & Cyr, 2015; P. Sharma, Davcik, & Pillai, 2016; Veloutsou, Chatzipanagiotou, & Christodoulides, 2020).</td></tr>
<tr><td rowspan="6"></td><td>Behavioural</td></tr>
<tr><td>• Consumer behavioural responses (e.g., Candi et al., 2017; Chitturi et al., 2007; Grein et al., 2020; Reimann et al., 2010).</td></tr>
<tr><td>• Purchase decisions (preferences, intentions, and choice) (e.g., Bloch et al., 2003; Ho-Dac, Kumar, & Slotegraaf, 2020; M. Kumar et al., 2015; Maeng & Aggarwal, 2018; Wan et al., 2017).</td></tr>
<tr><td>• Word-of-mouth (WOM) (e.g., Candi et al., 2017; Chitturi et al., 2008; N. G. Gilal, Zhang, & Gilal, 2018b; Homburg et al., 2015).</td></tr>
<tr><td>• Post-purchase behaviour (repurchase, etc.) (e.g., Chitturi et al., 2008; Cho, 2015; M. Kumar et al., 2015).</td></tr>
<tr><td>• Product success (e.g., Cooper, 2019; Hemonnet-Goujot, Manceau, & Abecassis-Moedas, 2019; Ho & Plewa, 2020; Moon et al., 2015; Mugge & Dahl, 2013; Nakata et al., 2018).</td></tr>
<tr><td rowspan="2"></td><td>Financial</td></tr>
<tr><td>• Firm financial success/performance (e.g., market share, profitability, turnover, sales, operational efficiency) (e.g., Huo, Zou, & Xie, 2019; Jindal et al., 2016; Luchs et al., 2016; Micheli & Gemser, 2016; Ravasi & Stigliani, 2012; Srinivasan et al., 2012).</td></tr>
<tr><td rowspan="4">Independent Variables</td><td>• Visual design elements (form/appearance: shape, colour, size, lines, style, harmony, symmetry, etc.) (e.g., Creusen & Schoormans, 2005; Hoegg & Alba, 2011; Maeng & Aggarwal, 2018; Westerman et al., 2012; Wiedmann, Haase, Bettels, & Reuschenbach, 2019).</td></tr>
<tr><td>• Non-visual elements/senses in design (e.g., Reimann et al., 2010; Sonderegger & Sauer, 2015; Srinivasan et al., 2012).</td></tr>
<tr><td>• Creativity/innovation (e.g., Micheli & Gemser, 2016; Mugge & Dahl, 2013; Nakata & Hwang, 2020; Nakata et al., 2018).</td></tr>
<tr><td>• Product personality (e.g., Creusen & Schoormans, 2005; Govers & Schoormans, 2005; Noble & Kumar, 2010).</td></tr>
</table>

Mediators	• **Product design pleasure and attractiveness** (e.g., Beverland, Gemser, & Karpen, 2017; Chitturi et al., 2008; Orth & Wirtz, 2014). • **Processing fluency** (e.g., Landwehr et al., 2013; J. E. Lee & Shin, 2020; Sample, Hagtvedt, & Brasel, 2020). • **Personality congruence** (e.g., Buettner, 2017; Govers, 2004; Govers & Schoormans, 2005). • **Designers' practices (in design process)** (e.g., Ahmed, Wallace, & Blessing, 2003; Alcaide-Marzal et al., 2020; Ban & Hyun, 2020; Crilly, 2015; Ravasi & Stigliani, 2012).
Moderators	• **Individual tastes and preferences (e.g., perception, value, acumen, experience, and characteristics)** (e.g., Bloch et al., 2003; Eytam, Lowengart, & Tractinsky, 2020; e.g., Haug, 2016; M. Kumar & Noble, 2016). • **Situational factors (e.g., age, income, and family)** (e.g., Noble & Kumar, 2010; Srinivasan et al., 2012). • **Cultural and social context** (e.g., Candi et al., 2017; F. G. Gilal, Zhang, Gilal, & Gilal, 2020; Guo, Heinberg, & Zou, 2019; Haug, 2016; Moon et al., 2013). • **Consumer involvement with product** (e.g., Bloch et al., 2003; Candi et al., 2017; Ho-Dac et al., 2020; C.-L. Hsu et al., 2018). • **Typicality or atypicality of design** (e.g., Celhay & Trinquecoste, 2015; Goode et al., 2013; Landwehr et al., 2013; Yan Liu et al., 2017; Micheli & Gemser, 2016; Mugge & Dahl, 2013; Schuhmacher, Kuester, & Hultink, 2018). • **Brand strength** (e.g., Calder, He, & Calder, 2020; Landwehr, Wentzel, & Herrmann, 2012; A. Mishra, 2016; Rubera, 2015; J. D. Townsend, Kang, Montoya, & Calantone, 2013). • **Organizational and environmental factors (e.g., resources and culture)** (e.g., Luchs et al., 2016; Noble & Kumar, 2010).

Table 3: The Main Theories Related to Product Design and Consumer Responses in the Literature

Numerous variables have been mentioned in the literature related to product design and consumer responses. In undertaking a thorough comparison between studies, this review found that many variables are similar, with individual researchers applying different terms to the same or similar concepts. This study has undertaken to select the most appropriate umbrella term for each variable, group similar concepts, and consequently reduce the number of variables. In addition, although these variables may play various roles in the existing literature, in this study each was assigned to a single category based on the variable's main role (see Table 3).

In the following section, the variables are assigned to one of four categories (i.e., dependent variables, independent variables, mediators, and moderators). Each is briefly reviewed from the standpoint of its interrelationships with other variables and its main roles as outlined in the product design literature.

Dependent Variables (Outcomes)

Attitudinal Variables

Attitudinal variables have a complex interconnectivity that flows throughout the consumer's ongoing experience with a product. In the first place, seeing or intuiting the product design affects a consumer's attitude towards the product, as measured by attitudinal variables. product design influences consumers' "psychological responses (cognitive/instrumental and affective/emotional responses)" (e.g., C. Anthony Di Benedetto, 2012; Noble & Kumar, 2010) towards the product. These responses can be understood using theories such as categorization, Gestalt and other related biases, processing fluency/complexity, and personality congruence. Then, a holistic "perception" of the product design will be shaped in the consumers' minds (e.g., Goode et al., 2013; Srinivasan et al., 2012). The perception forms consumers' "evaluation, judgment, and choice" (e.g., Yan Liu et al., 2017; Luo et al., 2008); if the responses are positive, consumers may be persuaded to pay a premium price for the product, known as "willingness to pay (WTP) (e.g., Chitturi et al., 2007; Homburg et al., 2015; Okada, 2005).

During the product consumption stage, product design can shape consumers' attitudes. An "experience" of the product design (e.g., Brakus et al., 2014; Candi et al., 2017) will be created in the consumers' minds. A positive experience (e.g., joy and fun) (Sauer & Sonderegger, 2011) will result in consumers' "satisfaction and loyalty" (e.g., Chitturi et al., 2008; Srinivasan et al., 2012), which, in turn, affect behavioural responses like post-purchase behaviour (e.g., Chitturi et al., 2008; C.-L. Hsu et al., 2018). In the meantime, attitude towards the product design can influence the "brand attitude, perception, value, and image" (e.g., Brexendorf et al., 2015; Homburg et al., 2015; Karjalainen & Snelders, 2010). A positive attitude towards the brand shapes "brand affection or emotional branding", which lies in feelings of passion, attachment, and pride in owning a particular brand (e.g., M. Kumar et al., 2015; Thompson et al., 2006). Subsequently, product design influences "brand development"

(e.g., Luchs et al., 2016; van Rompay & Pruyn, 2011) and "brand equity" (e.g., A. Mishra, 2016; P. Sharma et al., 2016; Vogel & Watchravesringkan, 2017) and can act as a branding tool. In this sense, there is a mutually supportive relationship between brand and product design.

Behavioural Variables

Attitudes towards the product design also affect consumers' behaviour and actual events in the market related to consumers' "behavioural responses" (e.g., Chitturi et al., 2007; Reimann et al., 2010). Positive behavioural responses towards the product design can result in a number of outcomes: "purchase decisions (preferences, intentions, and choice)" (e.g., Maeng & Aggarwal, 2018; Wan et al., 2017) and subsequently, as previously noted, satisfaction and loyalty (e.g., Chitturi et al., 2008; Srinivasan et al., 2012); consumers' recommendation or (positive/negative) "word-of-mouth (WOM)" (e.g., Chitturi et al., 2008; Homburg et al., 2015); and other "post-purchase behaviours (repurchase, etc.)" (e.g., Chitturi et al., 2008; Cho, 2015). Finally, in practice, product design plays a key role in "product success" (e.g., Moon et al., 2015; Mugge & Dahl, 2013), which can affect a company's financial outcomes (Luchs et al., 2016; Tabeau, Gemser, Hultink, & Wijnberg, 2017).

Financial Variables

Ultimately, a successful product design positively affects the "firm's financial success/performance, which is measured by factors such as market share, profitability, turnover, sales, and operational efficiency" (e.g., Micheli & Gemser, 2016; Ravasi & Stigliani, 2012).

Independent Variables (Driving/Underlying/Antecedents)

In the product design literature, independent variables related to the design of a product are mostly linked with the "visual design elements (form/appearance: shape, colour, size, line,

style, harmony, symmetry, etc.)" (e.g., Maeng & Aggarwal, 2018; Westerman et al., 2012). In addition, the literature has infrequently considered "non-visual elements/senses in design", covering the tactile or haptic (e.g., Ranaweera, Martin, & Jin, 2021; Wiedmann et al., 2019) aspects of product design (eg. material and texture) that can be more or less visible (e.g., seen in a product's texture) (e.g., Eklund & Helmefalk, 2018; Reimann et al., 2010; Sonderegger & Sauer, 2015; Srinivasan et al., 2012). Crucially, other important non-visual elements of product design, such as those that affect the auditory, olfactory, and gustatory senses (e.g., Candi et al., 2017; Sonderegger & Sauer, 2015) have rarely been studied in the product design literature (e.g., Sonderegger & Sauer, 2015). Further, "creativity/innovation" (e.g., Micheli & Gemser, 2016; Mugge & Dahl, 2013) and "product personality" (e.g., Creusen & Schoormans, 2005; Govers & Schoormans, 2005) are two important independent variables in the literature. Their roles in product design and their effect on design dimensions are discussed later in this review.

Mediating Variables

Successful design of products should be able to stimulate consumers' positive responses through "pleasure and attractiveness" (e.g., Beverland et al., 2017; Chitturi et al., 2008; Orth & Wirtz, 2014). Attractive things make people happy (Hagtvedt & Patrick, 2014). The attractiveness of product design can generate consumers' pleasure, which will positively affect consumers' perceptions of product design (Orth & Wirtz, 2014) and their emotional responses (Khalighy, Green, Scheepers, & Whittet, 2015). The creation of pleasure and attractiveness is dependent on the success of factors that facilitate the categorisation process such as "processing fluency" (e.g., Landwehr et al., 2013; Sample et al., 2020) and that aid in the communication of product personality and "personality congruence" (Buettner, 2017; Govers & Schoormans, 2005). All these factors are generated by a holistic perception of product design dimensions and their visual/non-visual elements.

"Designers' practices (in design process)" is another key mediator between product design and consumer responses. There is a cycle of connection between the product designers, who use professional knowledge and experience to choose specific design processes and practices, and the consequent perceptions of the product by consumers and their responses to it (e.g., Ban & Hyun, 2020; Crilly, 2015; Ravasi & Stigliani, 2012).

Moderating Variables

There are several effective variables that moderate the relationship between product design and consumers' responses to that design. Consumers' "individual tastes and preferences (e.g., perception, value, acumen or innate good taste, experience, and characteristics)" (e.g., Bloch et al., 2003; M. Kumar et al., 2015; Noble & Kumar, 2010) are among the most effective factors moderating product design perception. Personality congruence theory (e.g., Govers, 2004; Govers & Schoormans, 2005) also highly depends on these factors. Moreover, these factors can be changed over time, as shown in the implicit self-theory of ability, consisting of entity and incremental theories (e.g., Ji Kyung & Roedder John, 2014). "Situational factors (e.g., age, income, and family)" (e.g., Noble & Kumar, 2010; Srinivasan et al., 2012), and "cultural and social context" (e.g., Haug, 2016; e.g., Moon et al., 2013) can also moderate the perception of product design and affect consumers' responses.

The level of "consumer involvement with product" (high vs low) (e.g., Candi et al., 2017; C.-L. Hsu et al., 2018) is another important moderating factor in consumers' responses towards product design. Consumer involvement is an internal state that shows the amount of consumer familiarity, interest, and arousal provoked by a product class or category (e.g., Bloch et al., 2003; Candi et al., 2017; C.-L. Hsu et al., 2018). The level of consumer involvement is affected by processing fluency/complexity, personality congruence, and the categorization process through a holistic perception of the product design values, dimensions, and elements.

Furthermore, individual tastes and preferences, situational factors, and the cultural and social context also affect the level of consumer involvement with a particular category of product.

"Typicality or atypicality of design" is a significant factor moderating consumers' responses to product design and is related to design creativity/innovation in consumers' eyes (e.g., Goode et al., 2013; Mugge & Dahl, 2013). As was mentioned in the previous discussion of categorization theory, design typicality or atypicality directly affects consumer familiarity and involvement with a product (Candi et al., 2017; Walter et al., 2020) and, thereby, recognition and categorization (e.g., Micheli & Gemser, 2016; Mugge & Dahl, 2013). It follows that, the level of design typicality/atypicality also impacts the processing fluency/complexity and holistic perception of product design and, subsequently, can affect personality congruence (e.g., Miceli et al., 2014; S. Shapiro, 1999).

"Brand strength" can moderate the perceived value of product design and influence consumers' responses towards the product design (e.g., Calder et al., 2020; Landwehr et al., 2012; J. D. Townsend et al., 2013). Well-known brands, through brand involvement, may affect the perception of product design (A. Mishra, 2016; Reimann et al., 2010) by influencing the categorisation process and personality congruence with the brand.

"Organisational and environmental factors (e.g., resources and culture)" can also impact product design and, therefore, perceptions of and responses to it, particularly in terms of the design process (e.g., Luchs et al., 2016; Noble & Kumar, 2010).

Strategies in Product Design and Consumer Responses

Strategy
• Product personality
• Differentiation
• Level of product diversification/extension
• Level of creativity/innovation for categorization (incremental creativity)
• Creativity/innovation

Table 4: The Main Strategies Related to Product Design and Consumer Responses in the Literature

Strategies in the product design literature tend to be limited, tacit, vague, or generic, and unrelated to the viewpoint of this study. On the one hand, many of them are associated with NPD and its processes (e.g., Dahl, 2011; C. Anthony Di Benedetto, 2012; Luchs & Swan, 2011); co-development, co-creation, or co-design (e.g., W. Chang & Taylor, 2016; Eppinger, 2011); R&D (e.g., Cui & Xiao, 2019; Homburg et al., 2015); mass customization (e.g., Luchs et al., 2016; Trentin, Aichner, Sandrin, & Forza, 2020); sustainability (e.g., Li, Guan, Shi, & Jiao, 2020; Luchs, Brower, & Chitturi, 2012; Paparoidamis, Tran, Leonidou, & Zeriti, 2019); extending product life (e.g., Luchs et al., 2016); external context (consumers' needs, environment, and competitors), and firm strategy (objectives, capabilities, and production process) (e.g., Luchs & Swan, 2011; Luchs et al., 2016). On the other hand, most strategies that are mentioned indeed do have managerial implications and contain recommendations that should be considered during the product design process in order to increase positive consumer responses and gain more market success. Table 4 lists the most strategies or proposed approaches in the literature that concentrate on product design and are related to our study's objectives. These strategies are discussed below.

- **Creativity/Innovation**

Although creativity is the first step in innovation, these two terms are often applied synonymously in the marketing literature (Valgeirsdottir, Onarheim, & Gabrielsen, 2014). Creativity or innovation of a product emanates from its design novelty and differentiation

compared to alternatives in the market (Dean, Griffith, & Calantone, 2016; Rahmanzadeh, Pishvaee, & Rasouli, 2020). Creativity/innovation is a pivotal strategy for product success that can value to a design through the perceived newness and uniqueness of the product's attributes (Moon et al., 2013; Moon et al., 2015; Srinivasan et al., 2012). The perception of product innovation mostly relies on the creativity of product design dimensions (Srinivasan et al., 2012; Stanton, Townsend, & Kang, 2016), and the creativity of these dimensions, in turn, generates a competitive advantage (C. Anthony Di Benedetto, 2012). Meanwhile, innovation in product design positively affects consumers' holistic perception of the product and can have a positive influence on their responses by facilitating the categorization process (Wang, Shen, Song, & Phau, 2020). However, this process also depends on processing fluency/complexity (Brakus et al., 2014) and consumers' involvement with the product category (Candi et al., 2017). Following this further, because the success of product innovation relies on the ease of the categorization process (Candi, 2010; Yan Liu et al., 2017; Moon et al., 2015), a high level of innovation may negatively affect the categorization and success of product design (Talke et al., 2017).

- **Level of Creativity/Innovation**

As was noted during the discussion of categorization theory and in the section related to the moderating variables, scholars have suggested incremental and moderate levels of creativity for product design (in contrast with radical designs that are completely different from previous ones) (Xue, 2019) as the optimal strategy for product design innovation (Bohlmann, Spanjol, Qualls, & Rosa, 2013; Chao & Kavadias, 2008; Holahan, Sullivan, & Markham, 2014). Atypicality of product design negatively affects consumer familiarity and involvement with the product because it causes difficulties with recognition and categorization (e.g., Goode et al., 2013; Micheli & Gemser, 2016; Mugge & Dahl, 2013). In addition, the level of

typicality/atypicality of a design influences the processing fluency/complexity and holistic perception of it, resulting in a possible increase or decrease in the level of personality congruence (e.g., Miceli et al., 2014; S. Shapiro, 1999). Moreover, atypical design or highly styled products (Celhay & Trinquecoste, 2015) are perceived as only decorative goods with highly luxurious personalities; this can reduce the sales of many consumer goods (Hagtvedt & Patrick, 2014; Hoegg et al., 2010; Wu et al., 2017). However, in some cases, company strategies (e.g., positioning, pricing, and advertising) and capabilities (like brand strength and distribution channels) may justify and support radical creativity of product design (Slater, Mohr, & Sengupta, 2014), (e.g., Dyson's, SMEG's, and B&O's products). It should be noted that the related studies appear to have only considered creativity of form (uniqueness or newness) rather than creativity of product relevance or meaning (see Xu, 2020).

- **Level of Product Diversification/Extension**

Although product diversification (or extension) is a basic strategy for product design (Ansoff, 1957), this strategy appears to be largely missing from the product design literature. As discussed, some studies have focused on innovative design as a strategy, yet there has been no systematic research on the role of the diversification strategy in product design. Perhaps this is because diversification is related more to the development of different product lines than to a specific product line (Qiu, 2014). However, there is no doubt that, similar to the moderate level of innovation that can provide a strategic advantage (e.g., Micheli & Gemser, 2016; Mugge & Dahl, 2013), a moderate level of diversification (e.g., Benito-Osorio, Ángel Guerras-Martín, & Ángel Zuñiga-Vicente, 2012; Danneels, 2002; Hashai & Delios, 2012) in a product and its design could also be a vital strategy. On the one hand, a high level of product diversification confuses consumers due to categorization difficulties. On the other, a low level of diversification may not fully satisfy consumers' needs and expectations of the company brand.

With the right level of diversification within a product line, different consumer groups/segments with different needs and tastes can categorize and choose their preferred product more easily, thereby extending the product's market reach and penetration and also increasing the product's sales velocity. Despite the importance of the diversification strategy in product design, studies related to product diversification have only focused on corporate-level strategy (Yeyi Liu, Foscht, Eisingerich, & Tsai, 2018; Amalesh Sharma, Saboo, & Kumar, 2018). In contrast with the product innovation design strategy, the diversification strategy has not been taken into consideration in any study related to product design. However, product design and its dimensions obviously affect product diversification, and diversification is interrelated with product differentiation, innovation, and personality.

- **Differentiation**

The differentiation strategy based on product design and its dimensions can be characterized as a master key that can assist products to attain a competitive edge in a condensed competitive market (Baron, 2020; C. Anthony Di Benedetto, 2012; Grein et al., 2020). Product differentiation is a strategy influencing consumers' responses (M. Kumar & Noble, 2016; Stanton et al., 2016; Velasco et al., 2014) that should be considered as the most inspiring source for creativity/innovation and, consequently, greater consumer involvement (M. Kumar et al., 2015; Srinivasan et al., 2012; Stanton et al., 2016). In addition, the aesthetic and symbolic dimensions of product design are respectively assumed to be highly influential on differentiation, capturing consumers' minds and hearts by applying different elements of design (Brunner et al., 2016; Reimann et al., 2010). Importantly, these dimensions may be less imitable by competitors than differentiation based on functionality and ergonomics (Reimann et al., 2010; Srinivasan et al., 2012). Nevertheless, functionality and ergonomics also play undeniable roles in shaping the perception of differentiation (M. Kumar et al., 2015; Srinivasan

et al., 2012), particularly in shaping differentiation during or after product use (Luchs et al., 2016). This impacts post-purchase behaviours like repurchasing, loyalty, and WOM (Chitturi et al., 2008). Thus, design differentiation endows a unique personality to the product (Stanton et al., 2016). Furthermore, processing fluency and a medium level creativity or innovation can positively affect perceived differentiation through ease of categorization (e.g., Wang et al., 2020).

- **Product Personality**

Product design, via its dimensions and elements, holistically creates personality for products that provoke consumer responses (Candi et al., 2017; C.-L. Hsu et al., 2018), whilst consumers' personalities play an influential role in the evaluation and interpretation of a product's personality (Buettner, 2017; Confente et al., 2020; Mugge et al., 2009). Many studies based on the personality congruence theory have indicated that consumers prefer owning products with personalities that are close to their own (Govers, 2004; Govers & Schoormans, 2005) to represent their actual or ideal personalities (Noh & Mosier, 2014; Sundar et al., 2014).

A key strategy for product design is the communication of differentiated personality to stimulate the consumer's need for self-expression (Kaiser, Schreier, & Janiszewski, 2017; M. Kumar & Noble, 2016). A successful personality communication will result in greater consumer involvement (Candi et al., 2017; C.-L. Hsu et al., 2018) by facilitating the categorization process (e.g., Micheli & Gemser, 2016; Mugge & Dahl, 2013). In this process, visual processing fluency, which is conveyed through a holistic perception of the product and shapes a positive experience (e.g., joy and fun) of the product design (Sauer & Sonderegger, 2011), influence the ease of categorization and represents the personality of the product (such as distinctive, innovative, unique, luxurious, or cool).

Product personalities are as varied as those of biological entities such as humans, animals, or plants. However, successful products are most often perceived as creative/innovative and cool in personality (Im et al., 2015). These two main personalities encompass many traits related to products such as trendiness, friendliness, attractiveness, happiness (Rahman, 2013), genuineness, uniqueness, and originality (Sundar et al., 2014).

Finally, reviewing the product design literature shows that strategy or "comprehensive strategic insight" for product design is a pivotal issue that still remains largely unclear in academia and marketing practices (Yilmaz, Daly, Seifert, & Gonzalez, 2016). This is true even though clear product design strategies—based on relevant theories—help designers and marketers to achieve more success in a competitive product market that has both high R&D costs and a high failure rate (Victory, Nenycz-Thiel, Dawes, Tanusondjaja, & Corsi, 2021).

DISCUSSION AND FUTURE RESEARCH AGENDA

Product design is faced with two essential challenges. The first challenge is the complex and interrelated factors at play in how the consumer perceives a product and what preferences the consumer has for the product. The second challenge is the unbridged gap between the unique professional skills and practices of product designers and those of product marketers. Successful communication of product design to the consumers triggers their positive responses towards the product. Effective product design strategy can enhance the accuracy, consistency, and effectiveness of the design communication (Crilly et al., 2008; Kazmierczak, 2003). How a product is perceived, whether it is preferred over another by the consumers, and how they subsequently respond to the product design is highly varied based on complex and interrelated factors such as individual (Bloch et al., 2003), situational (Srinivasan et al., 2012), and socio-

cultural (Candi et al., 2017). At the same time, product designers and product marketers have unique ways of working and thinking that are often misaligned and dispersed (Beverland et al., 2016). This can cause chaotic design and hurdles in the development of product design strategy.

Studies have indicated that product designers apply different heuristic approaches in the design process (Ahmed et al., 2003; Crilly, Moultrie, & Clarkson, 2009). These product design strategies should be gathered and documented using critical analyses and appropriate customizations. Although academic studies cannot change consumer responses, they can be influential in gathering strategic insights to be utilized by designers and marketers, and thus enhance the success of design communication. D. Tang, Zhu, Tang, Xu, and He (2010) suggested designers should utilize their professional experience and know-how to establish a "product design knowledge management" system, thus enhancing the efficiency and innovativeness of product design. Additionally, formulating or codifying design strategies (Leo, 2020; Ravasi & Lojacono, 2005) and reducing "trial and error" (Ahmed et al., 2003) helps designers to manage their capricious designs. This would result in more practical and creative products. Simultaneously, the codification of designers' knowledge-based and pragmatic creativity in a manner that also considers the creative approaches of their global colleagues would assure their design success and pave the path for the practical and academic evolution of product design.

This comprehensive review, through compiling and exploring the linkages among the key relevant topics in product design, can help scholars, designers, and marketers to think practically about the main product design-related topics (values, dimensions, elements, theories, strategies, and variables) and link them to create more comprehensive strategies for successfully steering consumers' responses. This will inevitably allow a far more strategic and harmonious approach to product design and thus improve product design quality in practice, as well laying the groundwork for further academic studies. As strategy has been considered by

this review to be the missing link in the evolution of product design, prioritizing strategy—and the development of theories that can yield practical strategies—rather than merely relying on personal intuition and/or scrutinizing the product design-related variables will further the development of product design.

The Main Variables related to Product Design and Consumer Responses

Elements and dimensions of product design

Consumers' perceptions of product design and its brand (attitudinal response)

Consumers' individual, situational and socio-cultural factors (behavioral response)

| Processing-fluency or complexity | Holistic perception (Gestalt) | Appearance and judgment biases | Categorization | Personality congruence |

The Main Theories related to Product Design and Consumer Responses

The Main Strategies related to Product Design and Consumer Responses

Creativity or innovation

Level of creativity or innovation

Level of Diversification

Differentiation

Product personality

Figure 3: Relationships Between the Main Variables, Theories, and Strategies in this Study

Figure 3 indicates the most probable sequences and ordinal relationships between the main variables, theories, and strategies examined in this study. As the figure illustrates, although product design touches upon several influential topics, most scholars have focused highly on product design dimensions or attributes and consumers' responses (i.e., attitudinal and behavioural). Surprisingly, only a few studies in the literature have examined product

design-related theories, developed or customized such theories, or suggested product design-related strategies. For example, there has been scant research on categorization theory even though categorization is key to influencing consumers' attitudinal responses and can be influenced by various strategies (see Garaus & Halkias, 2020). Personality congruence is also a key theory for explaining consumers' behavioural responses and a pivotal point for the formation of product personality that has not been properly studied (see Confente et al., 2020); most of research on personality has concentrated on brand personality as influenced by Aaker (1997) framework. Although the product design literature is broad, it has lacked a harmonious development and has failed to provide a strategic path to continuous market success.

As such, borrowing more theories from other fields/disciplines and considering related variables could assist in devising practical strategies for product design. This is a necessary step in the formulation or codification (Leo, 2020; Ravasi & Lojacono, 2005) of product design strategies and the improvement of managerial and academic strategic insights into product design. Extracting practical strategies from various theories and accounting for the roles of different variables opens a vast field for future research. The exact roles of several basic variables remain unclear in the product design literature due to the difficulty of experimental and empirical studies in this area where actual product prototypes (see Tih, Wong, Lynn Gary, & Reilly Richard, 2016) (instead of their photos) are frequently unavailable. For example, the roles of each visual (e.g., colours, lines, shapes) and, particularly, non-visual element (e.g., material and texture) of product design—variables that are more functionality- and engineering-related (Srinivasan et al., 2012)—in creating product personality and thus influencing consumer responses have not been clearly determined.

Therefore, although product design is considered a highly important topic in marketing and marketing strategy, there is still insufficient academic research in this area, with many gaps in the literature. However, in comparison with service design, which has a very small literature,

the product design literature contains more research, which is a warning to the scholars in service design.

IMPLICATIONS

This review has shown that product designers and marketers should begin to consider product design and its development more strategically rather than intuitively. So far, there has been an insufficient focus on strategies in the product design literature. Instead of applicable strategies, most scholars have provided recommendations and suggestions that have mostly been case-based and have lacked generalizability. When devising practical product design strategies, it is important to understand that design strategy does not mean replicating the designs of others. However, product design strategy can constitute a reliable basis for error-free innovation to maximize the success of product design creativity. In the same regard, the terms "strategy" and "innovation" should aim real success in NPD, instead of being a repetitive motto.

While designers and marketers passively create products based on their own preferences and intend to endow particular personalities to their products (Crilly, 2019; Crilly et al., 2008), consumers actively translate the products' designs based on their own perceptions and personalities. These translations may differ from the intentions of the designers and marketers (Crilly et al., 2008; Mugge et al., 2009). Design strategy helps product designers and marketers to avoid personal preferences as much as possible and become more consumer-oriented. When consumer response towards product design is determinant, using theories and strategies improves product design success. Designers and marketers should also be aware of the role of design elements, values, and dimensions, including the complex interrelations between them that generate a specific personality. However, the skillful combination of these elements, values, and dimensions will be dependent on the individual's artistic viewpoint and

level of creativity (e.g., Schuhmacher et al., 2018; Xue, 2019). The differences between products' designs should emanate from the creativity of designers and marketers, not from the rudimentary components of design. In other words, designers and marketers should be aware of the role played by the interrelationships among product elements, values, and dimensions in the creation of product personality, including the related variables, theories, and strategies involved in product design and consumer responses; they should utilize all these aspects to shape their individual strategies. This is the strategic way to creatively develop product design in practice and in academia. Towards this end, as was discussed before, finding the links between the product design-related variables, theories, and strategies can help designers and marketers to acquire proper strategic insights. Furthermore, scholars' deep holistic attention to the discussed topics—rather than fixation on a specific set of variables—and more focus on theory development for devising practical strategies would assist the harmonious evolution of product design.

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APPENDICES

Appendix 1: A Set of the Most Relevant Articles Referencing a Product's Design Values and/or Dimensions

Source	Values/Benefits				Theories	Variables	Strategies
	Hedonic		Utilitarian				
	Dimensions						
	Aesthetics	Symbolic or semiotic	Functional or semantic	Ergonomics or kinesthetic			
Bloch (1995), Journal of Marketing (Review)	✓		✓	✓	• Categorization • Holistic perception (Gestalt) • Product visual complexity (number of product elements, components, the extent of interactions among components, and the degree of product novelty)	• Consumer perception (perceived value of product design) • Consumer psychological (cognitive and affective) responses • Consumer behavioural responses • Visual design elements (form/appearance) • Individual tastes and preferences (e.g., perception, value, acumen, experience, and characteristics) • Situational factors (e.g., financial resources, competing needs, and family influences) • Cultural and social context • Creativity/innovation	

Bloch et al. (2003), Journal of Consumer Research	✓	✓	✓	✓	• Categorization	• Individual tastes and preferences (e.g., perception, value, acumen, experience, and characteristics) • Visual design elements (form/appearance) • Non-visual elements/senses in design • Consumer satisfaction and loyalty • Creativity/innovation • WTP • Purchase decisions (preferences, intentions, and choice) • Consumer evaluation, judgment, and choice • Consumer behavioural responses • Cultural and social context • Consumer involvement to product (high vs low) affects their evaluations
Crilly et al. (2004), Design Studies (Review)	✓	✓	✓		• Maslow's hierarchy of needs (consumer need to utilitarian value of product design before hedonic one) • Holistic perception (Gestalt) • Categorization	• Consumer psychological (cognitive and affective) responses • Consumer behavioural responses • Product success • Firm financial success/performance (e.g., market share, profitability, turnover, sales, and operational efficiency) • Visual design elements (form/appearance) • Non-visual elements/senses in design • Product personality

						• Creativity/innovation
						• Cultural and social context
Creusen and Schoormans (2005), Journal of Product Innovation Management	✓	✓	✓	✓	• Categorization	• Consumer evaluation, judgment, and choice • Purchase decisions (preferences, intentions, and choice) • Visual design elements (form/appearance) • Individual tastes and preferences (e.g., perception, value, acumen, experience, and characteristics) • Product personality
Govers and Schoormans (2005), Journal of Consumer Marketing	✓	✓	✓		• Personality congruence or self-congruity	• Visual design elements (form/appearance) • Product personality • Individual tastes and preferences (e.g., perception, value, acumen, experience, and characteristics)
Rindova and Petkova (2007), Organization Science (Review)	✓	✓	✓			• Creativity/innovation • Visual design elements (form/appearance) • Consumer psychological (cognitive and affective) responses • Consumer perception (perceived value of product design)
Chitturi et al. (2007), Journal of Marketing Research	✓		✓		• Utilitarian and hedonic values/benefit of product design	• WTP • Purchase decisions (preferences, intentions, and choice) • Consumer evaluation, judgment, and choice

				• Consumer behavioural responses	
Chitturi et al. (2008), Journal of Marketing	✓	✓		• Utilitarian and hedonic values/benefit of product design • Maslow's hierarchy of needs (consumer need to utilitarian value of product design before hedonic one)	• Consumer satisfaction and loyalty • Consumer psychological (cognitive and affective) responses • Purchase decisions (preferences, intentions, and choice) • WOM • Post-purchase behaviour (repurchase, etc.) • Consumer experience • Product design pleasure and attractiveness
Noble and Kumar (2010), Journal of Product Innovation Management	✓	✓	✓	• Holistic perception (Gestalt)	• Consumer psychological (cognitive and affective) responses • Consumer behavioural responses • Visual design elements (form/appearance) • Individual tastes and preferences (e.g., perception, value, acumen, experience, and characteristics) • Situational Factors (e.g., financial resources, competing needs, and family influences) • Creativity/innovation • Organisational and environmental factors (e.g., resources and culture) • Product personality • Cultural and social context

Reference						
Reimann et al. (2010), Journal of Consumer Psychology	✓		✓		• Holistic perception (Gestalt) • Categorization	• Visual design elements (form/appearance) • Non-visual elements/senses in design • Consumer behavioural responses • Consumer perception (perceived value of product design) • Consumer evaluation, judgment, and choice • Brand attitude, perception, value, and image	• Differentiation
Bloch (2011), Journal of Product Innovation Management (Review)	✓	✓	✓	✓		• Visual design elements (form/appearance) • Non-visual elements/senses in design	
Radford and Bloch (2011), Journal of Product Innovation Management	✓	✓	✓		• Categorization	• Consumer psychological (cognitive and affective) responses • Design newness	
Hoegg and Alba (2011), Journal of Product Innovation Management	✓	✓	✓	✓	• Appearance bias (influence of product visual attractiveness on overall judgments of product design) • Judgment bias (judgment of product functional performance based on its appearance/form)	• Consumer evaluation, judgment, and choice • Visual design elements (form/appearance)	
Creusen (2011), Journal of Product Innovation Management (Review)	✓	✓	✓	✓		• Consumer psychological (cognitive and affective) responses • Visual design elements (form/appearance) • Brand attitude, perception, value, and image	

Study							
van Rompay and Pruyn (2011), Journal of Product Innovation Management	✓	✓	✓		• Holistic perception (Gestalt) • Processing fluency (holistic information processing)	• Consumer satisfaction and loyalty • Consumer evaluation, judgment, and choice • Brand attitude, perception, value, and image • Consumer psychological (cognitive and affective) responses	
Luchs and Swan (2011), Journal of Product Innovation Management (Review)	✓	✓	✓	✓	• Product visual complexity (number of product elements, components, the extent of interactions among components, and the degree of product novelty) • Holistic perception (Gestalt)	• Consumer perception (perceived value of product design) • Consumer psychological (cognitive and affective) responses • Consumer behavioural responses • Individual tastes and preferences (e.g., perception, value, acumen, experience, and characteristics) • Cultural and social context • Product success • Firm financial success/performance (e.g., market share, profitability, turnover, sales, and operational efficiency) • Post-purchase behaviour (repurchase, etc.) • Consumer evaluation, judgment, and choice • Brand development • Visual design elements (form/appearance) • Creativity/Innovation	• Sustainability (green products) • Firm strategy (objectives, capabilities, and production process) • External context (consumers' needs, environment, and competitors) • Interfirm engagement (cooperation and process) • Product design, features, attributes, and advantages (NPD strategy)

Source						
Srinivasan et al. (2012), Journal of Product Innovation Management	✓	✓	✓		• Consumer satisfaction and loyalty • Consumer experience • Consumer perception (perceived value of product design) • Consumer psychological (cognitive and affective) responses • Visual design elements (form/appearance) • Non-visual elements/senses in design • Firm financial success/performance (e.g., market share, profitability, turnover, sales, and operational efficiency) • Situational factors (e.g., financial resources, competing needs, and family influences)	• Differentiation • Creativity/innovation
Ravasi and Stigliani (2012), International Journal of Management Reviews (Review)	✓	✓	✓	• Categorization	• Creativity/innovation • Firm financial success/performance (e.g., market share, profitability, turnover, sales, and operational efficiency) • Consumer psychological (cognitive and affective) responses • Purchase decisions (preferences, intentions, and choice) • Designers' practices (design process) • Consumer satisfaction and loyalty • WOM	

Source	C1	C2	C3	C4	Column A	Column B	Column C
Hoyer and Stokburger-Sauer (2012), Official Publication of the Academy of Marketing Science (Review)	✓	✓	✓			• Visual design elements (form/appearance) • Non-visual elements/senses in design • Purchase decisions (preferences, intentions, and choice) • Individual tastes and preferences (e.g., perception, value, acumen, experience, and characteristics) • Consumer evaluation, judgment, and choice	
C. Anthony Di Benedetto (2012), Journal of Global Fashion Marketing (Review)	✓	✓	✓	✓		• Consumer psychological (cognitive and affective) responses • Consumer satisfaction and loyalty • Purchase decisions (preferences, intentions, and choice) • Creativity/innovation	• Product design, features, attributes, and advantages (NPD strategy) • Creativity/innovation • Differentiation • Sustainability (green products) • Firm strategy (objectives, capabilities, and production process)
Alba and Williams (2013), Journal of Consumer Psychology (Review)	✓	✓	✓		• Lay theories or distort recollection (forecasting product pleasurability based on experience)	• Consumer psychological (cognitive and affective) responses • Consumer satisfaction and loyalty • WOM • Consumer experience • Cultural and social context • Consumer perception (perceived value of product design)	

Study	C1	C2	C3	C4	Theory/Concept	Consumer/Design Factors	Creativity/Innovation
Mugge and Dahl (2013), Journal of Product Innovation Management	✓		✓		• Categorization	• Consumer psychological (cognitive and affective) responses • Product success • Creativity/innovation • Typicality or atypicality of design	• Level of creativity/innovation for categorization (incremental creativity)
Goode et al. (2013), Journal of Product Innovation Management	✓		✓		• Categorization	• Consumer perception (perceived value of product design) • Consumer evaluation, judgment, and choice • Creativity/innovation • Typicality or atypicality of design	• Level of creativity/innovation for categorization (incremental creativity)
Moon et al. (2013), Journal of Product Innovation Management	✓	✓	✓			• Individual tastes and preferences (e.g., perception, value, acumen, experience, and characteristics) • Visual design elements (form/appearance) • Cultural and social context	• Creativity/innovation
Brakus et al. (2014), Journal of Business Research	✓		✓		• Processing fluency (holistic information processing)	• Purchase decisions (preferences, intentions, and choice) • Consumer experience	
Moon et al. (2015), Journal of Product Innovation Management	✓		✓	✓		• Product success • Consumer evaluation, judgment, and choice • Purchase decisions (preferences, intentions, and choice) • Visual design elements (form/appearance)	• Creativity/innovation

Homburg et al. (2015), Journal of Marketing	✓	✓	✓	• Holistic perception (Gestalt)	• Consumer psychological (cognitive and affective) responses • WTP • WOM • Brand attitude, perception, value, and image • Visual design elements (form/appearance)	• R&D
M. Kumar et al. (2015), Journal of Product Innovation Management	✓	✓	✓	• Holistic perception (Gestalt)	• Brand affection • Consumer perception (perceived value of product design) • Purchase decisions (preferences, intentions, and choice) • Individual tastes and preferences (e.g., perception, value, acumen, experience, and characteristics) • Consumer satisfaction and loyalty • Post-purchase behaviour (repurchase, etc.)	• Differentiation
M. Kumar and Noble (2016), Journal of Business Research	✓	✓	✓		• Individual tastes and preferences (e.g., perception, value, acumen, experience, and characteristics) • Visual design elements (form/appearance) • Non-visual elements/senses in design	• Sustainability (green products) • Product personality

Reference					Mechanisms / Theories	Outcomes / Constructs	Additional
A. Mishra (2016), Journal of Business Research	✓	✓	✓	✓	• Holistic perception (Gestalt)	• Brand equity • Brand strength • Consumer perception (perceived value of product design) • Consumer experience • Consumer satisfaction and loyalty	
Jindal et al. (2016), Journal of Marketing	✓		✓	✓		• Consumer perception (perceived value of product design) • Individual tastes and preferences (e.g., perception, value, acumen, experience, and characteristics) • Firm financial success/performance (e.g., market share, profitability, turnover, sales, and operational efficiency)	
Micheli and Gemser (2016), Journal of Product Innovation Management	✓	✓	✓	✓	• Categorization • Signaling theory (using signals to transfer product quality to consumers, e.g., price and brand)	• Visual design elements (form/appearance) • Firm financial success/performance (e.g., market share, profitability, turnover, sales, and operational efficiency) • Creativity/innovation • Typicality or atypicality of design	• Level of creativity/innovation for categorization (incremental creativity)
Luchs et al. (2016), Journal of Product Innovation Management (Review)	✓	✓	✓	✓	• Product visual complexity (number of product elements, components, the extent of interactions among components, and the degree of product novelty) • Holistic perception (Gestalt) • Categorization	• WTP • Consumer perception (perceived value of product design) • Consumer psychological (cognitive and affective) responses	• Mass customization (company–customer interaction) • Involving consumers in the idea generation and concept development (co-development)

						• Consumer behavioural responses • Purchase decisions (preferences, intentions, and choice) • Product personality • Visual design elements (form/appearance) • Non-visual elements/senses in design • Post-purchase behaviour (repurchase, etc.) • Brand development • Product success • Firm financial success/performance (e.g., market share, profitability, turnover, sales, and operational efficiency) • Cultural and social context • Creativity/Innovation	• Firm strategy (objectives, capabilities, and production process) • External context (consumers' needs, environment, and competitors) • Interfirm engagement (cooperation and process) • Sustainability (green products) • Extending product life
Brunner et al. (2016), Journal of Product & Brand Management	✓	✓	✓	✓	• Processing fluency (holistic information processing) • Holistic perception (Gestalt) • Personality congruence or self-congruity • Hindsight bias	• Consumer psychological (cognitive and affective) responses • Consumer evaluation, judgment, and choice • Purchase decisions (preferences, intentions, and choice) • Product personality • Consumer involvement to product (high vs low) affects their evaluations • Visual design elements (form/appearance) • Brand attitude, perception, value, and image	• Product personality

					• Brand strength	

Beverland et al. (2017), Journal of Marketing Management (Review)	✓	✓	✓		• Product design pleasure and attractiveness • WTP • Consumer perception (perceived value of product design) • Consumer satisfaction and loyalty • Consumer evaluation, judgment, and choice • Visual design elements (form/appearance) • Non-visual elements/senses in design
Candi et al. (2017), Journal of Business Research	✓	✓	✓	• Holistic perception (Gestalt) • Categorization	• Consumer psychological (cognitive and affective) responses • Consumer behavioural responses • Purchase decisions (preferences, intentions, and choice) • WOM • Consumer satisfaction and loyalty • Visual design elements (form/appearance) • Non-visual elements/senses in design • Consumer evaluation, judgment, and choice • Consumer experience • Cultural and social context • Creativity/Innovation

						• Consumer involvement to product (high vs low) affects their evaluations	
C.-L. Hsu et al. (2018), Information Technology & People	✓	✓	✓		• Holistic perception (Gestalt)	• Consumer psychological (cognitive and affective) responses • Brand attitude, perception, value, and image • Consumer involvement to product (high vs low) affects their evaluations • Visual design elements (form/appearance) • Post-purchase behaviour (repurchase, etc.)	
Xue (2019), Creativity and Innovation Management	✓	✓	✓	✓	• Holistic perception (Gestalt)	• Consumer psychological (cognitive and affective) responses • Consumer perception (perceived value of product design) • Consumer evaluation, judgment, and choice • Purchase decisions (preferences, intentions, and choice) • WOM	Level of creativity/innovation for categorization (incremental creativity)
Wiedmann et al. (2019), Journal of Product & Brand Management	✓	✓	✓		• Holistic perception (Gestalt) • Processing fluency (holistic information processing) • Appearance bias (influence of product visual attractiveness on overall judgments of product design) • Judgment bias (judgment of product functional performance based on its appearance/form)	• Visual design elements (form/appearance) • Non-visual elements/senses in design • Consumer perception (perceived value of product design) • Consumer evaluation, judgment, and choice	

Sabir (2020), Asia Pacific Journal of Marketing and Logistics	✓	✓	✓		• Holistic perception (Gestalt) • Product visual complexity (number of product elements, components, the extent of interactions among components, and the degree of product novelty)	• Consumer psychological (cognitive and affective) responses • Consumer behavioural responses • Consumer satisfaction and loyalty • Purchase decisions (preferences, intentions, and choice) • Consumer involvement to product (high vs low) affects their evaluations • Consumer experience
Eytam et al. (2020), Review of Managerial Science	✓		✓	✓	• Processing fluency (holistic information processing) • Product visual complexity (number of product elements, components, the extent of interactions among components, and the degree of product novelty) • Diffusion of innovation theory	• Individual tastes and preferences (e.g., perception, value, acumen, experience, and characteristics) • Consumer psychological (cognitive and affective) responses • Visual design elements (form/appearance) • Consumer perception (perceived value of product design) • Consumer evaluation, judgment, and choice • Purchase decisions (preferences, intentions, and choice)

Althuizen (2021), Psychology & Marketing	✓	✓	• Processing fluency (holistic information processing) • Product visual complexity (number of product elements, components, the extent of interactions among components, and the degree of product novelty) • Optimal stimulation level theory	• Consumer psychological (cognitive and affective) responses • Consumer perception (perceived value of product design) • Consumer evaluation, judgment, and choice • Visual design elements (form/appearance) • Design newness

Appendix 2: Distribution of Publications on "Product Design" in SSCI via the Web of Science Database

Total Publications
895 Analyze
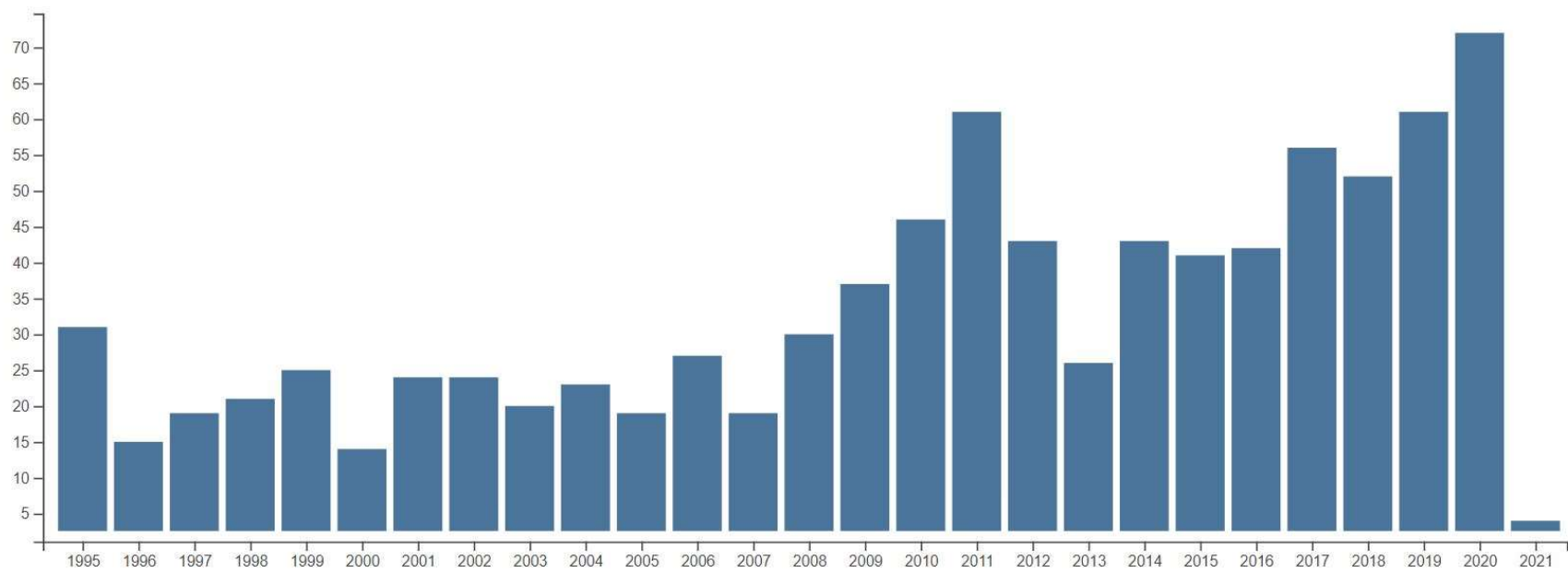
Distribution of Journal Articles on "Product Design" in the Scopus Database

Total Publications

3181 Analyze
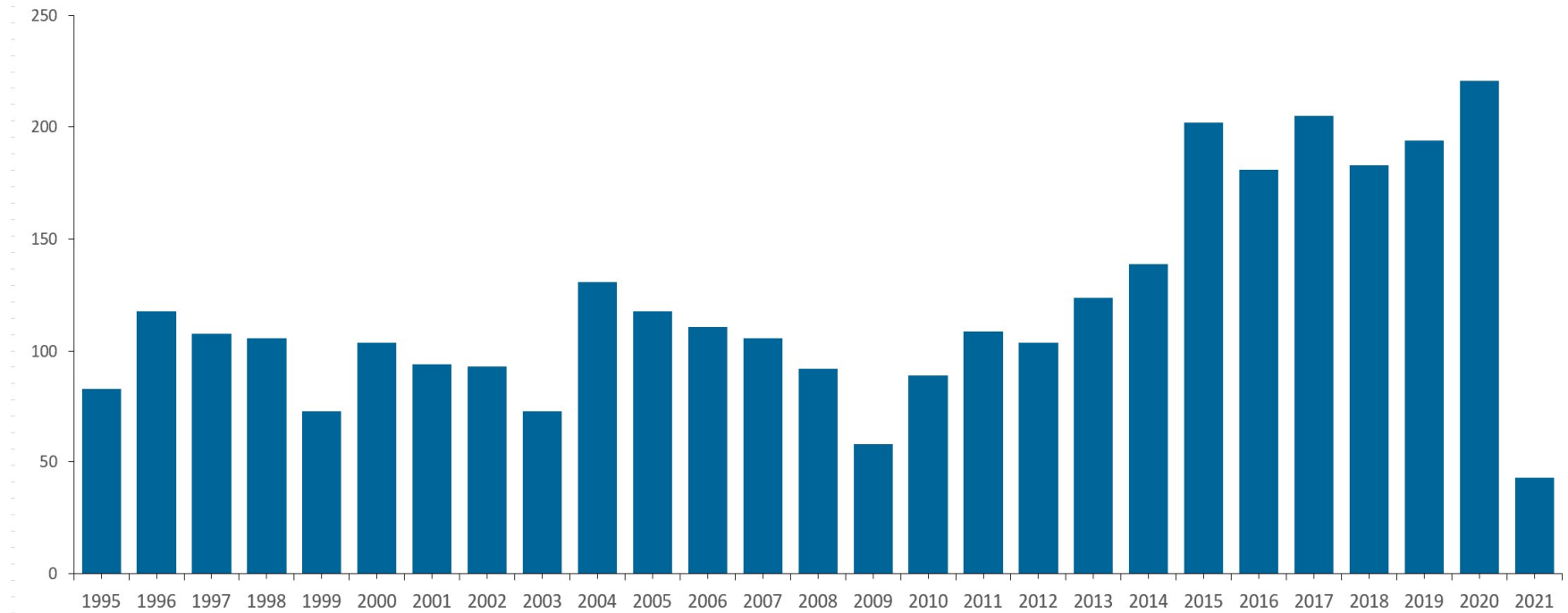
CHAPTER 3: PARER/ARTICLE 2

Are Product Design Researchers and Practitioners on the Same Page? How Professional Product Designers View Creative Design

ABSTRACT

This research is the first study that aims to explore professional product designers' views on creative design to compare their viewpoints with the related academic literature on product marketing. To find the designers' views on creative design, face-to-face in-depth interviews based on repertory grid analysis and semi-structured questions were conducted with 32 professional and award-wining product designers who mostly design for international producers.

Although marketing scholars often approach design as a noun, something that can be viewed and analysed as a bundle of attributes, dimensions or characteristics, professional designers view design differently. To them, design is a verb, a problem-solving process by which, they meet the challenges consumers have with products. Comparing professional product designers' views on design creativity and the main topics in the literature, places scholars' dispositionalism against designers' situationalism and enables marketing scholars to improve their viewpoints on product design and their research more practically based on problem-solving and design thinking. This also increases mutual understanding between marketers and designers.

INTRODUCTION

In the theoretical 'landscape' of design research, marketing researchers often view the *design* concept as either noun or verb (see Cash, 2020; Gemser & Barczak, 2020). Some scholars tend to assume *design* to be a noun, and therefore, explore the characteristics of new products as a "bundle of attributes" (Noble, 2011, p. 391). For example, scholars often discuss four dimensions for product design, aesthetics, symbolism, functionality, and ergonomics (e.g., Micheli & Gemser, 2016; Moon et al., 2015). The presumption is that these various product attributes determine the market success of these products subject to the moderation of a number of other factors (Bloch, 1995). In contrast, other scholars assume *design* to be a verb and focus more on the process of designing new products. These areas of research are often referred to as design thinking (see Spanjol & Noble, 2020), design templates (Goldenberg & Mazursky, 2002), or design heuristics (Yilmaz & Seifert, 2011).

Across these two research approaches, creative problem solving is viewed as a core concept for only the design-as-verb tradition (see Micheli et al., 2019), but we argue that it needs to be considered central to the design-as-noun tradition as well. For example, although Bloch (1995) takes a design-as-noun approach to analyse the various contingencies that lead to consumer responses, the key one—what challenges consumers have that need solving—is not explicitly mentioned yet from a designer perspective should the most pivotal.

We interview professional designers and they tell us the right and creative design process (design as-verb) leads to the right and creative design characteristics (design-as-noun). From this designer viewpoint, the cacophony of dimensions scholars have suggested for good

and creative design should be viewed as alternative solutions paths (Bruseberg & McDonagh-Philp, 2002). That is, when scholars study product design using the characteristics of various products, what they are studying is various alternative routes to address possible challenges consumers have with products—but any of the possible solution paths could have to be employed depending on what was identified to be the problem that needed solving (Aarikka-Stenroos & Jaakkola, 2012; Skarp & Gadde, 2008).

For example, it is well known that consumers with hearing difficulties often buy hearing aids but fail to use them. Alternative approaches to dealing with this issue include an aesthetics route that might view hearing aids as jewelry so making a more attractive hearing aid might be the solution proposed. Another approach may solve a problem by focusing on the ergonomics of the design such that it makes the aid more comfortable. Still, other approaches may focus on improving the functionality of changing/charging batteries or even moving the whole unit inside the skull as with an implant.

However, a central problem is in trying to infer the value of product attribute patterns rather than seeing them as alternative solution paths. These paths are neither good nor bad by themselves because they are merely problem-analogues, laying out different design strategies—but they can become useful or not, depending on how they address the challenges consumers have with products.

We start by reviewing the product characteristics tradition of marketing scholarship, but then contrast this with creative problem-solving. Unfortunately, employing a problem-solving approach in applied business settings is rarely as straightforward as focusing on the product dimensions, because a challenge for many marketing practitioners is defining the problem to be solved. Managers tend to identify symptoms of problems rather than the core problems and may be tempted to focus on the product characteristic approach only.

A key insight comes from von Hippel and von Krogh (2016) who note that often managers cannot articulate a problem unless they see a potential solution first. This paradox is often of concern to professional designers who struggle to connect up ambiguous user needs to articulated design characteristics.

With this question in mind that whether designers' views towards the main topics of the literature are complied with scholars' views or not, we illustrate our approach with results of face-to-face in-depth interviews with thirty-two professional designers from Australia. We combined semi-structured interviewing with Repertory Grid Analysis Technique, an indirect approach to probing participants' views. We also asked respondents about their creativity approaches and possible influencing factors. Subjects were also probed for their views of several strands of academic research on product design and development, especially on their views of good and creative design, as well as the characteristics of award-winning products. This can help scholars to compare the literature topics with designers' views and to improve the literature more practically, which also increases the quality of interaction and understanding between scholars, managers, and designers.

Although we find that professional product designers talk about similar issues as marketing scholars do, the relative emphasis and interpretation they give often diverge— especially due to the problem-solving perspective that designers take. These design professionals explain that they do follow a variety of strategies or paths when developing design solutions. But the key aspect is that they are seeking solutions so knowing what goals designers sought to reach (design-as-verb) is fundamental to understanding what they achieve (design-as-noun). This recalls contingency theory and assumes designers do not focus on the product attributes during the design process, but situations shape their design (situationalism). However, because scholars are not involved in the design process, their dispositionalism—as a cognitive bias—often results in an intensive focus on the product attributes to explain its

design quality. Therefore, this study intends to build on the relevant theoretical framework to expand the boundaries of knowledge and theory in the field.

THEORETICAL FRAMEWORK

Contingency theory is a leadership-related theory that in product development (see Atuahenegima, 1995) is applied for project and strategic management. It suggests there is not one "best answer" to a specific problem, but the appropriateness of managerial interventions is dependent on the prevailing conditions surrounding that problem (Martinez Sanchez & Perez Perez, 2003). Thus, the contingency approach in line with the regularity theory of causation (see Zacher, Schmitt, Jimmieson, & Rudolph, 2019)—that attempts to explain contingency factors and causation of actions in a process, can be also useful in creative problem solving by design (design thinking). Because solving the design problems depend on several contingency conditions and causes.

Philosophy seeks to define everything and we possess different philosophies based on our knowledge and mindset. Product scholars may have a tendency to define product design as an outcome that they see and evaluate based on their knowledge and dispositions. However, designers who were involved in the design process may tend to define it as a set of problem-solving paths (design thinking)—from identification to solution—based on the process' situations. Therefore, judgment dispositionalism (see Quilty-Dunn & Mandelbaum, 2018) as a tendency to prefer dispositional attributes, may oppose process' situationalism (see Blake & Mouton, 1982).

Product differentiation is a critical concept for strategic product development, but the problem is that scholars and practitioners often differ in how they approach the concept. Marketing scholars certainly advocate the importance of product innovation based on

differentiation, which is typically articulated via product design characteristics or attributes (Velasco et al., 2014) including elements and dimensions (Bruce & Daly, 2007). Scholars focus on four main dimensions for product design: aesthetics, ergonomics, functionality, and symbolism, as well as a myriad of visual and non-visual elements (Bloch et al., 2003; Creusen, 2011), such as shape, colour, pattern, materials, and texture (e.g., Luchs et al., 2016; Maeng & Aggarwal, 2018).

However, an alternative perspective to focus on product characteristics is problem-solving (Dorst & Cross, 2001; Skarp & Gadde, 2008). This is one of the oldest approaches to understanding creativity (Bodas Freitas & Fontana, 2018; Moreau & Engeset, 2016) so is surprising those who study designers' perceptions of the design process do not emphasize it as it deserves. Table 1 lists recent studies focused on product designers' and/or marketers' perceptions of the design process, but only a few of those appear to make problem-solving a central focus. Often design is seen as a process with stages such that understanding consumer needs is important—themes that are consistent with problem-solving and design thinking approaches (Brown, 2008; Micheli et al., 2019). However, it is not that the approach is foreign to the studies listed in Table 1, but rather it seems assumed that problems are possibly more obvious than they often are in the so-called "fuzzy front end" of the product development process (see MacCormack, Verganti, & Iansiti, 2001; Reid & De Brentani, 2004).

Authors and Journal	Method	Purpose
Gemser and Leenders (2001), *Journal of Product Innovation Management*	• Interviewing with senior managers at 47 firms	• Finding how integrating industrial design in the product development process affects firm performance
Dorst and Cross (2001), *Design Studies*	• Experiment, observation, and post-observation interviewing with 9 product designers	• Exploring designers' problem-solving approaches
Bruseberg and McDonagh-Philp (2002), *Applied Ergonomics*	• Interviewing with 5 product designers to understand the requirements and their preconceptions towards focus group techniques • Focus group including 7 undergraduate students in industrial design	• Providing designers' feedback on the appropriateness of applying the approaches

Ahmed et al. (2003), *Research in Engineering Design*	• Observation and post-observation interviewing with 6 novice and 6 experienced designers	• Exploring the differences between approaches of novice and experienced designers
Perks, Cooper, and Jones (2005), *Journal of Product Innovation Management*	• Interviewing with 18 manufacturing firms' managers, also applying questionnaire (with open-ended questions)	• Exploring the design's role in the NPD process
R. W. Veryzer (2005), *Journal of Product Innovation Management*	• Survey, observation, and interviews with managers and team members involved in NPD projects at 6 firms	• Understanding the interrelation and roles of marketing and industrial design
Sleeswijk Visser et al. (2007), *Creativity and Innovation Management*	• Observation and interviews with professional designers and Masters students in industrial design to add innovative concepts to a product (in 2 studies and with 10 participants in total)	• Investigating the use of communication tools during idea generation • Comparing different communication tools to study the qualities of empathy and inspiration
Antioco, Moenaert, Feinberg, and Wetzels (2008), *Journal of Academy of Marketing Science*	• Conducting a survey with the participation of 121 and interviewing with 4 product design managers	• To explore the organizational and communication antecedents
Crilly et al. (2009), *Design Studies*	• Interviewing with 21 product designers	• Testing a proposed framework, how product visual form should be interpreted by consumers
Goffin and Micheli (2010), *Research-Technology Management*	• Interviewing with 19 product designers and managers • Focus group including 6 product designers	• Investigating differences between product designers and managers • Interviewees' perceptions of the design's role in NPD
Yilmaz and Seifert (2011), *Design Studies*	• Observation and interviewing with an uncertain number of product designers	• Exploring whether designers heuristics lead to creative solutions
Micheli et al. (2012), *Journal of Product Innovation Management*	• Interviewing with 8 managers and 11 industrial designers at 5 firms	• Investigation of the language used by designers and managers describing "good" and "poor" industrial design • Exploring the design's role in NPD from their perspectives
Daly, Yilmaz, Christian, Seifert, and Gonzalez (2012), *Journal of Engineering Education*	• Observation, recordings, and collecting the concept sketches from 36 engineering students and practitioners	• Investigating how engineering students and practitioners generate ideas
Valencia, Person, and Snelders (2013), *Journal of Engineering and Technology Management*	• Interviewing with 10 managers and an industrial designer	• Investigating how managers perceive the role of industrial design, based on their experiences with designers
Hattula, Herzog, Dahl, and Reinecke (2015), *Journal of Marketing Research*	• Experimental studies with 480 marketing managers	• Exploring whether managerial empathy increases or decreases the self-reference in predictions of consumer preferences

Crilly (2015), *Design Studies*	• Interviewing with 30 professional designers	• To reveal designers' views on fixation and the practices they adopt
Millspaugh and Kent (2016), *Journal of Fashion Marketing and Management*	• Interviewing with 38 with fashion designers	• Examining the co-creation of SMEs designers during internationalisation
Beverland et al. (2016), Journal of Product Innovation Management	• Interviewing in 3 complementary phases with a number of product designers and marketers	• Comparing designers and marketers' thoughts to enhance their inter-functional coordination
Nakata et al. (2018), *Journal of Product Innovation Management*	• A survey with its focus on product managers	• Exploring key antecedents and consequences of new product creativity
Allen, Chandrasekaran, and Basuroy (2018), *Journal of Marketing*	• Interviewing with 13 practitioners experienced in crowdsourcing	• Exploring the influence of design crowdsourcing on product performance
Hemonnet-Goujot et al. (2019), *Journal of Product Innovation Management*	• Interviewing with 18 marketers	• To explore the role of design expertise, brand commitment, and number of stages the designer was involved in NPD
Crilly and Moroșanu Firth (2019), *Design Studies*	• Interviewing with 3 industrial designers	• To analyse the prototypes

Table 5: Research Focusing on Product Designers or Managers

Early normative work on creative problem-solving by Wallas (1926) focused on four stages: preparation, incubation, illumination, and verification. The first two steps focused on understanding the problem, the third found the solution, and the fourth showed that the solution worked. Young (1960) advocated a similar problem-solving process, and his first three steps emphasized understanding the problem, the fourth found the solution, and the fifth worked out the details of the solution. Osborn (1935) developed yet another normative problem-solving framework, of which the initial steps were even more detailed approaches to understanding the problem. Since the mid-20th century, most creative problem-solving usually emphasized setting out the problem first, gaining insight into the problem, solving it in creative ways, and then finally implementing it (Bodas Freitas & Fontana, 2018; van der Borgh, Xu, & Sikkenk, 2020).

Although these frameworks highlight the value of setting out the problem, marketing managers seem to have considerable difficulty in identifying the strategic problem and optimum solution among several alternatives, such that they can help guide designers (Lau,

Yam, & Tang, 2011; Moldoveanu, 2009). Similar issues were found by Baer, Dirks, and Nickerson (2013) who examined managers' identification of problems and opportunities. Some understanding into the challenges managers have in identifying strategic problems is provided by von Hippel and von Krogh (2016) who introduce the concept of "need-solution pairs". They argue that often managers cannot identify the core problem or need, unless they see the solution illustrated or hinted at in some way first. That is, it is common—even normal—that managers often focus only on problems symptoms rather than the core problem, but in seeing a potential solution they can recognize what their deeper problem was.

Although it may seem ironic to find a problem by first seeing a solution, other scholars have found similar patterns in that individuals often move backwards through normative creative problem-solving processes. For example, Schilling (2005) referred to von Hippel and von Krogh need-solution pairs as "completing a schema", one of five ways in which individuals gain insights which can then be used to revisit the problem formulation stage. Schilling's second way of gaining insight is from reorganizing information, something that can happen when one applies a formal problem-solving process like Wallas', Young's or Osborn's. Another way is to overcome a mental block that fixates one on certain approaches to problems—and marketing managers who are experts in their products are particularly prone to having these mental blocks in the first place due to the complexities of mental set fixation. Yet another way random recombinations, which can sometimes lead to creative design ideas (Bstieler & Hemmert, 2010).

However, Schilling's last method, finding problem analogues, is significant because, from a designer perspective, it incorporates the attributes-based approach used by scholars. That is, increasing product aesthetics, functionality or other dimensions can be viewed as generic ways to modify products by invoking problem analogues. Thus, an attributes-based approach introduces a limited number of fairly standard design paths using analogies, a

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potentially good thing given Moldoveanu (2009) contention that managers make better decisions when there are few alternatives, rather than many. But choosing the best of a limited set is still not as optimal as looking outside the set to find something better. That is, an attributes-based approach (managerial or scholar thinking) may help a designer come up with solutions, but that does not mean it necessarily solves the problems consumers may have with a product.

Overall, it seems scholars' insights are highly influenced by managers' way of thinking (Deighton et al., 2020) and thus, there are significant differences between marketing scholars and design practitioners, and this needs exploration. It is certainly possible to view product design from both an attributes perspective and a problem solving one as both offer valuable insights. However, our question concerns how product designers approach the verb-versus-noun question and to what extent each perspective describes how they frame the design concept. To understand these differences, we interviewed a sample of professional product designers asking them about their own opinion towards creative design also towards the related topics that scholars discussed in the product design/development literature.

METHODOLOGY

The focus of data collection was to determine the mindset of individual designers when developing new products. If one approaches the interviews by enquiring directly about either end product attributes or problem-solving, designers should be expected to speak to these issues easily. The question, however, is what way they naturally approach the issues. Therefore, our

approach was to interview in an open- or semi-structured format so to reveal their frame of mind, rather than have researchers impose those frames from the questions asked.

In this research we explored problem-solving (Osborn, 1935) and creativity-related theories (e.g., Amabile, Conti, Coon, Lazenby, & Herron, 1996; Runco & Jaeger, 2012), knowledge-based theory (Allen et al., 2018; W. Chang & Taylor, 2016), grounded theory, emerging theory (Andriopoulos, Gotsi, Lewis, & Ingram, 2018; Beverland et al., 2016) and exploratory insights from interviews (Allen et al., 2018; V. Kumar, Dixit, Javalgi, & Dass, 2016). First, we comprehensively reviewed the literature related to product design, product personality, creativity, and innovation to find all the important topics in relation to product design. Then, we started to review papers focusing on product designers and/or product managers. This process along with a content analysis helped us to have a comprehensive list of questions based on the literature gaps, for our semi-structured interviews.

Combining semi-structured interviews with Repertory Grid Analysis (RGA) (see Micheli et al., 2012) we did our best to ask the questions indirectly as far as possible. As RGA is applied to capture the content of subjective perceptions (Clauss & Tangpong, 2018; Leonidou & Hultman, 2019) in a situation where the interviewees may struggle to convey thoughts and ideas and for addressing the complex and implicit topics (McDowall, Saunders, Rojon, & Saunders, 2019) like the perception of creative design that is a subjective concept difficult for interviewees and interviewers to articulate and interpret accurately (Micheli et al., 2012). Our approach allowed us to start from an unstructured format where their frame of mindset the agenda for the discussion and this progressed into a more structured format asking direct questions. The structured portions of the interviews were to ask subjects about what they did not talk about in the RGA portion. That is, if subjects discussed problem-solving in the RGA, we would later directly probe on product design attributes or dimensions. If they focused instead, on design dimensions in the RGA, then we would directly probe into problem-solving.

As the interviews developed, only one of these two approaches evolved in the interviews, which is discussed below.

In the existing research, we followed a standard format and approach interviews (see Allen et al., 2018; Friend, Malshe, & Fisher, 2020). All of the interviews were recorded with the interviewees' allowance and later transcribed by the researchers. In the interviewing process, we asked respondents to write three creative design projects and three non/less creative ones, which they had been involved in, and compare them based on the RGA guidelines in similar design-related studies (how two of them are similar and different from the third?) (see Micheli et al., 2012). This technique mostly helped us to find the answers related to the first part of our questions "creativity, techniques, and related factors" (see Appendix 1).

In the next step, we asked them about the roles of design elements (visual and non-visual), besides, the roles of design values and dimensions, their interactions, and design-related theories and strategies. What is more, we asked them about the level of creativity and diversification/extension. For remeasuring the level of creativity, after their response to the related question, we showed them three washing machines' photos from different angles, with different types of creativity and features on a laptop computer to control each participant's response (see Appendix 2).

Finally, we showed the interviewees three Australian award-winning products on the Good Design Australia website, which we had selected among the winners of the year 2018, from different product categories (see Appendix 3), asking them to critically analyse the products and say why these products are good, creative, and have won the award. It also should be noted that all of the respondents have been familiar with these products more or less, as they all were among the national and international winners or judges, even including the designers and judges of the three selected award-winning products. In this way, we firstly, wanted to find their criteria for selecting the winners, secondly, to explore the logic behind the designs, and

thirdly, we wanted them to judge the products based on the discussed topics. Finally, we asked them "how you can develop these products?", to find the existing problems and show the winner products can be also developed by redesigning.

Sample and Data Collection

In this exploratory research, the potential interviewees were all design award judges during 2018 and 2019, and prominent product designers who have won the related awards (as can be assumed to be more knowledgeable and experienced designers) and were living in Australia (see Table 2). Indeed, most of these potential participants in Australia lived in Sydney and only a few of them were residents of other cities such as Melbourne, Brisbane, and Adelaide. To find them, we used several online databases, particularly the Good Design Australia, which is one of the world's pioneer organizations in holding design award events since 1958. The other databases that we used are Design Institute of Australia, DEXIGNER, Red Dot, A'Design Award and Competition, iF, iDSA, European Product Design Award, and Good Design Award, respectively.

Interviewee	Gender	Age	Experience	Education	Major	Working internationally	Judging	Award winner	Academic	Main industry	Nationality
I1	M	42	20	Bachelor	Industrial design	✓	●	✓	●	Different product specially furniture and home appliances	Australian
I2	M	45	20	Bachelor	Industrial design	✓	●	✓	●	Different products	Australian
I3	M	46	20	Master	Design	✓	✓	✓	●	Different products particularly, automotive design	Australian

I4	M	42	20	Bachelor	Medical science	✓	✓	✓	•	Different products and services	Australian
I5	M	75	52	Bachelor	Commerce	✓	•	✓	•	Jewellery design	European
I6	M	52	28	Bachelor	Industrial design	✓	•	✓	•	Furniture design	Australian
I7	M	46	22	Bachelor	Industrial design	✓	•	✓	•	Different products	Australian
I8	M	74	48	Master	Engineering	✓	✓	✓	•	Different products and services	European
I9	M	55	30	PhD	Engineering	✓	✓	✓	✓	Different products and services	Australian
I10	F	51	25	Master	Psychology	✓	✓	✓	•	Different products and services	European
I11	F	66	44	Bachelor	Architecture and interior design	•	✓	✓	•	Different products and services	Australian
I12	F	40	18	Bachelor	Commerce	✓	✓	✓	•	Product and fashion design	European
I13	M	45	20	Master	Industrial design	✓	✓	✓	•	Product design mostly furniture and home appliances	European
I14	M	75	50	Master	Engineering	✓	✓	✓	•	Different products particularly, medical products	European
I15	F	48	22	Master	Visual communication	✓	✓	✓	•	Different products and services	European
I16	F	44	20	Master	Industrial design	✓	✓	✓	✓	Different products	Asian
I17	M	66	38	Master	Design	✓	✓	✓	•	Designing different products	European
I18	F	48	20	PhD	Industrial design	✓	✓	✓	✓	Different products	European
I19	M	36	15	Bachelor	Industrial design	•	•	✓	•	Furniture design	European
I20	M	45	20	Master	Commerce and design	✓	✓	✓	•	Different products	Asian
I21	M	52	25	Bachelor	Design	✓	✓	✓	•	Different products particularly, medical products	Australian
I22	M	42	16	PhD	Product design	✓	•	✓	✓	Different products	Australian
I23	F	40	17	Bachelor	Design	✓	✓	✓	•	Product and fashion design	Australian
I24	F	55	25	PhD	Engineering	✓	✓	✓	✓	Different products	Asian
I25	F	65	40	Master	Engineering	✓	✓	✓	✓	Different products	American

I26	F	37	15	Bachelor	Design	•	✓	✓	•	Product, service, and fashion design	Australian
I27	M	47	22	Bachelor	Design	•	•	✓	•	Different products and services	Australian
I28	M	55	32	Bachelor	Design	✓	•	✓	•	Different products	European
I29	M	46	20	Bachelor	Design	✓	✓	✓	•	Different products and services	European
I31	M	53	28	Bachelor	Industrial design	✓	✓	✓	•	Different products	Australian
I30	F	39	17	Bachelor	Design	✓	✓	✓	•	Product and fashion design	Australian
I32	F	62	38	Master	Industrial design	✓	✓	✓	•	Different products	European

Table 6: Respondents' Characteristics

First, we constituted a comprehensive list of the potential interviewees, which lasted around three months. Then, we sent the invitation messages to those who were based in Sydney or its suburbs. After that, we sent our invitation messages to out-of-town participants, as we met five participants from Melbourne and one from Brisbane. It should be noted that the invitation messages have been sent through emails and/or social networks (mostly through LinkedIn, Facebook, and Instagram respectively). Overall, thirty-two face-to-face in-depth interviews were done at the convenient time and place of the respondents, mostly in their offices and homes. On average, each interview lasted around one and half hours, the shortest interview lasted around half an hour and the longest approximately four hours. The questions were the same (see Appendix 1), however, for the two participants who had only half an hour for their interviews, we asked them to respond to the questions briefly. All the interviews have been conducted during 2019 and 2020.

Coding and Data Analysis

In coding, content analysis, and data eliciting we followed design-related studies' process applying in-depth interviews (see Beverland et al., 2016; Jacobs & Cambré, 2020; Micheli et

al., 2012). The recorded interviews were transcribed verbatim and the resulting text files were imported into QSR NVivo 12 for the coding process and thematic analysis (see Crilly & Moroşanu Firth, 2019). The transcribed interviews were then coded in two cycles (see Saldaña, 2015). For the first cycle, as an elemental method, structural coding (see Guest, MacQueen, & Namey, 2011) was applied and conceptual phrases were generated to categorize the data corpus for each question of the questionnaire (see Appendix 1). This method is suitable when there are multiple participants and semi-structured data gathering means are employed. After this, values coding (see Gable, 1993) and versus coding (see Hager, Maier, O'Hara, Ott, & Saldana, 2000) were performed. Values coding could help in reflecting the values, beliefs, and attitudes of participants regarding the concepts in the questions. Versus coding could identify dichotomous terms, which could suggest strong conflicts in processes, concepts, etc. In the second cycle of coding, focused coding (see Charmaz, 2006) was applied to develop categories based on the coded data and thematic or conceptual similarity. In the end, pattern-coding (see Miles & Huberman, 1994) was applied by organizing the corpus into themes based on the identification of similarly coded data, finding the repetition rate, and selecting the most comprehensive quotes describing a particular concept in each question. Two researchers that also have participated in the interviews, were collaboratively involved in the coding and analysing process.

FINDINGS

Our interviews with product designers tended to follow a similar path, with the RGA portion focused on problem-solving, often with an emphasis on the difficulty clients have in working through the process. As the interviews progressed and we probed more directly on product attributes, respondents spoke more to those issues. By the time the interviews progressed to

evaluations of products themselves, they were generally focused on product attributes. Respondents talked passionately, effortlessly, and sincerely on both problem-solving and design attributes. It would be difficult to determine which approach they held more closely had it not been for a common structure across most interviews. Essentially, when evaluating their own work respondents focused on a problem-solving perspective, but when discussing other designers' work, a design dimensions approach was followed. A small number of respondents recognized this pattern in their own interviews, but the great majority did not. Below we present details of the themes raised in interviews by comparing them with the related topics in the literature.

Creative Problem-Solving and Related Techniques

Designers describe what they do as problem-solving. So strongly are these views held that all the interviewees believe design creativity means never-ending problem-solving by design (see Osborn, 1935). For instance:

> *Problem-solving is never-ending without any end line, all products should be improved by design. For example, the kid lock on the medicine bottles is a good and creative solution for the related problem, but also makes the bottle difficult to use for the main users [the elderly], therefore, target users' need is very important.*

The most significant outcome of using RGA in this study is designers spontaneously highlight the role of problem-solving by design, before thinking about any design elements or demotions, as most of the respondents state something similar to this passage:

> *Design's creative idea or design thinking should solve the product's problem in the best possible way. Designers and marketers should focus on the right/real problem and the best solution. Genius solutions are not the result of elements and benefits [dimensions], these are only tools for solving the problems,*

and emphasizing them is like solutions searching the problems, while problems should search for

solutions.

That is, design-as-a-verb is their focus and emphasizing design dimensions puts the cart before the horse.

Respondents believe that every product should be improved by more creative design, solving the existing problems, which indicates the importance of a strategic approach in the design process. This is an issue that has not been properly considered in the related literature (see Beverland et al., 2016; Dorst & Cross, 2001; Yilmaz & Seifert, 2011). Further, in the literature, it is unclear how the problem and solution can be discovered, while on this subject, the existing study provides a direction.

If problem-solving is a paramount one, it may follow a formal use of creative problem-solving tools, which would be useful. However, the majority of respondents designed heuristically or intuitively and do not use formal creativity techniques. Some designers who work individually believe these techniques are not useful, and one even said: "Traditional creativity techniques are not proper anymore; they are old school." However, a common alternative to formal techniques many respondents use is teamwork. That is, they find it sufficient to bring together a few individuals involved with the products with a few skillful members for creative ideation. As one of them said:

> *Teamwork with a small group of heterogeneous skillful experts (5 to 6 experts) is good, it creates*
> *dynamism [synergy] in idea creation. However, before ideation, they should think individually to prevent*
> *the decision biases.*

Many point out maverick members and/or someone unfamiliar with the topic can be sufficiently influential on the team's creativity to break the boundaries. For example:

> *It is good to have someone creative in the team, unfamiliar with the product, industry, or service to*
> *unlock and unleash the routinely thinking. Besides, maverick members with their intrinsic characteristics*
> *like tenacity and visions can push the boundaries and inspire other members.*

Lateral thinking, brainstorming, co-designing (with users' participation), prototyping, market research, etc., sometimes are conducted by some design consultancy agencies, to find the right needs, problems, and solutions, whereas, individual designers only do visual study and sketching. About finding the problem and solution in different steps, some respondents who work at design consultancy firms say something like this comprehensive quotation:

> *First, we use some methods (like the double diamond technique) to form the problem, thinking about all the possibilities by divergent thinking. Then, we think about the possible solutions by convergent thinking and narrowing things down to the choices. We should not be lost in the creative thinking process; therefore, a logical time limitation is needed. This is the so-called, push at the end approach.*

Concerning co-designing, prototyping, and market research to uncover the users' needs, however, the significant roles of them are obvious, designers' and their clients' biases often hinder finding the real problems and solutions. Two interviewees for example provide specific details:

> *The big mistake is that most of designers and businesses do not talk with the customers to find their real needs and problems. Showing the prototype and collecting feedback can be very useful. Designers do not do these; however, the design consultancy companies sometimes conduct market research and competitor analysis.*

> *Many of the product designers and product managers have biases in selecting the design elements as they think know what the users want. These biases destroy the concept of solving the real problem. They think that have empathy with the users, but the true test of empathy is showing them the prototype and ask them about its problems and design.*

That is, designers emphasized that the problems to be solved are from the perspective of the consumer and contrast this with the perspective of managers and designers—whose views frequently revolve around various design dimensions. Specifically, emphasizing the design dimensions is viewed as a bias that interferes with genuine problem-solving.

Factors Affecting Creative-Problem Solving

Product designers' linked their creativity with their engagement with the design task, which is dependent on the environmental factors (see Amabile, Conti, et al., 1996) like product categories, production constraints, project features, users' characteristics, client's brand's/company's position, and client's willingness to take risks. Of the many issues identified in the RGA task, this was usually mentioned first. For instance, two typical comments are:

> The brand [prestige/position], target users [empathy with them], product [type/category], its feature, production type [mass/batch], sales volume, and project size affect our engagement and creativity as some products are more attractive with more potentiality for design creativity. For example, tech companies/industries are more creative. Unlike, designing a kitchen basket is not very engaging.

> If the client company is a big brand, creative, and risk-taking with an appetite for change, we would be more creative. However, fundamental creativity needs a big risk and big companies prefer incremental creativity with low risk in the competitive markets.

That is, the nature of the task greatly influenced designers considerably and the factors influencing them were varied.

However, the focal aspect of this theme was that most of the interviewees believe the client's managerial skills, trust, and openness motivate designers to be more creative. For example:

> Pre-determined projects cannot be creative. Clients' openness to accept creative ideas, involvement and trustful collaboration reduce challenges, but hierarchy reduces our engagement and creativity. Clients usually face struggles managing the constraints and process, which makes ambiguity and tensions, however, challenges with knowledgeable clients will be full of tensions, but constructive.

Thus, most interviewees believe that one of the largest factors affecting their creative problem-solving is how clients confine their work. Clients are seen as often changing their

opinion, which highlights the importance of clients' openness and project management skills. Furthermore, they assert the brief is critical in that it should be comprehensive as well as clear especially at the first stages of design. For example:

Sometimes the idea is fantastic, but it also should be feasible with consideration of the limitations (like time, budget, resources, and the most important one is our freedom). Clients often change the design objectives. It is better if we know the limitations and expectations at the first step of projects, reworking kills our motivation and creativity.

Clients usually impose their opinion on us ... Therefore, having a clear plan and precise project management are important.

Although most respondents noted some challenges with their clients, interpreting these comments shows that big design agencies have the least challenges with the clients in comparison to the designers who work in small firms or individually (as freelancers). It is because the consultancy firms have aligned interest with the clients, as their success and fame are dependent on their clients' business success. In general, the more experienced designers try to solve the challenges with meetings, consultation, and collaboration. They also believe that meeting many of the challenges can result in further creativity, depending on the clients' and designers' knowledge and experience. For instance:

Involvement and availability of clients for meeting and consulting reduce challenges and reworking, but unlike freedom and collaboration, hierarchy reduces our engagement and creativity, indeed, the level of VUCA [volatility, uncertainty, complexity, and ambiguity] affects creativity.

Some clients are well-informed, they come to designers with pre-conceived ideas. Designers think: do I give the clients what they want or what they need? It depends on the designers' experience and ability to lead the clients [and manage] *challenges with knowledgeable clients constructively.*

Therefore, designers usually engaged clients to further ideas, but still saw them as a significant constraint.

Visual and Non-Visual Elements

Although a problem-solving approach was taking throughout much of the interviews, a design dimensions approach also was discussed albeit later in the conversations. Product design elements and dimensions started to play a role in explaining the differences between visual and non-visual elements. Many of the interviewees believe design elements act as a way to express design, with one respondent referring to the expression role this way:

> The elements are design language, because they communicate the design idea. That is, they are not the design per se, but rather the way the design is articulated.

The selection of design elements to articulate the design is based on designers', clients', and users' tastes. However, brand and corporate identity, and previous design paradigms (in the company or product category) affect these elements' selection. For example, regarding designers' taste a respondent says:

> Personal tastes, experience, and intuition of designers and clients affect the selection process. For example, if we ask the team members to design a product [that's] cute, all the sketches are different using different elements.

Thus, to achieve a set goal, there are many design elements that form a lexicon from which, one could draw. Furthermore, about users' tastes an interviewee for instance offered:

> The perception of these elements might be different in different cultures. A traditional package of a cream in France may be good for the French, whereas, in Australia, users prefer modern designs. [Therefore,] having knowledge about the users is very important.

However, some designers also believe they should change consumers' tastes as one of them expressed:

> We should open the consumers' eyes, not producing what consumers think they want. This is the creativity if we change their tastes and attitudes.

Brand and corporate identity, as well as legacy design elements previously used, also influence the pattern of design elements used. Two interviewees offered:

For example, Chanel uses particular and traditional colours and patterns and analogy is observable in the Chanel designs, which is the design personality.

For kitchen appliances, particular colours are used, as lime green and orange are more common than dark blue and black. Besides, psychological cues are used.

Yet in no way did the designers argue that these legacy design elements were the design. They were just ways to express the design in a familiar palate.

The selection of non-visual elements like materials was considered more technical and engineering-based. They could enhance quality and durability as well as reduce production costs. For example, two respondents pointed out:

Selection of non-visual elements [material] is heuristic, experience-based, and more technical [engineering], to decrease the costs and enhance the quality, durability, longevity, and considering the environmental issues [sustainability/recyclability], therefore, non-visual elements are important in terms of solving the problem.

Touching also is important and I consider it in my design applying material and texture, it communicates the product quality.

Concerning other non-visual elements, it should be noted that they have not been studied properly in the existing literature, however, are influential on consumers' response (Sonderegger & Sauer, 2015). Yet in this regard, only one interviewee still said:

Some non-visual elements like scent are very important. For example, the cleanness smell of the detergent powder [clothes] communicates the sense of cleanness, however, the clothes may not be very clean necessarily.

Overall, the theme of design versus expression of the design came through the interviews and this advanced further in the interview topic concerning design dimensions.

Design Dimensions and Design Values

The four key dimensions of design did come out in interviews, but respondents stressed that something bigger than just dimensions was behind these characteristics. Most of the respondents are familiar with the terms "form and function" and they believe design elements constitute the dimensions of the form. For example, one designer offered: "Design elements generate design values and benefits [dimensions]." In accordance with the literature (e.g., M. Kumar et al., 2015; Luchs et al., 2016) designers pointed out design elements and dimensions are seen holistically. That is, the fundamental design concept leads to expression in dimensions, and those dimensions, in turn, offer value to consumers.

Furthermore, many designers believe the importance of dimensions depends on the product's job, users' needs, and problem that should be solved by design, somehow in line with the rhetoric (see Buchanan, 2001) and design thinking frameworks (see Brown, 2008; Micheli et al., 2019) as they expressed something similar in this quotation:

> All of the dimensions are important based on the users' need (design for everyone pleases no one), problem, and product's job, and all work together [holistically] in a unified way to make a differentiation.

In addition, a jewelry designer stated:

> Aesthetics, symbolism, and ergonomics are important in jewelry design, but functionality in jewelry is related to symbolism like an engagement ring. However, ergonomics is important, as the jewelry should be suited to customers' physical size and the specific part of the body like hand, neck, and ear.

Furthermore, a furniture designer expressed:

> Based on the product's job, the importance of design dimensions is different. In the furniture industry in general, aesthetics and ergonomics are more important, then, functionality and symbolism. However, it depends on the job of the furniture. For commercial furniture, ergonomics and functionality are more important, and for residential furniture, aesthetics, and symbolism respectively. Besides, for the workplace and students as the users who want to use it for a long time, ergonomics is highly important.

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In a similar vein, another interviewee says:

For technical tools, symbolism and aesthetics are not as significant as functionality. For example, the Swiss Army knife is good symbolically, aesthetically, and functionally for a limited period of usage, but it does not work for a butcher.

That is, while dimensions are important, there is still something abstract behind it that guides the role of the dimension themselves.

In agreement with the literature (Chitturi et al., 2008; Crilly et al., 2004), a respondent states the importance of the dimensions is based on Maslow's theory and the utilitarian value should be met first:

The importance of these dimensions is based on Maslow's hierarchy of needs. First, the product should respectively be useful, reliable, usable, convenient, which are related to functionality and ergonomics, then, it should be also pleasurable [aesthetics] and meaningful [symbolic].

However, some designers believe that as we first see the product form, its hedonic value is more important, which also is in accordance with the literature (Hoegg & Alba, 2011; Noble & Kumar, 2010). Indeed, both of these viewpoints are correct based on several criteria such as product's job, users' need and taste, also time and possibility for testing and decision-making (Luchs et al., 2016). For example, two interviewees say:

The first thing that users are faced with is aesthetics or product form. Consumers first see the product and they should like its appearance, if they do not like it, the other things are not important.

Aesthetics is a part of human nature and visual communication as the first contact is very important.

Interestingly, a few respondents point out design elements should be based on the users' taste and the dimensions should be based on their needs. For instance:

Design elements are more close to the users' tastes and design dimensions are more linked with the users' needs.

Concerning the relationship between design elements and dimensions, some interviewees state that visual elements are more linked with hedonic value and non-visual elements are more related to the utilitarian value of product design. For example:

It seems visual elements are closer to aesthetics and meaning [symbolism], while, non-visual elements are closer to ergonomics and functionality.

Although the literature only has described the role of design elements in processing fluency theory (see Brakus et al., 2014; Landwehr et al., 2013), some respondents point out that design dimensions also should not make the product complex, as has been criticized judging the lounge/couch. An interviewee expressed:

A creative and good product should be user-friendly or easy to use, for example, the creative design reduces buttons on cell phones. A balance between the elements and dimension is important.

Furthermore, judging the award-winning products (lounge/couch and hearing aid) shows that consistent with "appearance and judgment biases" theory (see Hoegg & Alba, 2011; Sauer & Sonderegger, 2011), aesthetics and symbolism (hedonic value) can convey utilitarian value (functionality and ergonomics). But also, that utilitarian value can communicate symbolism. It is a striking and complementary point for the literature as their tasks are also different and the literature has pointed out the symbolic dimension talks more about the product's user. However, functionality mostly talks about the product itself (Crilly et al., 2004). As an example, one respondent said:

I believe, aesthetics mostly assists symbolism and these two dimensions affect [our perception of] other dimensions, but functionality and ergonomics also can communicate the symbolism.

Regarding the closeness of functionality and ergonomics, many interviewees believe these two dimensions are close but separate, which was illustrated in judging the award-winning products. This is somehow in concert with many studies (see Bloch, 1995; Jindal et

al., 2016) and somewhat inconsistent with the study of Homburg et al. (2015) that has suggested ergonomics as the subset of functionality. For instance, two respondents express:

Functionality and ergonomics are closely overlapping and closer than aesthetics and symbolism. A product is functional only when it is ergonomic and does all its jobs properly, however, ergonomics and functionality have different definitions and solve different problems, thus, are separate.

A heavy handbag may be functional, but difficult to carry [non-ergonomic]. Many chairs look nice and are functional, in terms of usability, durability, having flexible legs and wheels, tables, and so on, but are uncomfortable. For example, if it has a very low backrest.

Thus, the relationship between the two dimensions may be interwoven and complex.

In final consideration, as ergonomics and functionality are more engineering-related than other dimensions (Srinivasan et al., 2012), engineers and industrial designers are more interested in the utilitarian value or technical process of design, whereas, product designers are more enthusiastic about the hedonic value. Although some engineers and industrial designers based on their tastes and acumen also were very eager to the hedonic value and product appearance/social value, none of the product designers was highly keen on the utilitarian value and engineering/technical parts of product design, which highlights the need of their close collaboration in the design teams. It should be noted that product designers are not usually involved in the engineering aspects of designing, as their knowledge and education are not related to engineering or industrial design. In this regard, many of the interviewees state something like these quotes:

Aesthetics and symbolism are more important for product designers, however, functionality and ergonomics more for industrial designers and engineers in general.

Engineers think more about the product's job and designers think more about its appearance.

Similarly, two engineers say:

Product technological features affect my engagement and creativity. I apply technology to solve the manufacturers' problems by design. For engineers, material, recyclability, and the technical process of design are more important.

I first think about functionality and ergonomics, then, aesthetics and symbolism, as the product's job is very important and a beautiful product that does not work is a piece of crap.

Whereas, many product designers point out something like this passage:

Technical parts of the design are not attractive for me, I prefer the tangible and visible parts of a car to its engine.

Therefore, the design itself is influence by the designer's skill and interests.

Atypicality and Diversification in Products

Concerning the level of creativity, the majority of the respondents believe creativity should not only focus on form, but on the necessary dimensions of product design based on the product's job, the problem that it should solve, and users' and/or businesses' needs and characteristics. Comparing the three washing machines, they posit that form creativity should not harm its usability/function, but design creativity should consider both form and function appropriately in relevance to the products' job, otherwise, it needs redesigning to solve the problem. Therefore, in this topic, the meaningfulness (appropriateness or relevance) aspect of creativity (e.g. Nakata et al., 2018; Verganti & Öberg, 2013) is very important, and it is necessary to ask why the product is different/novel and does it relevant to its job or not. Regarding the atypicality two interviewees, for example, say:

Creativity should solve the problem based on users' and businesses' needs and traits to become an innovation, otherwise, it is only a good imagination. Atypical or radical design must have meaningfulness that why it is different. If the product works well and does its job properly, it can find its place in the market over time.

The failure creative products are not creative in terms of the necessary dimensions and cannot do their jobs, they have mostly only creative appearance. The more creative or unique is better, but only if the product can do its job. If a product's form is very radical but is difficult to use, we should enhance its functionality by redesigning. The creativity of the unusual washing machine is superficial [too hedonistic], whereas, creativity should also consider its performance, operability, and usability.

What is more, concerning the categorization theory, they suggest that if a product is creative in terms of form and function and does its job efficiently, but consumers cannot categorize it, marketers and advertising designers should make them familiar with its benefits and differentiation. Many of them express something like this quote:

If consumers cannot categorize it, advertisers should communicate the product differentiation [benefits] and make it acceptable for the market.

This makes a big challenge for several recent studies that suggest only incremental creativity/innovation (e.g., Goode et al., 2013; Micheli & Gemser, 2016; Mugge & Dahl, 2013) for ease of consumers' categorization (Bloch, 1995; Radford & Bloch, 2011; Reimann et al., 2010) and product success. It is because they have only focused on the form creativity, showing the products or products' photos with creative/unusual form sacrificing the other dimensions (e.g., functionality or usability).

About the level of product diversification/differentiation/extension, the respondents believe product diversification should be limited based on the consumers' need, otherwise, will result in failure and obligatory sales discounts. Most of the respondents state something similar to this quotation:

Product diversification or extension should be meaningful and logical based on market [segments'] needs. However, marketers usually prefer a wide range of diversification to sell more, I think it confuses the consumers and will be resulted in failures and obligatory sales discounts.

Analysing the Award-Winning Products

In relation to the criteria for a good and creative product design, most of the interviewees talk about problem-solving and meeting the users' needs through a good combination of design elements and dimensions. The notable point is that if they judge their own design or the product, which they fully know about, they often judge that based on the problems it solves for the target users, which is in compliance with the rhetoric (see Buchanan, 2001) and design thinking approaches (see Brown, 2008; Micheli et al., 2019). Design dimensions, therefore, received little attention. However, if they are not completely familiar with that product, they usually rely on the design dimensions and product's job with more abstract references to problem-solving. Describing creativity of award-wining products, many of them state something like these passages:

> *It solves the existing product problems based on the target users' needs. The winner products usually are a good combination of the elements and dimensions regarding the users' need, problem, and product's job.*

> *They are good solutions to improve people's lives from utilitarian and hedonic viewpoints and helping the business.*

Judging the award-winning products also shows three important points to consider. Firstly, regarding the utilitarian value, many respondents mention that aesthetics and symbolism might affect our perception of functionality and ergonomics and mislead us, which has been noted as "appearance and judgment biases" (see Hoegg & Alba, 2011; Sauer & Sonderegger, 2011). It is whereas, judging functionality and ergonomics needs time using the product, as Luchs et al. (2016) also have discussed that in their review paper. Besides, it can be a challenge for consumers' post-purchase behavior and online stores. Two interviewees for example say:

Although visual elements and the product's appearance communicate these dimensions, we probably make mistakes judging these dimensions.

Ergonomics and functionality are more perceivable during using the product.

Secondly, most of the respondents note that in judging a product, specifically its functionality and ergonomics from seeing the photos, even watching advertising video and reading the description, is not reliable, which is challenging for the studies that used photos to measure consumers' perception of products' utility (e.g., Hoegg & Alba, 2011; Radford & Bloch, 2011; Sonderegger & Sauer, 2015). In this regard, an interviewee says:

For judging the functionality and ergonomics we should test the product in a period of time. Seeing its photos, watching advertising, and reading the description cannot be enough.

When discussing the award-winning products specifically, design dimensions dominate. When judging the lounge/couch, interviewees believe that aesthetics usually communicates symbolism, however, functionality (lights, tables, charging facilities, and speakers) and ergonomics (it looks comfortable) also can convey symbolism. Moreover, a product without aestheticism also can be symbolically attractive for its specific target users (for couch potatoes). For the hearing aid, the interviewees suggest the hearing aid's magnetic attachment battery and the charging case (functionality) are notable, users do not need to carry batteries anymore and its aesthetics and functionality have made it symbolic. They believe the combination of jewelry and a medical product is a good try to turning it into an accessory, like glasses. Finally, for the cup, interviewees believe the cup is a good combination of design elements and dimensions, and its texture and sustainable materials (coffee husk) have made it functional (it does not transfer the heat), ergonomics (light), and symbolic (for drinking coffee).

DISCUSSION, IMPLICATIONS, AND FUTURE DIRECTIONS

The current exploratory research provides several implications for creative product development and opens many avenues for future business to business relations and consumer studies. Although the academic literature emphasizes the noun aspects of design in terms of product characteristics, this research views those dimensions as the outcomes of alternative design strategies which were invoked depending on what were the key consumer problems to be solved. This demonstrates the necessity of strategic insight for the success of product design development. All respondents believe design creativity is continuous problem-solving, which denotes creative development of product design involves strategic processes or steps. Furthermore, it should be taken into consideration that scholarly concentration on design elements and dimensions may be a distraction—at least as far as understanding designer opinions. The creative design needs precise focusing on finding the real problem(s) of the existing product and the best solution(s). Hence, design attributes should serve the problem-solving task, a critical point that usually has been neglected in the literature.

Moreover, as designers' engagement is a precondition of creative design, influential factors should be thoughtfully considered to adjust the expected outcome, factors like product and project's features, production type, users' characteristics, client's brand/company's position, client's risk, managerial skills, trust, and openness. Many interviewees did not have a correct perception of marketing strategy or approaches. Hence, their creative designs only rely on their own experience and heuristics, instead of on an improving and seamless process to assure innovation success. In this sense, the creative strategy of product design can be a mixture of strategic insights and designers' intuition.

Scholars should consider design strategically from a creative problem-solving perspective. Towards this end, design elements, dimensions, and the related theories assist design strategic development by documentation and formulating of designers' insights created

by trial-and-errors to shape strategic knowledge management of creative-design thinking and implementing. However, this needs additional interdisciplinary research to reveal how design strategy can be documented, formulated, and taught.

Another important point to consider is related to designers' and their marketing clients' biases in selecting design elements and dimensions. This research indicates users' tastes and needs should be the main criteria choosing design elements and dimensions, then, the product's job and the problem that should be solved by design are the key variables influential on consumers' choices. Yet, product designers and their clients often incorrectly believe they have empathy with the users, which is only achievable by testing prototypes and collecting feedback from the target users. This also shows the importance of prototyping in product marketing studies. The current research also indicates the creativity techniques for finding the problems and solutions are necessary and should be followed by co-designing/co-development and prototyping. What is more, in completing the visual processing fluency (see Brakus et al., 2014; Landwehr et al., 2013), it should be considered that both design elements and dimensions should reach a good combination based on the discussed criteria to enhance the product's usefulness and user-friendliness, not to make it complicated.

Although non-visual elements of design can play important role in a design, it seems because of the difficulty of performing this research, there few relevant studies focusing on them (Sonderegger & Sauer, 2015). That needs precise consideration in future research.

Regarding the creative design teams, the findings suggest besides actively engaged engineers and designers, taking advantage of maverick members with fresh ideas, as well as those with different expertise are highly important for the success of ideation.

Concerning product atypicality and differentiation, the results suggest that creativity should consider all the necessary dimensions of a product based on its job, usability, and the problem that should be solved by design, instead of the mere form uniqueness. In this regard,

the meaningfulness aspect of creativity (e.g., Nakata et al., 2018) is more important. Designers should ask themselves that why it is different/novel and is it appropriate and relevant to its job or not. However, if consumers cannot categorize highly creative products (see Micheli & Gemser, 2016; Mugge & Dahl, 2013), marketers and advertising designers should help consumers become familiar with a product's benefits so that a good/creative product can finally find its place in the market over time.

In final consideration, marketing scholars have the same kinds of problems reviewing designers' work as they themselves do—which leads to radically different perspectives on how research should be done. Designers judged their own work based on the problems they addressed but had to infer this from looking at others' work. Therefore, to judge others' work they focused on the design strategies applied, that is, well-known design dimensions like functionality or aestheticism. However, this focus is not so much a bias as it is blindness. Yet, scholars in product development share this same blindness.

Regarding problem-solving and creativity-related theories in product development research, we need to better understand the design as a verb and the kinds of problems designers themselves are trying to solve, instead of the design as a noun and focusing on product elements and/or dimensions. These design attributes are merely alternative generic strategies to solving the problems consumers have with products. As product marketing scholars are not involved in the design process, their myopic or stereotypic views often lead to dispositionalism and superficial evaluation of the outcome by anchoring the attributes. It is while, design practitioners evaluate their design process based on contingent circumstances or their situationalism. Going back to the hearing aid example this research started with, improving aesthetic or ergonomic aspects of the design are just alternative routes to solving consumers' problems. Thus, finding the right problems and addressing them, using appropriate approaches remain as the main parts of the more encompassing issues that product development scholars

need to address by shifting their thinking ways towards design thinking. In addition, measuring and analysing product marketers' views on the discussed topics can be very insightful and needs to be considered in future research.

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APPENDICES

Appendix 1: Interview questions

Repertory grid analysis

- Comparing the similarity and differences of three creative design projects and three less creative ones (that the interviewee has participated in) based on the repertory grid analysis.

Creativity, techniques, and related factors

Please tell me about any method or approach you use in designing creative products? What factors affect your creativity in design process?

- Do you ever try to put specific personality/characteristics in the product you design? How do you do this?
- What is good/creative/innovative design?
- What is the designers' role in product designing?
- What kind of role clients (marketers) play in the design process?
- How designers share their creative approaches/strategies to their global colleagues?
- Does sharing the design approaches/strategies good?

Visual and non-visual elements

- In your design experience, how important are the visual (pattern, proportion) and non-visual (material, texture) elements of design, and how do you go about the

process of designing to get those in the design to translate your intended/creative personality?

Product design values and dimensions

- Academics often talk about hedonic and utilitarian values and four dimensions of good design: aestheticism, symbolism, functionalism and ergonomics. In your design experience, how important are these dimensions, and how do you go about the process of designing to get those in the design to translate your intended/creative personality?

Atypicality and diversification

- Most people think that creative products and variety/diversification/extension/differentiation of products are good things, but can a product be too creative and too varied/diversified?

Analysing the award-winning products

- Please analyse the awards winning products. Why these are creative or non-creative bad? What are the criteria for design awards?

General questions

1. How many years are you in this job (experience)?
2. What is your education level?
3. What was your major?
4. Which University did you graduate from?
5. What is your nationality?
6. Do you work independently or for specific firm(s)?

7. Do you design internationally or only for national companies?

8. Have you ever won any design award?

9. Have you ever been an award jury?

10. Do you also have an academic job (teaching)?

11. What is your main industry/product?

12. How old are you?

Appendix 2: Three washing machines to control the interviewees' responses to questions regarding the product atypicality

Appendix 3: The product's different photos, descriptions, and advertising videos have been provided for the interviewees on the following website addresses for judging

King Cloud

https://good-design.org/projects/king-cloud-iii/

Facett

https://good-design.org/projects/facett-2/

Huskee Cup

https://good-design.org/projects/huskee-cup/

CONFERENCE PRESENTATION

Innovation and Product Development Management Conference

(27th IPDMC, Antwerp, Belgium, online, June 2020)

Product Design Strategy: Professional Designers' Views on Creativity

ABSTRACT

Although marketing scholars know product design creativity is vital in competitive markets, most of the related studies focus on consumers' responses to product designs' creativity. Only scant research has focused on product designers and/or marketers. Hence, this research focuses on understanding prominent product designers' views of the product design's creativity, but we gave special emphasis to understanding where and how the current literature does not incorporate designers' views. Overall, integrating academic and practitioner views, the current unique research fills the literature gaps and establishes a basis for future consumer studies. It also helps designers and marketers to broaden their strategic vison on product design and manage design creativity more efficiently.

Keywords: *Product Design Strategy, Product Design Creativity, Product Design Innovation*

THEORY DEVELOPMENT

Product design is a phenomenon consisting of design process and design features (e.g., Ganesan, Malter, & Rindfleisch, 2005). While marketing scholars as the expert critic users can analyse product design features or attributes—such as design elements (e.g., color, shape, texture) (e.g., Lawson, 1983) and design dimensions (i.e., ergonomics, functionality, symbolism, and aesthetics) (e.g., Moon et al., 2015)—they are facing ambiguity in scrutinizing the process behind the final products. The vagueness is in situation where the designers can explain the process—the hidden side of design projects—which will be helpful to more precisely judge a product as a package or "bundle of attributes" (see: Noble, 2011). The more we know about the process, the more practical strategies we can develop for product design success. Thus, this approach can provide a springboard for developing product design strategy. Besides, while product design scholars talk more about the design features and designers more about the design process, incorporating their views will be lucrative for both parties. Therefore, based on a comprehensive literature reviewing, the extant research impartially compares the professional product designers' viewpoints towards creative product design with the related academic literature.

Product Design Atrributes

Product design literature covers design elements and dimensions that endow personality (e.g. creative, innovative, cool, luxurious) (e.g., Desmet et al., 2008; Im et al., 2015), language (Dell'Era & Verganti, 2007), and value (Chitturi et al., 2008) to products. Design elements can be visual, which often play a more pivotal role, or non-visual (e.g., Luchs et al., 2016; Sonderegger & Sauer, 2015), such as form, pattern, material, color, texture (e.g., Lawson,

1983; Luchs et al., 2016; Moon et al., 2015). Design dimensions include functionality, ergonomics, aesthetics, and symbolism (e.g., Micheli & Gemser, 2016; Moon et al., 2015).

Aesthetics and symbolism (hedonic value). Users' first experience with products is often product appearance or form (Hoegg & Alba, 2011; Noble & Kumar, 2010) by which they make an overall or holistic judgements (Moon et al., 2013; Sauer & Sonderegger, 2011). Researchers believe after a rudimentary level of utility, users prefer the products with more hedonistic values (e.g., Chitturi et al., 2007), in line with Maslow's theory (see: Chitturi et al., 2008). However, scholars find that judging product capabilities are not as possible as its appearance at the first sight (Luchs et al., 2016).

Functionality and ergonomics (utilitarian value). Functionality and ergonomics are closely interrelated (Jindal et al., 2016), and even Homburg et al. (2015) suggest ergonomics as a part of functionality. However, functionality refers to product performance while ergonomics relates more to body comfort (Noble & Kumar, 2010). As the best products are not necessarily the most beautiful one (Bloch, 1995), functionality and ergonomics also play very influential roles in product design (Crilly et al., 2008). Marketing scholars usually attempt to evaluate all dimensions of product design by showing the product's photos to users (e.g., Hoegg & Alba, 2011; Radford & Bloch, 2011; Sonderegger & Sauer, 2015), however, perception of utitlitarian value of product by only seeing that, cannot be as easy as perception of its hedonic value (Wan et al., 2017).

Product Creativity and Personality. The terms creative and innovative are usually applied to describe a good design, embodying the quality of design elements and dimensions (Micheli & Gemser, 2016; Noble & Kumar, 2010). Creativity derives from two components "originality or uniqueness" and "relevance or meaningfulness" of product design (Im, Montoya, & Workman Jr, 2013; Nakata et al., 2018). Besides, through its components' characteristics, creativity as a dominant personality conveys many desirable personalities (Im et al., 2015;

Luffarelli, Stamatogiannakis, & Yang, 2019; Warren & Campbell, 2014) such as original, unique (Bird & Tapp, 2008), cool (Im et al., 2015), funny, cute (Mugge et al., 2009), friendly, cheerful (Klink & Athaide, 2012), etc.

Scholarly Theories and Strategies in Product Design. However, the literature in product design lacks development of theories and strategies. Marketing studies indicate consumers always have an insatiable tendency to new creative products' designs (Radford & Bloch, 2011), which points to the significance of design theories and strategies. The related theories and strategies, which can be seen in the body of product design literature are mostly focused on users' perception and experience outcomes rather than designers' perspectives or the design process. However, we will discuss the related theories and strategies where is needful.

METHODOLOGY

In this research we precisely followed methods used by related studies, in terms of both data gathering (see: Allen et al., 2018; Andriopoulos et al., 2018; Beverland et al., 2016; V. Kumar et al., 2016) and data coding process (see: Altrichter, 1993; Guest et al., 2011; Miles & Huberman, 1994; Saldaña, 2015).

Based on a comprehensive literature review, we designed and applied semi-structured questions and Repertory Grid Analysis Technique (to investigate the implicit process) (see: Goffin & Koners, 2011; Micheli et al., 2012), for our face-to-face interviews with thirty-two prominent product designers in Australia. These interviewees served at judging panel of design awards (2018 and 2019) and/or have received the related awards. Directly and indirectly, we explored their views towards creative product design, creativity technics, influential factors, product personality, elements, dimensions, theories, strategies, product atypicality, and line

extension. Additionally, we requested them to comment on three recent award-winning products.

FONINGS AND MANAGERIAL IMPLICATIONS

Creative Problem Solving, Techniques, Factors, and Product Personality

We started the interviews with Repertory Grid Analysis Technique, asking about the recent highly creative and less creative product design's projects that they were involved and comparing the projects' process and features (e.g., differences and similarities) to indirectly investigate what factors affect product creativity.

This stage uncovers product designers see creativie design as a "problem solving" process that can continuesly improve products, which is not in line with literature in product design. This denotes, design elements and dimensions are only considered as the auxiliary tools serving problem solving. This indicates us a deviation from the marketing scholars' prespectives, who highly emphesize the quality of elements and dimensions to describe the product creativity and success. Thus, they should focus more on the process of finding real problems and the best solutions. Further, although "continious improvement" refutably needs strategy, it is being neglected by both researchers and practitioners. While creative design as a commercial art should continuously find the problems and solutions, the need for strategy is undeniable. Hence, designers should be more open to adapt their creative design thinking with strategic thinking for achieving more success. Yet, sparkles of creative strategy are seen in design agencies if they own design teams with heterogeneous members and do prototyping with participation of target users. Whereupon, design teams' members should be including a balanced combination of creatives, engineers, designers, and even target users. Meanwhile,

prototyping should be more highlighted to measure design quality in both market (designers and marketers) and academic studies.

Moreover, creativity of designers depends on the level of their engagement, on which several exogenous factors are influential, for example, product category, production type, project's ambiance, users, brand position, and client's characteristics including risk acceptance, expertise, openness, and trust. Therefore, these factors need more academic studies and managerial attention.

What is more, we asked them to describe the process of applying creativity and personality to the creative product's designs. They believe "relevance" component of creativity is considered as the most important part that shapes and inspires the personality, which is in line with the literature in creativity (e.g., Lehnert, Till, & Ospina, 2014). Meanwhile, they indicate that in addition to design elements and dimensions, users' tastes, needs, and characteristics (matched with personality congruence theory: Govers, 2004), designers' taste, brand personality, product job, product category, and country of origin affect product personality.

Design Elements and Dimensions

In the next part we asked them to express the roles of design elements (e.g., color, shape, pattern, material, texture) and dimensions (i.e., symbolism, aesthetics, ergonomics, and functionality) and their approach to selecting them. They believe the elements shape the dimensions. Their answers show the selection of design elements depends on the tastes of designers, clients, and consumers, besides, on brand identity, and design paradigms (in the company and the category). Thus, the noticeable point is that clients' and designers' biases should be controlled as far as possible. Further, selection of design non-visual elements like texture and material are more engineering, technical, and complicated. Hence, usually are being

neglected by designers and scholars (see: Sonderegger & Sauer, 2015), which is deserved for more attention. In the meantime, the dimensions' importance relies on the product job and problem that should be solved. Overall, we conclude that design elements are more based on the consumers' taste and the dimensions more on the consumers' need. The interviewees went further to state that visual elements are more close to hedonic value (aesthetics and symbolism) of product design and non-visual elements more to utilitarian value (functionality and ergonomics).

On the one hand, they think utilitarian value should be met first as the first level of Maslow's pyramid [or Herzberg's hygiene factors] (see: Chitturi et al., 2008; Crilly et al., 2004). One the other, they suggest hedonic value is significant, because we firstly deal with product appearance (see: Hoegg & Alba, 2011; Noble & Kumar, 2010). Taken together, the importance of these values/dimensions depends on the product job, users' needs, and tastes.

Finally, they suggest sustainability, business mode, manufacturability, cost efficiency, and brand, as the other dimensions for product design success that need more studies (see: Luchs & Swan, 2011; Luchs et al., 2016).

Product Design Theories and Strategies

We also requested the interviewees to elaborate design theories and strategies they apply in the designing process. They stated that the theories shape the strategies, and design elements and dimensions constitute design strategies for problem solving purposes. Yet, only a few designers with an active academic profession expressed some of the theories and strategies.

Product Atypicality and Line Extension

We asked the interviewees to state their opinion about revolutionary designs of products (like a completely different washing machine) and products with evolving features (a product line

with a few differences in design, like producing many computer mouses with small differences in designs, but under a same brand).

We wanted to examine if product creativity and extension occur at an incremental level, as the literature indicates (see: Micheli & Gemser, 2016; Mugge & Dahl, 2013). Their responses show creativity has not any boundary, but should simultaneously emphasize on both form and function "relevant" to the product job, the problem that should be solved by design to meet the needs of consumers and businesses. Neither form nor function should be sacrificed for being different or creative. If a product has different appearance, but does its job [e.g., Dyson fans], marketers should solve the users' categorization problem (see: Radford & Bloch, 2011; Reimann et al., 2010). However, they suggest businesses circumscribe product diversification or line extension that only target the users' need, to prevent product failure and unsolicited sales discounts.

Analaysing the Award-winning Products

We finally asked the respondents to evaluate three recent awards winning products, which had won Good Design Australia award in 2018, and the interviewees were more or less familiar with (couch, hearing aid, and cup). We wanted to know how they judge/have judged these products, and how they can develop those. Interestingly, they judge their designs or the designs that they were fully familiar with, according to the problems that designs have solved, but judge the others based on design dimensions and product job. This again proves that problem solving is prioritized for creative design, rather than design elements and dimensions.

Furthermore, judging the winners shows some common notable points: 1) in line with "appearance and judgement biases" (see: Hoegg & Alba, 2011; Sauer & Sonderegger, 2011), hedonic value can lead even professionals to misperception of utilitarian value. Thus, a right judgment of utilitarian value depends on possibility of time for using the product (see: Luchs

et al., 2016). 2). Based on the previous notable point, consumers cannot judge utilitarian value of products by only their photos, advertisements, or the related descriptions. This finding conflicts with previous studies (e.g., Hoegg & Alba, 2011; Radford & Bloch, 2011; Sonderegger & Sauer, 2015), suggesting prototyping and using the product for a period of time as the reliable methods for measuring a product real values/benefits. This has an important implication for managing consumers' post-purchase behavior and e-marketing. 3) Unlike what previous studies aver (e.g., Candi et al., 2017; Homburg et al., 2015; C.-L. Hsu et al., 2018) functionality and ergonomics are separate dimensions (see: Bloch, 1995) with different performances.

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CHAPTER 4: PAPER/ARTICLE 3

Managerial Thinking versus Design Thinking: Comparing Alternative 'Strategic Landscapes' of the New Product Development Process

ABSTRACT

The product development process has been approached from two dominant perspectives, *managerial thinking* and *design thinking*, and we investigate this process comparing across the two. We conducted a worldwide survey of both (1) professional award-winning product designers and (2) professional managers involving in the new product development process. Therefore, we are the first to simultaneously study both perspectives, and because of this find a paradoxical dynamic between them. New product success rates are stubbornly low, and we address the possibility that the problem has to do with differences in how marketing managers and product designers approach the new product development task. Managers have difficulty with understanding the problem to be solved until they see the solution in the form of an outstanding product design. Designers have difficulty developing new products until they have a specific and insightful understanding of the problem that needs to be solved. Therefore, if managers cannot articulate the problem until designers come up with a design, both parties are often wandering in the dark, and our low rate of innovation success should hardly be surprising.

INTRODUCTION

Most marketing scholarship on product design development process consists of customer-centric studies that seek to explain consumers' attitudes towards innovative products (e.g., Homburg et al., 2015; Mugge et al., 2018; Song, Moon, Chen, & Houston, 2018). Such an approach is consistent with how a marketing manager approaches product development (e.g., Hattula et al., 2015; Nagaraj et al., 2020; Nakata et al., 2018) and, as one would expect, marketing scholars also consider managers' perspectives (see Deighton et al., 2020) of the development process. However, fewer marketing scholars consider designers' views (Beverland et al., 2016; Micheli et al., 2012). On the other hand, industrial design scholars focus more on designers taking an engineering view and qualitative approaches to the ways designers and engineers develop products (e.g., Crilly et al., 2009; Yilmaz & Seifert, 2011).

This bifurcation is hardly a surprise because the two approaches represent the different realities perceived by product managers and designers, respectively. One of those realities is the designer-centered approach in the process, usually called *design thinking* (e.g., Nakata & Hwang, 2020), but the other puts the manager's cognition and intuition at the center of the process and can be referred to as *managerial thinking* (e.g., Vanharanta & Easton, 2010). Although design thinking is becoming of interest to marketing and innovation management scholars (see Spanjol & Noble, 2020), this view still contrasts with managerial perspectives (see Micheli et al., 2019; Nagaraj et al., 2020).

Unfortunately, so different are these views that sometimes it seems like managers and designers take two different "perspectives" (Micheli et al., 2012) yet at other times manager

and designer seem to come from two "different thought worlds" (Beverland et al., 2016), a problematic issue in the product development process. That is, we seem to have two alternative "dominant logics" (Werhane, 2018), "strategic visions" (Wrigley, Nusem, & Straker, 2020), or "landscapes" (von Hippel & von Krogh, 2016) to new product development research. These differences have not been comprehensively studied in the field—but there is a need for closer examination of such differences and we try to do so. Because we believe bridging these two thoughts shapes a strategic marketing thinking that fades the client-agent weaknesses and teaches us how to absorb more exchanging capacities for market success.

One approach to the managerial perspective is represented by von Hippel and von Krogh (2016) who explore not only managers' cognitive styles but also managers' decision-making approaches in problem-solving. They argue managers think linearly and often face difficulties formulating the problems to be solved. This is due to a cognitive bias called *functional fixedness* (p. 215). Often problem identification and formulation come only *after* the discovery of possible solutions, especially in unfamiliar situations where they do not have a functional understanding of the object (Moldoveanu, 2009; Stock, Heald, Holthaus, Gillert, & von Hippel, 2018). This suggests their ability to conceptualize innovative products is usually blocked until they see the sparkles of novel viable solutions.

Alternatively, Brown (2008, pp. 88-89) describes design thinking as a cognitive skill with three nonlinear, but systematic loops that highly rely on creativity, imagination, and intuition of the design thinker. The first step is *inspiration* which is the identification of the problem and/or solution. The second is *ideation* or developing, testing, and refinement of the idea. Third concerns *implementation* which launches the product to the market. This model is similar to traditional stepwise models of creativity (Osborn, 1935; Wallas, 1926) and the more recent componential model (Amabile, Collins, et al., 1996, p. 113; Amabile & Pratt, 2016, p. 165).

To develop a more strategic marketing thinking in the field, this research attempts to compare managerial thinking with design thinking by identifying the key factors in the new product development process for both managers and designers. We focus on two key attributes of the product design (i.e., form and function), five highly influential factors on the process (i.e., Client's attitudes towards risk and innovation, Client's openness, Quality of client's brief, Client's trust, and Intrinsic motivation), and their influence on a crucial outcome—financial success. We operationalize this research in two field studies, one of professional award-winning product designers around the world who design for major brands, and the other of USA and UK professional product/marketing managers of major brands who regularly work with professional product designers. Each study is survey-based and uses the same items and constructs, but the models developed for each group are so different, they might as well represent separate realities.

However, our core contribution focuses on the paradoxical dynamic between managerial thinking and design thinking. If managers have difficulty formulating problems until they see a solution, then it will be hard to provide designers with a good starting place in which to do useful design thinking. Although designers can do well solving problems, their success is highly dependent on starting with the right problem—or even any problem—and with proper guidance often end up solving issues that never were problems, to begin with. In effect, we show that managers and designers tend to talk past one another and rarely get to the heart of the issue in new product development. With this as context, it is not surprising that the outcomes of the innovation process are frequently so disappointing (Chakravarty, Zhou, & Sharma, 2020; Morais-Storz, Nguyen, & Sætre, 2020). Each partner in the dyad may think they have done their part well—and get frustrated with being let down by the other side.

THEORETICAL FRAMEWORK

People think variably and based on the theory of intelligence, scholars describe the structure of thinking (C. D. Lin & Li, 2003) and mostly categorize it into two main and complementary categories, logical/rational and visual/spatial thinkings (Eliens, Eling, Gelper, & Langerak, 2018; Xie, Zhang, Chen, & Xin, 2020). Based on what we know about design thinking and managerial thinking, it is supposed that managers think more logically, while designers tend to think more visually. However, we need to know more and explore how they can complete each other to reach strategic marketing thinking in the competitive market.

For many scholars, a useful starting place to understanding how managers and designers interact may be the theories of principal-agent or the agency theory (Eisenhardt, 1989). This perspective focuses on the role of principals contracting with agents, which corresponds to how managers relate to designers hired to undertake new product development. However, what is well known about agency theory is that it has many assumptions and complexities (Hadida, Heide, & Bell, 2019), ranging the gamut from asymmetric information to adverse selection to agent opportunistic behavior to moral hazard and to even the role of monitoring, incentives, and agency costs (see D. P. Mishra, Heide, & Cort, 1998; S. P. Shapiro, 2005). Few management scholars accept agency theory in its entirety, and most relax some critical assumptions along the way.

To apply agency theory to the exchange relationship of managers and designers, scholars have proposed that several key assumptions may need to be relaxed. Davis, Schoorman, and Donaldson (1997) drop the assumption of self-interested behavior by agents, such that designers may well love their job and want to do well for the clients they serve. Alternatively, A. Sharma (1997) lets go of the assumption that there is little holding designers to high standards, and instead he suggests at least four types of behavioral control on designers to yield successful outcomes. Nilakant and Rao (1994) focus on the role of operational versus

facilitative roles of an agent, as well as the measurability of effort, and in the case of designers, they may play a facilitative role which suggests better outcomes for managers than traditional agency theory would suggest. Finally, Tumbat and Grayson (2016) argue that managers may well relinquish control over product development decisions to experts like professional designers in a system that sounds a lot like trust (see also Carson, 2007).

However, all of these relaxations of agency theory's assumptions seem to favor the idea that designers do a better job at new product development than the theory might suggest—something which seems strange given that the success rate of new products is usually in single digits (Morais-Storz et al., 2020; Simester, Tucker, & Yang, 2019). That is, prior work always seems to suggest that possibly the situation managers and designers find themselves in is more conducive to good work than the hard-edged, incentive-oriented, contract-induced relationship suggested by agency theory (see Bergen, Dutta, & Walker, 1992; Tangpong, Hung, & Li, 2019). Yet prior research gives little insight into what might be better, except for scholars like Tumbat and Grayson (2016) to suggest that managers need to trust their designers more and do what they propose.

Our approach also relaxes a key assumption of agency theory, but we focus on an issue which when relaxed leads to more difficulty in managers getting what they want, regardless of how they can monitor or enforce a contract (see Seshadri & Mishra, 2004). That is, we start by questioning whether managers have the ability to write the contract itself—and often fail to specify the problem that designers are supposed to solve. This challenge, however, is but a variant of one of the first principles of strategy: if you do not know where you are going any road will lead you there. Thus, we review managerial thinking and then extend this to design thinking.

Managerial Thinking

Problem-solving lies at the heart of managerial thinking but it is also there, that many managerial problems start. von Hippel and von Krogh (2016) assert managers have difficulty identifying and formulating problems, and as the result, selecting the optimal solution. They need to see the object/product or something related to that and increase their functional understanding of the object (Stock et al., 2018) in order to identify and formulate the problem. Then, viable solutions might trigger their mind (von Hippel & von Krogh, 2016), and narrowing down the "real options" (see Kaufmann, Kock, & Gemünden, 2021) can be helpful to select the optimal/satisfactory one. It appears this issue is associated with their cognitive biases and weakness in or fixedness of imagination (Biyalogorsky, Boulding, & Staelin, 2006; Stock et al., 2018; von Hippel & von Krogh, 2016).

In the managerial decision-making literature, such issues are discussed under the theory of bounded rationality (Simon, 1955). Decision-makers possess limited knowledge and ability to process the information and also are faced with confined resources, such as insufficient time to make decisions (Kunc & Morecroft, 2010; Yamini, 2020). They try to simplify the situation to find mental shortcuts, however, this heuristics is unhelpful in complex and unfamiliar situations (Yamini, 2020) and cause their managerial misperception (Conner & Prahalad, 1996; Weber, Chahabadi, & Maurer, 2020). When facing uncertainty and complexity, managers avoid decision-making to prevent the inevitable consequences of a poor decision (Hogarth & Karelaia, 2012)—something consistent with "utility theory" (see Wallenius et al., 2008). Uncertainty makes them hesitant, which in turn leads to being mentally blocked to helpful framing or evaluation of the situation or even selecting among the options (Amit & Paul, 1993; Kaufmann et al., 2021). This cognitive bias relates to "anchoring" (Kornberger, Leixnering, & Meyer, 2018; Meier, Favero, & Zhu, 2015) and is a type of loss aversion behavior, such that managers waiting, attempt to analyze the risk logically (Tiwana, Wang, Keil, & Ahluwalia,

2007; Yamini, 2020), and even seek to transferring that risk to other parties (K.-K. Kim & Park, 2014).

Design Thinking

In comparison, design thinking contains a more systematic process for creative problem-solving that illustrates designers' principles, approaches, methods, materials, and tools in the process (Brown, 2008; Liedtka, 2015). The literature on design thinking mostly encourages managers to follow designers through the design thinking process (see Nagaraj et al., 2020; Nakata & Hwang, 2020; Spanjol & Noble, 2020). These scholars often try to set design thinking within a managerial perspective to overcome managers' cognitive biases and address potential weakness/fixedness related to idea visualization, so to lead to successful outcomes (Liedtka, 2015).

The design approach is founded on creativity research, drawing from frameworks like Amabile's componential model of creativity (Amabile, Collins, et al., 1996, p. 113; Amabile & Pratt, 2016, p. 165). The model includes 5 stages: 1) presentation and problem identification, 2) preparation and gathering information, 3) idea generation, 4) idea validation, and 5) outcome assessment (success, failure, or progress). A central concept, intrinsic motivation, affects the first and third stages while creativity skills influence the third stage. Skills in the task domain impact the second and fourth stages. Several elements of this model, including the stages, motivation, and skills have been abbreviated within a model proposed by Brown (2008, pp. 88-89) for design thinking. Through the process, design thinking identifies, frames, formulates, and evaluates the real problem and tries to solve it with the best solution (Dorst, 2011). The heuristics embodied in design thinking are thought to be successful in complex and unfamiliar situations whereas managerial thinking flourishes in more routine problem-solving settings.

While one would ask how design thinking could overcome bounded rationality concerns through expanding the agency theory, the literature on design indirectly offers answers. Ahmed et al. (2003) applied techniques like observation (e.g., a 'thinking aloud' method) and post-observation interviewing to investigate professional product designers' approaches to creative problem-solving—which is in line with Amabile's and Brown's models. Interestingly, they uncover during the design process, professional designers referred to past designs [e.g., case-based reasoning], they mentally synthesize and visualize varied features and materials, additionally, drawings/sketches help professional designers. Thus, designers' imagination and sketches assist them with visualization or conceptualization of the process from problem identification and framing to ideation, evaluation, and solution (Tedjosaputro, Shih, Niblock, & Pradel, 2018; Verganti, Vendraminelli, & Iansiti, 2020). In congruence with the Amabile's model, designers constantly and heuristically "reframe" the problem and other stages—mentally and visually—to reach an optimal solution (Beckman, 2020).

Reinterpreting the Development Process

To set the issues of managerial thinking and design thinking in context, we next consider the ways these types of thinking reinterpret the product development process overall. Luchs and Swan (2011) proposed what should appear to be a straightforward, sequential model of the product development process (see also Luchs et al., 2016). It is from this model that we have chosen our key concepts to be investigated.

The model first starts with (1) the context and strategy of firms, including their attitudes towards risk and innovation. Part of this step incorporates managers' engagement with designers who are typically external of the firm but also, may be from an independent internal autonomous department. Issues arise regarding the level of openness managers have towards

design, their trust of designers, as well as the writing of the client brief to the designers. A second step in the process focuses on (2) the design process itself and two key issues may be the intrinsic motivation of designers, in addition to how they incorporate consumer needs into the process. Finally, the consequences of this process lead to (3) the development of a product form and function, where form represents the hedonic or aesthetic aspects of the final design and function relates to the utilitarian aspects (Chitturi et al., 2007, 2008; J. D. Townsend, Montoya, & Calantone, 2011). Consumers then respond to a product's form and function, which leads to (4) the financial success of the product (e.g., Ernst, Hoyer, & Rübsaamen, 2010; Nakata et al., 2018; Salzmann & Kock, 2020).

As logical as this sequential process may seem, von Hippel and von Krogh (2016)'s approach to managerial thinking presents a major challenge to the causal ordering. If managers often cannot determine the problem to be solved until they see the solution, then the critical context and strategy step managers undertake may not happen until *after* the product is designed. That is, managers may have only a vague notion of their context and strategy at the start of a product development process, which may be reinterpreted once a solution is found. Empirically, it will appear that context and strategy constructs will *mediate* the link between the product attributes and the financial success of the product.

The role of design thinking also challenges the apparently straightforward causal sequence of Luchs and Swan (2011)'s model. If managers often respond to the specific attributes of the proposed designs, much of the work of design cannot happen until an initial, rough, or tentative design, or even a prototype is provided to managers who then shift their context and strategy to suit. Designers might want to start from a clear and insightful brief and move forward in the process, but they may know all too well that the process will lead nowhere if the client is not open, trusting, and willing to take a risk. These alternative perspectives of managers and designers are summarized in Figures 1 and 2—based on the significance of one-

way effects and the variables' interactions—and will be reviewed in detail with hypotheses

formed around them. The managerial thinking approach will be dealt with first.
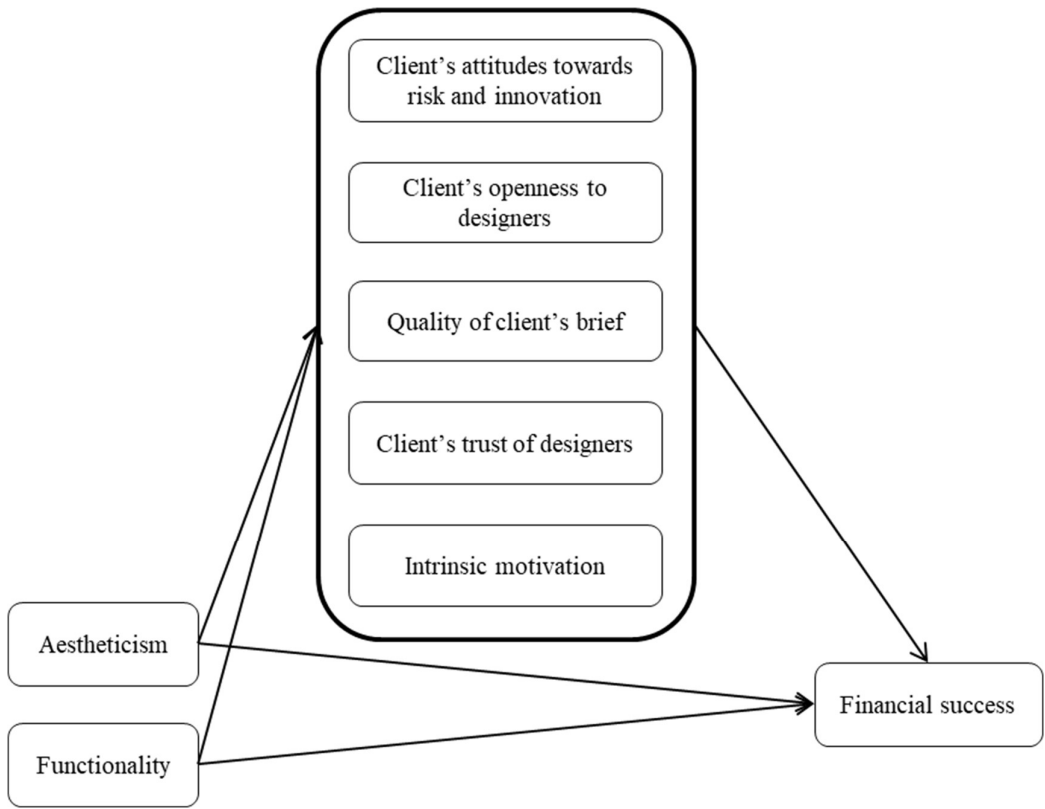
Figure 4: Managers' framework
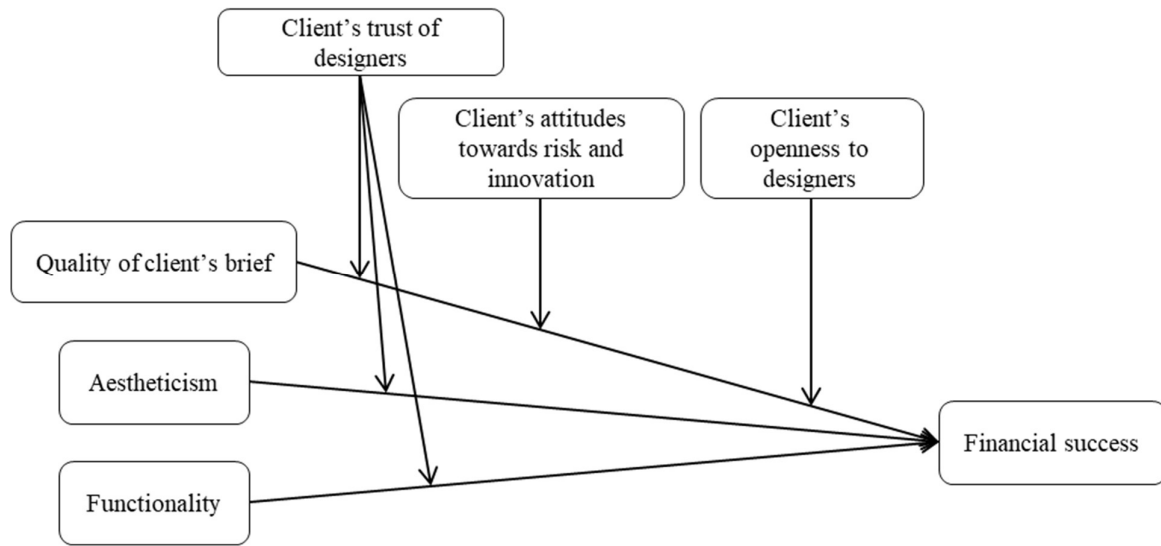
Figure 5: Designers' framework

Managerial Thinking on Design Attributes, Attitudes, and Success

If the causal sequence for managers starts (or rather, *restarts*) with the attributes that designers incorporate in the product design and its development, one way to think about this reinterpretation is the updating of attitudes towards changes. That is, design attributes predict managerial attitudes and then product development success.

For example, Damanpour (1991)'s meta-analysis identified positive managerial attitudes towards changes as an important precursor to subsequent innovation and success. If designers do come up with designs for which managers can see the problems they solve, managerial attitudes towards changes may suddenly turn positive. Managers who might have previously had some hesitancy (Biyalogorsky et al., 2006) may see that the proposed designs have a good likelihood of success and buy into the process. These positive attitudes towards changes would then predict the success of the design process much more than before. That is,

the casual ordering will start with product attributes, followed by changes in managerial attitudes towards changes, and finally design success.

Positive attitudes towards changes can take a number of forms in the product development process. In Luchs and Swan (2011)'s model, they specify two critical steps, the first being the client firm's development of strategies and the formation objectives. Once that step is resolved, the next is how client managers engage with an outside partner like a design firm. For the initial step, positive attitudes towards changes may take the form of positive attitudes towards the overall risks (e.g., Carson, 2007; Douglas & Shepherd, 2000) associated with creative and innovative designs. That is, firms may report that they are willing to take risks to develop creative ideas and innovative products so that they can lead the market (Dotzel & Shankar, 2019; A. K. Gupta, Raj, & Wilemon, 1986; Sorescu & Spanjol, 2008). For the second step, engaging with a design firm, positive attitudes towards changes may take the form of openness to and supportiveness of the designers seeking out and exploring the best designs (Laursen & Salter, 2006; Stock, 2014) to be competitive or pioneer in the market (Min, Kalwani, & Robinson, 2006; Sanchez, 1995).

To be sure, the causal chains proposed are a form of hindsight bias (e.g., Bukszar & Connolly, 1988; Hoffrage, Hertwig, & Gigerenzer, 2000). When managers are working through an innovation process and see the design attributes (i.e., form and function), they update their knowledge and tend to perceive their updated attitudes as their original ones. But empirically, these attitudes will mediate between the product attributes and the financial success of the product.

H1: For marketing managers (or in managerial thinking), managers' willingness to take risks and innovate will mediate the relationship between the design attributes (form and function) and the financial success of the product.

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H2: For marketing managers, their openness to proposed designers' solutions will mediate the relationship between the design attributes (form and function) and the financial success of the product.

Managerial Thinking and the Ego-Centric Value of Briefs, Trust and Motivation

Positive attitudes towards changes are not the only area in which, hindsight bias can emerge. If clients are presented with a design that suggests a novel problem that can be solved, then it is reasonable for managers to infer that their brief to the designers must have been a good one—it certainly got the managers to where they wanted to be. Yet, because design briefs provided by clients are fairly formalized and objective (see Ban & Hyun, 2020; Bruce & Daly, 2007; Haines-Gadd et al., 2015), one might assume that hindsight bias will be less. However, we propose that managers will be fairly ego-centric and give themselves credit for coming up with the solution (e.g., Hattula et al., 2015)—even though designers were the ones who actually developed the design and showed managers something better was possible. Thus, the following hypothesis is proposed:

H3: For marketing managers, the quality of the brief will mediate the relationship between the design attributes (form and function) and the financial success of the product.

To extend the ego-centric perspective further, we refer to scholarship on trust in a collaborative relationship (Fang, Palmatier, Scheer, & Li, 2008; Mangus, Jones, Folse, & Sridhar, 2020) like between managers and designers. Hagedoorn (2006) suggests that client

firms in a collaborative relationship often have difficulty trusting partner firms, not so much because the partner is not committed, capable or motivated, but rather because client firms do not want to cede control to outsiders. So conflicted are some managers that they often report paradoxically that they both trust their designers, and they do not trust their designers (e.g., Alpenberg & Scarbrough, 2018; Dayan, Di Benedetto, & Colak, 2009). That is, clients might accept that their designers have goodwill towards them, but they do not entirely trust their designers' capabilities—until clients receive a design they think will work, which is not *really* the trust in a literal sense of the word (see Moorman, Zaltman, & Deshpande, 1992). Marketing managers tend to give themselves credit for their outstanding brief, rather than trusting designers. Therefore, we offer the hypothesis:

> H4: For marketing managers, lack of trust will mediate the relationship between the design attributes (form and function) and the financial success of the product.

Finally, creativity theory in design (e.g., Amabile, Collins, et al., 1996) suggests that intrinsic motivation is a key factor in predicting creativity. Offering extrinsic motivation is usually harmful to creativity in that when a reward is on offer (Andrews & Smith, 1996; Burroughs, Dahl, Moreau, Chattopadhyay, & Gorn, 2011; Malek, Sarin, & Haon, 2020) because those doing the creating tend to game the reward system rather than be genuinely creative (Hofstetter, Zhang, & Herrmann, 2018; Z. J. Zhao & Chadwick, 2014). Creating is often considered such a difficult task, it takes a great deal of effort to keep at such a seemingly impossible task, unless one actually appreciates the process or goal for its own sake, that is, is intrinsically motivated. In a product development context, Amabile and Pratt (2016) find that this intrinsic motivation could be as subtle as making progress a development goal, and in the case of marketing managers, this could be as straightforward as writing out the brief. Although

in Luchs and Swan (2011)'s model, intrinsic motivation of managers would likely be related to team performance or dynamic capabilities at an early stage in the development process, empirical survey data will again show a different causal ordering in that intrinsic motivation fits into a mediation relationship:

> H5: For marketing managers, intrinsic motivation will mediate the relationship between the design attributes (form and function) and the financial success of the product.

The Design Thinking Underlying Briefs and Trust

Although marketing managers have followed a moderation model driven by hindsight bias consistent with von Hippel and von Krogh (2016), designers act in ways that seem closer to Luchs and Swan (2011)'s conventional model—but with a few caveats. Instead of a model that has largely linear effects, we propose a number of interactions consistent with the difficult position designers face with clients. Well aware of the client's inertia/fixedness (Biyalogorsky et al., 2006) and inability to see problems until solutions are presented (von Hippel & von Krogh, 2016), the kind of theoretical landscape seen by designers is conditional on the willingness of clients to follow a development process that starts with a good brief and relies on the expertise of designers. Further, developing products with excellent design attributes should lead directly to financial success (e.g., Calantone, Chan, & Cui, 2006; Y. L. Zhao, Libaers, & Song, 2015), but for designers, this is still conditional on the trust clients place in them.

A problem-solving perspective to the design process is fairly traditional and therefore, Luchs and Swan (2011)'s model emphasizes many steps that need to be completed successfully

to arrive at financial success. In this context, the value of a good brief on ultimate success should be straightforward (see Ban & Hyun, 2020; Haines-Gadd et al., 2015). But the difficult position that designers have means that they may not believe clients will actually implement good designs even if designers develop what—from their perspective—is a good design.

Ironically, designers will not be able to know objectively whether the brief focuses on the correct problem because managers often cannot see that. But designers can see the reaction of managers. Therefore, designers will see that the value of a quality brief will only be fulfilled if clients display positive attitudes in response to what designers recommend. Three concepts already discussed on the client-side of the theory are the client's positive attitudes towards risk, as well as their trust of and openness to designers. In each case, the value of the brief will not be recognized unless designers also "feel" that clients signal willingness to accept what has been recommended. Thus, we proffer three hypotheses:

> H6: For designers (or in design thinking), the quality of the brief and client trust interact such that only when both are high does higher financial success follow.
>
> H7: For designers, the quality of the brief and client risk attitudes interact such that only when both are high does higher financial success follow.
>
> H8: For designers, the quality of the brief and openness to designers interact such that only when both are high does higher financial success follow.

Although product designs with strong attributes should lead to financial success (e.g., Calantone et al., 2006; Jindal et al., 2016), much still depends on the managers' abilities to see the value of the attributes. Often functionality of the product is difficult for managers to see given their functional fixedness (von Hippel & von Krogh, 2016) regarding what products in their category are expected to look like. This might be even worse regarding managers'

inability to appreciate the aesthetic nature of some designs. Hence, the value of the product attributes is enhanced by the trust of the designer, and we offer these hypotheses:

H9: For designers, the functional quality of the product design interacts with the client trust of designers such that when both are high, financial success follows.

H10: For designers, the form or aesthetic quality of the product design interacts with the client trust of designers such that when both are high, financial success follows.

METHODOLOGY

Our method focused on two quantitative survey-based studies, one of professional award-winning product designers and the other of professional product/marketing managers. However, as a pretest for these, we also performed depth interviews with professionals involved in product development. We conducted face-to-face interviews with 23 designers and 12 managers in Australia. An additional 5 designers and 7 managers from Europe, also 6 designers and 9 managers from North America were interviewed via video conference. Interviews sought to find the most influential factors on the process outcomes, and to do so, we applied a qualitative Delphi method (see Greason, 2018), besides thematic coding and analysis (see Jones, Coviello, & Tang, 2011) to reach the most important variables and the research framework. Then, we developed a questionnaire based on the literature that also drew on the words and phrases of our interview participants to be consistent with respondents' jargon. Next, we administrated the survey questionnaire—with the same questionnaire for both designers and managers. These steps were taken to increase the validity and control common-method variance, systematic and random errors, casual inference, and other possible related

biases (see Hulland, Baumgartner, & Smith, 2018; Rindfleisch, Malter, Ganesan, & Moorman, 2008).

In both the managers' and designers' studies, five independent variables finally, were measured along with two attributes of products, specifically their form and function (i.e., aestheticism and functionality), plus the dependent variable (financial success). The key concepts were inspired by Luchs and Swan (2011)'s model, however, we developed the research scales based on reviewing the prior research to find the key influential factors in the product development success and refining them by indirect questioning in the qualitative interviews. The eight scales measured are listed in Table 1. For the first five scales, their development was based on both the literature listed in Table 1, but also from the words and phrases used by interview participants. For the last three, these were based mostly on the literature listed in the table. The exact wording used in the scales is presented in the factor analysis findings for designers and managers below (Tables 2 and 5). It is notable that from the designers' perspective, client attitudes towards risk and innovation, trust, and openness, were measured as their perceptions. It also should be noted that a 5-point Likert scale where 1 = *Strongly disagree* and 5 = *Strongly agree* was used. The order of items was also randomized.

Variables	References
Intrinsic motivation	Adapted from Sasser and Koslow (2012), Amabile, Collins, et al. (1996), Andrews and Smith (1996), & Burroughs et al. (2011).
Quality brief for the product development	Inspired by Koslow, Sasser, and Riordan (2006) & Bruce and Daly (2007).
Client attitudes towards risk and innovation	Inspired by West (1999), Nakata et al. (2018), J. Kim, Kim, Garrett, and Jung (2015), A. K. Gupta et al. (1986), & Salomo, Weise, and Gemünden (2007).
Clients' trust of designers	Inspired by J. B. Smith and Barclay (1997), Moorman et al. (1992), Dwyer, Schurr, and Oh (1987), Schleimer and Faems (2016), & Pemartín, Rodríguez-Escudero, and Munuera-Alemán (2018).
Clients' openness	Inspired by Dewar, Whetten, and Boje (1980), Laursen and Salter (2006), & Stock (2014).
Aesthetics/Form	Adapted from Homburg et al. (2015) & inspired by Sonderegger and Sauer (2015).
Functionality	Adapted from Homburg et al. (2015).
Financial success	Adapted from Nakata et al. (2018), Griffin and Page (1996), & Ledwith and O'Dwyer (2009).

Table 7: Established Scales Used in Our Scale Development

Study 1: Professional Designers

Data Collection

To identify an appropriate sampling frame, we first compiled a list of worldwide professional award-winning product/industrial designers who either won major design awards or served on the juries (who also are among the former award winners) selecting award winners (Rogan, 2014; Xia, Singhal, & Peter Zhang, 2016). To find award winners and jury members, we used seventeen online databases where such individuals were listed. We also directly searched online to find additional designers who have won related national or international awards. Moreover, we searched online to find at least one contact address for each person. These steps took around six months in 2019 and resulted in 852 potential participants with their contact addresses. We only could not find any contact information for 65 designers from the list.

The majority of potential respondents were from major design-focused countries: US, 91 (21.6%); Italy, 40 (9.5%); Germany, 37 (8.8%); UK, 26 (6.2%); and China, 25 (5.9%). Other countries represented include Japan, Canada, Australia, Sweden, and France each with 12 (2.8%) respondents; and also the Netherlands, Hong Kong, and Brazil each with 10 (2.4%); as well as India with 9 (2.1%); Spain with 8 (1.9%); Argentina, Denmark, and Finland each with 6 (1.4%); Austria, Switzerland, Taiwan, and Turkey each with 5 (1.2%).

We sent the questionnaire with an invitation message in English to them during a ten-month period from November 2019 to the end of August 2020. Each invitation message was followed by up to two follow-up messages in case we had not received any response from them, and we stopped following ups after collecting 400 completed questionnaires. In addition, for contacting the target respondents, LinkedIn, email, Instagram, Facebook, and Twitter were used (see Dushnitsky, Piva, & Rossi-Lamastra, 2020; Nagaraj et al., 2020).

We explained to the potential respondents that we want to know about the development/design process of successful products and requested that they answer the questions in consideration of three successful product development/design projects that they recently have worked on (3 × 420 = 1260 products). Appendix 1 shows all the product categories and mentioned brands.

Finally, out of the 787 targeted designers, we collected 420 completed questionnaires. Five target respondents said that cannot read English and 54 declined to answer the questions due to time limitations, security considerations, and other issues. We are also sure that 83 target designers did not see any of the messages (e.g., our LinkedIn messages had not been seen). The rest did not reply to our messages at all. Our net response rate is thus 65.5%.

Demographically, the designer sample was majority male (66.6%) and the median experience was 10-15 years. About 22.6% were less than 30, with another 35.2% between 31 and 40, while 25% were 41-50. Most were well educated in that 41.4% held a master's degree, and 47.3 held an undergraduate degree.

Measurement

The items for the constructs were factor analyzed to confirm their structure which is presented in Table 2. All but one loading is above .7 and no off-loading was greater than .3. Average Variance Extracted (AVE) for each variable ranges from .55 to .67 and thus above 0.5 (Fornell & Larcker, 1981; Voorhees, Brady, Calantone, & Ramirez, 2016) and exceeds the Maximum Shared Variance (MSV) that approves the convergent validity (Y. Tang & Marinova, 2020). Cronbach's alpha ranged from .785 to .889.

	Intrinsic motivation	Functionality	Aesthetics	Quality of client's brief	Client attitudes towards risk and innovation	Client trust of designers	Client openness to designers
Working on that project was motivating and something I really wanted to do.	**0.805**	0.144	0.247	0.090	0.122	0.072	0.075
Working on that project was personally rewarding.	**0.771**	0.129	0.144	0.085	0.151	0.103	0.132
Working on that project was interesting.	**0.812**	0.177	0.201	0.042	0.183	0.057	0.108
The project was engaging.	**0.814**	0.167	0.137	0.087	0.169	0.191	0.119
The design improved product performance.	0.111	**0.775**	0.114	0.057	0.109	0.113	0.053
The design made the product more capable of doing its job.	0.102	**0.816**	0.082	0.070	0.045	0.080	0.105
The design resulted in better/more appropriate product functionality.	0.220	**0.816**	0.144	0.031	0.033	0.104	0.124
The design enhanced the product's practicality.	0.117	**0.812**	0.146	0.011	0.028	0.087	0.055
The product design was good-looking.	0.191	0.164	**0.833**	0.035	0.011	0.110	0.075
The product design looked appealing.	0.166	0.165	**0.813**	-0.033	0.075	0.221	0.124
The product design was visually striking.	0.153	0.094	**0.789**	0.096	0.117	0.127	-0.070
The product design had appealing materials/textures or components.	0.148	0.095	**0.748**	0.068	0.037	0.005	0.151
The client's brief clearly explained project challenges to the designers.	-0.023	-0.003	0.127	**0.815**	0.105	0.024	0.081
The client's brief clearly identified the desired business outcomes.	0.109	0.043	0.028	**0.755**	0.021	0.063	0.134
The client's brief was clear in terms of required design outcomes.	0.068	0.068	0.061	**0.811**	0.131	0.028	-0.031
The brief the client provided contained a clear overall direction.	0.092	0.048	-0.053	**0.760**	0.099	0.064	0.138
Product managers (clients) were willing to take risks for developing more creative ideas.	0.184	0.055	0.141	0.132	**0.820**	0.108	0.232
Product managers (clients) were inclined to take risks for increasing innovative product outcomes.	0.136	0.085	0.024	0.172	**0.811**	0.138	0.239
Product managers (clients) were motivated to lead the market innovatively.	0.220	0.058	0.044	0.084	**0.787**	0.079	0.066

Product managers (clients) could count on designers' decision-making.	0.122	0.139	0.203	0.034	0.224	**0.741**	0.079
Product managers (clients) had faith in the designers' practical abilities to get results.	0.134	0.136	0.087	0.117	0.127	**0.785**	0.194
Product managers (clients) could rely on the designers to overcome design ambiguities/uncertainties.	0.095	0.101	0.118	0.038	-0.003	**0.818**	0.145
Product managers (clients) were willing to explore new creative ideas.	0.155	0.095	0.147	0.132	0.454	0.098	**0.663**
Product managers (clients) were open to the designers' suggestions.	0.092	0.154	0.112	0.114	0.276	0.215	**0.769**
Product managers (clients) supported sharing various new ideas.	0.224	0.150	0.070	0.186	0.097	0.215	**0.751**
Cronbach's alpha	0.889	0.853	0.859	0.814	0.848	0.785	0.800

Table 8: Loading for Designers

The dependent variable, Financial success, is made up of four items (i.e., the product design increased: sales, market share, profit, and return on investment) using the same five-point scale as the independent variables. This loads on a single factor explaining 78.0% of the variance. Loadings range from .854 to .905, with a Cronbach's alpha of .905. Besides, heterotrait-monotrait (HTMT) ratio of correlations—with cut-off values below 0.85 (shown in Table 3)—that recently is applied in the related studies also indicates sufficient evidence of the discriminant validity (smaller than 1 or below 0.85) (Henseler, Ringle, & Sarstedt, 2015; Voorhees et al., 2016).

HTMT for Designers	Intrinsic motivation	Client attitudes towards risk and innovation	Client trust of designers	Client openness towards designers	Aestheticism	Functionality	Financial success
Intrinsic motivation							
Client attitudes towards risk and innovation	0.501						
Client trust of designers	0.427	0.414					
Client openness towards designers	0.498	0.721	0.586				
Aestheticism	0.515	0.279	0.438	0.362			
Functionality	0.452	0.256	0.399	0.384	0.406		
Financial success	0.287	0.179	0.340	0.236	0.336	0.632	

Table 9: HTMT for Designers

Findings

To analyze the data, ordinary least squares (OLS) regression was used in a stepwise manner and the final model is presenting in Table 4 as Model 2. All two-way interactions were considered in the model and only the ones significant at $a=.05$ were included. There are four interactions in the final model, of which three support hypotheses. In Model 2, there are three

significant one-way effects of the functionality and aestheticism of products, but also the client's trust in designers. Three more factors are involved in significant interactions. Model 1 is included to demonstrate that there is no mediation structure obvious in the data.

Independent variables	Financial success	
	Model 1	Model 2
Intercept	0.000	-0.045
Functionality	0.317***	0.292***
Aestheticism	0.184***	0.134**
Quality of client's brief		0.009
Client attitudes towards risk and innovation		0.023
Client openness to designers		0.013
Client trust of designers		0.152**
Functionality X Client trust of designers		0.151***
Quality of client's brief X Client attitudes towards risk and innovation		0.087*
Quality of client's brief X Client trust of designers		0.128**
Client trust of designers X Client openness to designers		-0.106*
R^2	.175	.249

Table 10: OLS Regression Parameters for Designers

H6 argued that both the quality of the client's brief and client trust of designers needed to be high in order to influence financial success. The corresponding interaction is significant, and the mean levels are plotted in Figure 3. To interpret the figure, the means are estimated for four conditions. The high and low conditions for the Quality of the client's brief variable are for one standard deviation above the mean and one standard deviation below the mean. The high and low conditions for Client trust of designers are also for one standard deviation above the mean and one standard deviation below the mean. The figure shows that only when the brief is considered of good quality does trust in the designers have a positive effect on Financial success. Thus, H6 is supported.
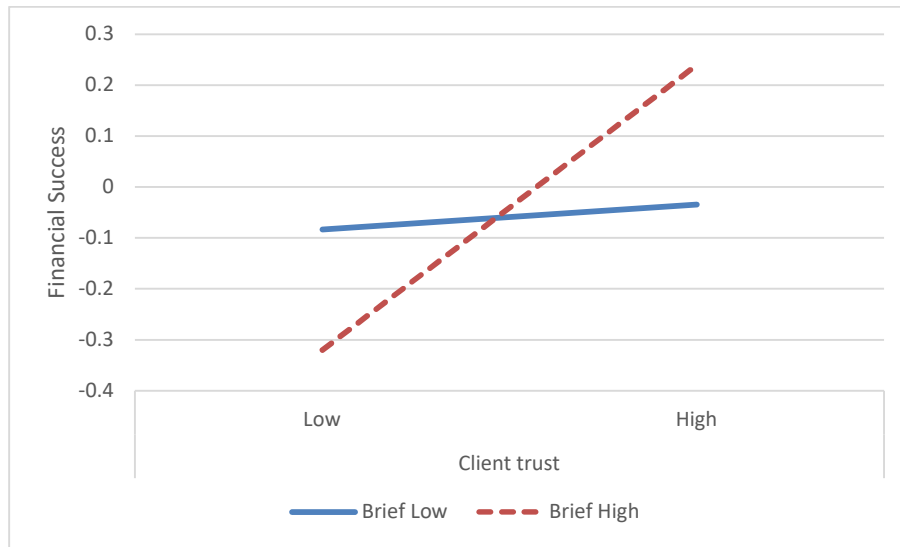
Figure 6

The next hypothesis, H7, suggested an interaction similar to H6 in that only when the quality of the client's brief is high does positive client attitudes towards risk and innovation lead to financial success. Again, the line in Figure 4 is upward sloping only when the brief quality is high as well. Therefore, H7 is supported.
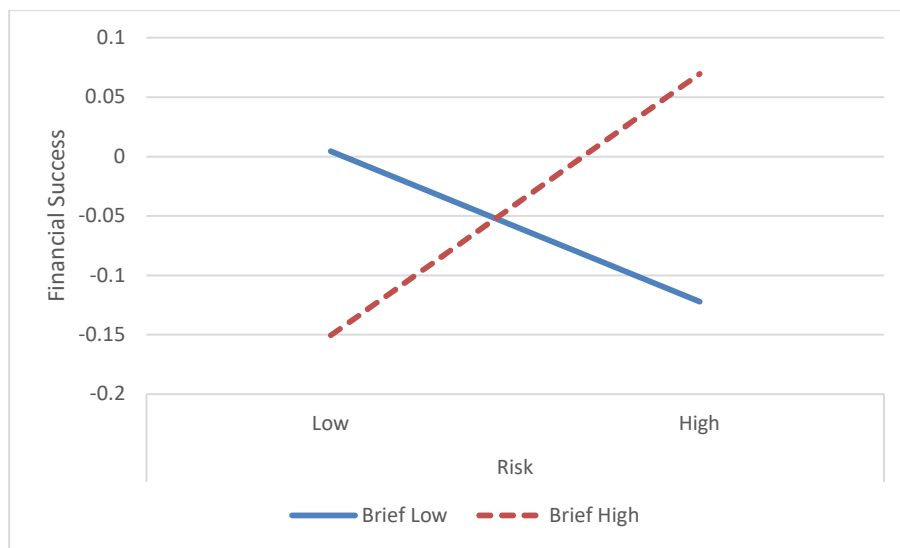
Figure 7

In a third, similar hypothesis, H8, it was proposed that when the brief is high that openness to designers increases financial success. The corresponding interaction is not

significant, nor is the one-way effect for client openness to designers. As a result, H8 is not supported.

In H9, it was argued that there should be an interaction between the functionality of products and client trust in the designer and this was found to be significant. Figure 5 shows the mean levels of the four conditions. The figure shows that only when trust is high, does a high-quality brief result in higher levels of financial success. This supports H9.
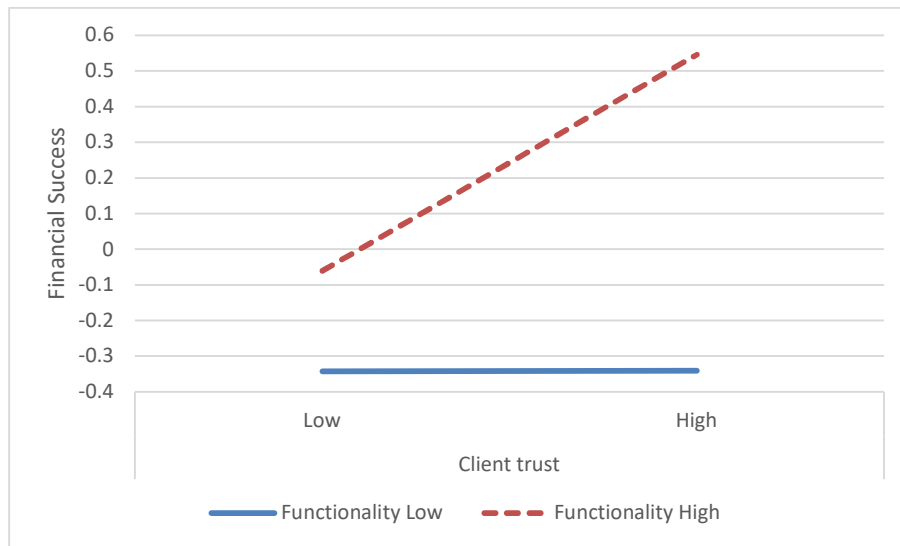
Figure 8

For H10, it was also argued for an interaction between the aestheticism of products and the client trust of the designers. This result was not found and therefore, H10 is not supported.

One more interaction was found and it was not expected. This is shown in Figure 6 and it involves both client trust of designers as well as client openness to designers. The figure shows that only when client openness to designers is low, does client trust in designers have a positive influence. Alternatively, when clients are open to designers, trust is not needed to lead to financial success.

Figure 9

Study 2: Marketing Managers

Following the first study's processes, we applied the same variables including identical question items and scales as used for the designers—only with changing the pronouns and a few words as needed.

Data Collection

For collecting data, we cooperated with one of the best international online panel data providers (see Porter, Outlaw, Gale, & Cho, 2018). The managers were from two major design-focused countries, the UK (206 responses, or 51.3%), and the US (196 responses, or 48.7%). We also used a screening question for them "*We/I used external/in-house professional designers to develop these three recent successful projects*".

The product categories managers mentioned are very similar to the designers. Appendix 2 shows all the product categories and mentioned brands. It should be noted that all of the

professional designers design for different producers, thus, in comparison with managers, designers more freely state the companies/brands they have designed for.

During three months from August 2020 to the end of October 2020, the questionnaire has been sent to 654 professional product/marketing managers of major brands, regularly involving in new product development and we stopped data gathering after attaining 402 (n = 402) completed questionnaires, for a 61.5% response rate. Just over half of the respondents (57.7%) were male. The modal level experience was 5-10 years, with 29.8% of the sample at this level, another 17.1% had 10-15 years, and 15.4% had 15-20 years. The modal age was 31-40 years with 29.8% of the sample at this level, while 21.8% were 41-50, and 18.6% were 51-60. The majority had a degree of some kind, with 36.3% having a bachelor's and 25.3% having a master's.

Measurement

The same items were used and the same structure was identified as in the designer's study. The loadings are in Table 5. All loadings are above .6, and the off-loadings are modest with the highest at .354. The AVE for each variable is higher than 0.5 and above MSV, ranging from .589 to .708

	Functionality	Aesthetics	Intrinsic motivation	Quality of client's brief	Client attitudes towards risk and innovation	Client openness to designers	Client trust of designers
The design improved product performance.	**0.778**	0.253	0.145	0.211	0.157	0.108	0.119
The design made the product more capable of doing its job.	**0.768**	0.118	0.225	0.140	0.220	0.055	0.156
The design resulted in better/more appropriate product functionality.	**0.732**	0.166	0.222	0.278	0.125	0.159	0.139
The design enhanced the product's practicality.	**0.698**	0.194	0.150	0.138	0.156	0.233	0.159
The product design was good-looking.	0.204	**0.704**	0.206	0.152	0.174	0.272	0.136
The product design looked appealing.	0.247	**0.752**	0.227	0.137	0.085	0.262	0.063
The product design was visually striking.	0.112	**0.706**	0.232	0.071	0.185	0.254	0.115
The product design had appealing materials/textures or components.	0.214	**0.676**	0.114	0.191	0.231	-0.075	0.295
Working on that project was motivating and something I really wanted to do.	0.274	0.220	**0.715**	0.234	0.256	0.047	0.201
Working on that project was personally rewarding.	0.233	0.233	**0.629**	0.239	0.208	0.125	0.266
Working on that project was interesting.	0.220	0.216	**0.690**	0.264	0.145	0.315	0.151
The project was engaging.	0.190	0.250	**0.721**	0.256	0.152	0.154	0.154
The client's brief clearly explained project challenges to the designers.	0.185	0.250	0.164	**0.711**	0.254	-0.045	0.234
We/I clearly identified the desired business outcomes in the brief.	0.193	0.063	0.174	**0.738**	0.231	0.354	-0.052
Our/my brief was clear in terms of required design outcomes.	0.237	0.126	0.315	**0.697**	0.095	0.214	0.195
The brief we/I provided contained a clear overall direction.	0.254	0.149	0.313	**0.637**	0.048	0.187	0.205
Our/my company was willing to take risks for developing more creative ideas.	0.132	0.180	0.184	0.194	**0.777**	0.100	0.109
Our/my company was inclined to take risks for increasing innovative product outcomes.	0.199	0.165	0.120	0.126	**0.761**	0.237	0.173
Our/my company was motivated to lead the market innovatively.	0.205	0.164	0.176	0.115	**0.799**	0.143	0.118
Our/my company was willing to explore new creative ideas.	0.178	0.139	0.210	0.191	0.372	**0.622**	0.262
Our/my company was open to the designers' suggestions.	0.156	0.267	0.216	0.152	0.091	**0.716**	0.208

Our/my company was supported designers for sharing various new ideas.	0.180	0.259	0.069	0.229	0.235	**0.694**	0.221
We/I could count on designers' decision-making.	0.193	0.184	0.262	0.259	0.190	0.336	**0.622**
We/I had faith in the designers' practical abilities to get results.	0.221	0.232	0.304	0.164	0.141	0.343	**0.655**
We/I could rely on the designers to overcome design ambiguities/uncertainties.	0.251	0.211	0.211	0.144	0.239	0.201	**0.690**
Cronbach's alpha	0.875	0.844	0.887	0.853	0.850	0.827	0.846

Table 11: Loadings for Managers

The dependent variable, Financial success, was an identical four-item one that was used for designers. These four items loaded on a single scale explaining 74.9% of the variance, and the loadings range from .839 to .893, with a Cronbach's alpha of .89. Furthermore, the HTMT ratio of correlations—with cut-off values lower than 0.85 provides a sufficient discriminant validity (shown in table 6).

HTMT for Managers	Intrinsic motivation	Client attitudes towards risk and innovation	Client trust of designers	Client openness towards designers	Aestheticism	Functionality	Financial success
Intrinsic motivation							
Client attitudes towards risk and innovation	0.638						
Client trust of designers	0.807	0.660					
Client openness towards designers	0.759	0.713	0.776				
Aestheticism	0.746	0.625	0.740	0.757			
Functionality	0.722	0.605	0.707	0.666	0.676		
Financial success	0.554	0.728	0.573	0.642	0.610	0.726	

Table 12: HTMT for Managers

Findings

As with the designer sample, OLS regression was used in a stepwise manner with the final models presented in Table 7. All interactions were tested and only two were significant at a=.05. Additional models in Table 7 were fit to demonstrate mediation. To show mediation several conditions need to be met: 1) the independent variables will affect the mediator, 2) the independent variables affect the dependent variables when the mediator is not included in the model, 3) the mediator has a significant and unique effect on the dependent variable, and 4) the

influence of the independent variable shrinks when the mediator is added to the model. This

occurs at a one-way level for H1, H2, and H3, but in a more complex way for H4 and H5

Independent variables	Quality of client's brief	Client attitudes towards risk and innovation	Client openness to designers	Client trust of designers	Intrinsic motivation	Financial success	
						Model 1	Model 2
Intercept	0.000	0.000	0.000	0.000	0.000	-0.009	-0.009
Functionality	0.459***	0.322***	0.282***	0.369***	0.393***	0.300***	0.100*
Aestheticism	0.269***	0.345***	0.450***	0.412***	0.418***	0.390***	0.171***
Quality of client's brief							0.109*
Client attitudes towards risk and innovation							0.392***
Client openness to designers							0.127*
Client trust of designers							-0.065
Intrinsic motivation							0.066
Quality of client's brief X Client trust of designers							-0.087*
Quality of client's brief X Intrinsic motivation							0.090**
R^2	.427	.351	.489	.483	.521	.379	.539

Table 13: OLS Regression Parameters for Managers

The assessment of H1, H2 and H3 will be discussed together. These hypotheses propose mediation effects linking product functionality and aestheticism with financial success. H1 addresses how the client's willingness to take risks and innovate mediates, H2 relates to client openness, and H3 for the Quality of the client's brief. To show the first condition of mediation, three models in Table 7 use product attributes (functionality and aestheticism) to predict Client attitudes towards risk and innovation, Client openness to designers, and Quality of client brief. For the second condition of mediation, Model 1 of Table 7 shows that both Functionality and Aestheticism influence Financial success. To demonstrate condition three, Table 7 also shows that in Model 2, each of these three variables significantly influences Financial success. Finally, condition 4 is met in that the influence of both Functionality and Aestheticism decline when comparing Model 1 and Model 2. A Sobel test confirms the fourth condition at a=.05 for Functionality for all three variables, but for Aestheticism, the condition is confirmed only for Client attitudes towards risk and innovation and Client openness to designers. For the Quality of the client brief, the Sobel test was significant at a=.056. Thus, H1 and H2 are confirmed, but H3 is confirmed only for Functionality, and marginally for Aestheticism.

To address H4 and H5, both involve interactions, which are presented in Figures 7 and 8. Figure 7 shows that only when the Quality of the client's brief is high does one observe the hypothesized negative relationship between Client trust of the designer. Figure 8 shows a somewhat similar story in that only when the Quality of the client's brief is high is there the hypothesized positive influence of intrinsic motivation.

Figure 10
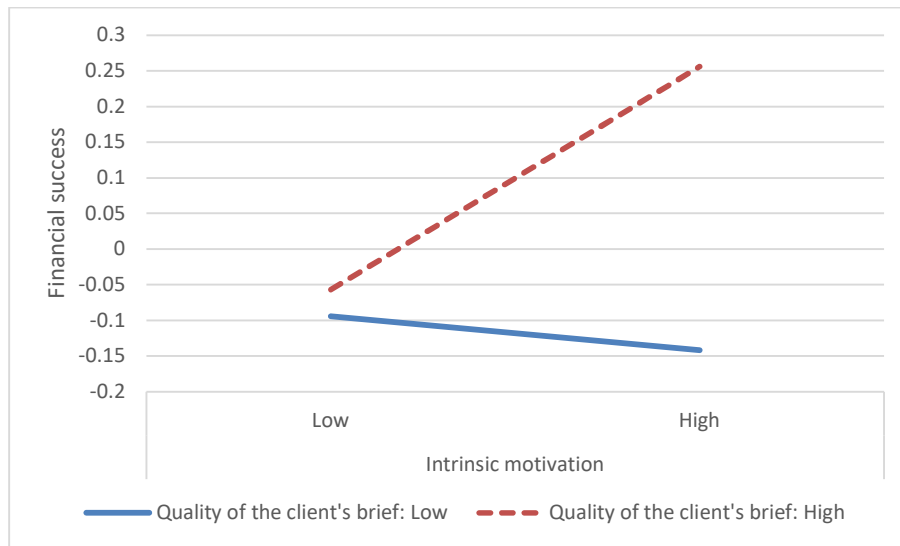
Figure 11

To address the mediation structure, we again consider the four conditions. For the first three, it is straightforward to show support. Table 7 shows significant effects of both Functionality and Aestheticism on Client trust of designers and Intrinsic motivation as is also the case that Functionality and Aestheticism influence Financial success. For the third condition, Figures 7 and 8 show the influence of the two mediating variables, but only on a

conditional basis. Regarding the fourth condition, again, Functionality and Aestheticism both influence Financial success in Model 1, and this influence reduces in Model 2. The mediation effect can also be confirmed through a Sobel test. The *p*-value for this test ranges from .056 to .059, which means that there is only marginal support for H4 and H5, and that both are also conditional on the client's brief being high quality.

DISCUSSION AND CONCLUSION

Through two studies we have shown how marketing managers and product designers have different approaches to or "strategic landscapes" of the product development process. Designers view the process as conditional on both the client's brief and the trust clients place in them—two factors that all designers expressed in the interviews. Products with a better aesthetic and functional attributes did lead to more financial success (Calantone et al., 2006; Y. L. Zhao et al., 2015), but primarily for those managers who come to openly support the designer's role in the product development process.

However, for marketing managers, there is a clear mediation processing underlying the data. Marketing managers act as if they form their attitudes only once they can see the proposed products' functional and aesthetic attributes, an issue von Hippel and von Krogh (2016) had proposed regarding managers' limitations in the problem formulation.

The contrast in causal structure is striking. Managerial thinking and design thinking do seem to be different representations of the product design process, very much two distinct ways of thinking. Our initial objective was to compare product designers' views on the process with managers', however, the results led us well beyond this. Product designers and managers—as two main business-to-business (B2B) partners in the marketing field—answered the same questions starkly differently.

The pattern of results draws on many concepts: bounded rationality (Simon, 1955), functional fixedness of managers (von Hippel & von Krogh, 2016), egocentrism (Hattula et al., 2015), hindsight (Bukszar & Connolly, 1988) and other biases, and the importance of how managers can overcome those by relying on professionals' proficiencies (A. Sharma, 1997). The role of designers in the product development process has not been considered well in the literature. Instead of teaching design thinking to managers, this research highlights the necessity of more consideration to collaborative trust (Fang et al., 2008) in social exchange (see Blau, 1964) and relational contract (Seshadri & Mishra, 2004) to maximize the absorptive capacity (J. N. N. Chang, 2017) and strategic marketing thinking (Deighton et al., 2020) to gain more success.

In professional relationships, we unfortunately often see that managers sometimes interfere with and attempt to control professional service providers (A. Sharma, 1997). Yet these undermining tactics should be substituted with trust and risk-taking to get to more successful outcomes (Carson, 2007)—assuming, of course, that somewhere in the process someone identifies consumers' needs, expectations, problems, and strategic objectives (Ban & Hyun, 2020; Haines-Gadd et al., 2015).

IMPLICATIONS AND FUTURE RESEARCH

Each party, both designers and managers, should find their proper place in the process (see Luchs & Swan, 2011; Luchs et al., 2016). Managers often cannot put themselves in designers' place and vice versa, so only real collaborative trust can bridge (logical/rational) managerial thinking and (visual/spatial) design thinking to success. Designers should not have to put themselves in managers' roles to find problems. Instead, managers must attempt to find the real problems consumers have with products using insightful market research. They then must

clearly explain those problems in a quality product development brief, so to help designers and trigger their intrinsic motivation to do a great job. Designers' proficiency in problem-solving and imagination does come to the aid of managers—albeit not always in ways managers understand.

It is hard to get away from some level of negativity directed at managers who are unable to conceptualize the consumer problems that need to be solved by the product development process. If managers cannot identify those problems, and if designers cannot figure those problems out for themselves, then designers are merely guessing. Sometimes designers may guess well and find common ground with managers, but sometimes designers do not guess well and the process goes awry. No wonder most new products fail. However, it is difficult to get away from the possibly harsh judgement that managers may well get the product design they deserve, rather than the product design they need.

There are also theoretical implications of this research that are highly interwoven. More attention needs to be paid to the principal-professional theory (A. Sharma, 1997) which may mitigate many problems in attaining success. In the product development process, the hierarchical principal-agent relationship (Eisenhardt, 1989) suppresses innovativeness and market success. Both managers and designers should enhance their awareness of their weak and strong points, also their roles in the process. This simultaneously points out the literature gaps associated with designers' place in the process and the limitations of managers.

Future research desperately needs to find ways to help managers conceptualize problems so they can better inform designers. Marketing scholars have spent decades researching ways to approach the product development process, but surprisingly little attention has been given to how to overcome the conceptualization challenges that managers have.

We seem to live in a troubled world crying out for creativity, and so one aspect of it, design thinking, is elevated to solving the product development problems of managers.

Certainly, design thinking is a useful tool, but it is only a tool. Apply the correct tool to the wrong problem and one gets nowhere. Therefore, if managers first know where they are going in terms of problem formulation, and then the road of design thinking may well lead managers there. Shedding light on the different strategic landscapes of managers and designers leads both practitioners and researchers towards deeper insights on strategic marketing thinking.

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APPENDICES

Appendix 1: Designers' Product Categories and Brands

Main categories	Products	Share	Mentioned brands
Home appliances Total share: 172 = 13.65%	Vacuum cleaner (14 products), refrigerator and fridge (13), mixer/blender (12), air conditioner (10), coffee maker (9), washing machine (9), TV (9), microwave oven (7), oven (7), dishwasher (7), juicer (6), water dispenser (5), air purifier (5), smart home system (4), beverage maker (3), heater (3), hair dryer (3), toaster (3), electric kettle (3), robotic vacuum cleaner (3), water purifier (3), casavitra cooktop (2), radio (2), iron (2), clothes dryer (2), video and system (2), extractor hood (2), beverage dispenser (1), garment steamer (1)	152 products = 12.06%	Bosch (15 products), Dyson (13), SMEG (13), Samsung (10), Delonghi (8), Westinghouse (6), B&O (6), Tefal (5), GE (5), Moulinex (4), Miele (4), Lavazza (4), Sony (3), Panasonic (3), Motorola (2), Black & Decker (2), Gaggenau (2), LG (2), Kenwood (2), Morphy Richards (2), Electrolux (2), Philips (2), Nespresso (2), Muller (2), Karcher (1), Whirlpool (1), Gaggenau (1), Blendtec (1)
	Miscellaneous (kitchenware)	12 = 0.95%	Ikea (7)
	Miscellaneous (Cookware sets)	8 = 0.63%	Tefal (5)
Homeware and household products Total share: 123 = 9.76%	Toy (14), lighting and lamps (12), luggage (9), decorative products (6), sex toy (6), pet product (6), textile (4), cup (4), lampshade (4), stationery (3), tableware (3), luxurious set (3), plates (3), bed and bath set (3), porcelain (2), glassware (2), wine glass (2), vase (1), baby sleeping set (1), baby feeding set (1)	89 = 7.06%	Lego (9), Ikea (5), Delsey (3), American Tourister (2), Samsonite (2), Mothercare (2), Pelikan (1), Sheaffer (1), Barbie (1), Hello Kitty Sanrio (1)
	Miscellaneous (homeware or household)	34 = 2.69%	Ikea (2)
Fashion: apparel and accessories Total share: 115 = 9.12%	Jewellery pieces (12), watch (11), shoes and bag (10), footwear (8), dress (7), knit sweater (5), Jacket (3), glasses frames (3), accessories (3), valet (2), sunglasses (2), umbrella (2), jeans (1), belt (1), suit (1)	71 = 5.63%	Mango (6), Zara (5), Rolex (5), Levi's (4), Gorgio Armani (4), LV (4), M&S (4), YSL (4), D&G (4), Chanel (3), Fossil (3), Ralph Lauren (3), Gucci (3), Lacoste (3), Hugo Boss (3), Pandora (2), Mont Blanc (2), Swatch (2), Omega (2), CK (2), Tom Ford (2)
	Miscellaneous (fashion design)	44 = 3.49	Fendi (5), Mango (4), Burberry (4), Versace (4), Dior (4), Zara (3), M&S (3), D&G (3), Givenchy (3), Bulgari (3), Hermes (3), Timberland (2), Gap (1), YSL (1), Parada (1), LV (1)
Sport products Total share: 88 = 6.98%	Fitness equipment (12), footwear (11), motorcycle (7), sports clothes (6), bicycle (4), backpack (4), treadmill (4), e-bike (4), helmet (3), gun (3), tent (2),	67 = 5.31%	Nike (7), Puma (6), Adidas (6), Yamaha (4), NordicTrack (2), Matrix (1), Hercules (1)

	camping equipment (2), gloves (2), climbing equipment (1), fishing tool (1), kayak (1)		
	Miscellaneous (sport products/accessories)	21 = 1.66	Adidas (4), Nike (3), Puma (3)
Car and transportation Total share: 111 = 8.8%	Car interior and exterior concept design (41), yacht interior and exterior (13), train interior and exterior (7), e-automobile (6), car engineering parts (6), car interior (6), boat interior and exterior (5), car exterior (4), bus interior and exterior (4), crossover (3), public transportation (3), military vehicle/tank (2), flyboat (2), van (2), sports car (2), compact car (1)	107 = 8.49%	Tesla (9), BMW (8), Mercedes-Benz (7), GM (7), Ferrari (7), Maserati (6), Toyota (5), Lamborghini (5), Porch (5), Honda (4), Audi (4), Jaguar (4), Volvo (4), Nissan (3), Volkswagen (3), Fiat (3), Scania (2), Ford (2), Rolls-Royce (2), The Pentagon (2), American Eagle (1), Lurssen (1), Golden Eagle (1), VLocity (1), Bertram (1), MasterCraft (1), Harris Crown (1), Boston Whaler (1), Bulldog (1), Galeon (1), RCD Atelier (1), Princess (1), Alfa Romeo Giulia (1), Renault (1), MiniMiner (1)
	Miscellaneous (accessories: lamps, wiper blade, tire, etc.)	4 = 0.31%	Valeo (2), Bosch (1), Marshal (1)
Med-tech and healthcare devices Total share: 98 = 7.7%	Handicap furniture (7), medical scanner (5), surgical robot (5), respiratory device (5), exoskeleton (4), medical wearable device (4), mother care product (4), medical watch (4), prosthetic arm and leg (4), portable dialysis device (3), MRI scanner (3), device for diabetes (3), inhaler (3), laser surgical equipment (3), PreMie equipment (3), personal test device (3), dermatology laser (2), device for blinds (2), wearable dialysis device (2), dental unit (2), cardiovascular device (2), Phaco-emulsifier surgery equipment (2), remote surgery robot (2), massage furniture (2), hearing aid (2), cardigraph (2), rehabilitation device (2), urine drainage (2), CT injector (2), blood pressure test (1), Ingenia MRI scanner (1), devices for Parkinson's disease (1)	92 = 7.3%	GE (8), Medtronic (7), Royal Philips (7), Fitbit (4), Cardinal Health (2), Bayer (2), Myomo (1), Nipro (2), Alcon (2), Medency (2), CardioTech (2), Accuray (1), Stryker (1), Canon (1), Toshiba (1), Novartis (1), Pfizer (1), Accu-Chek (1), Candela (1)
	Miscellaneous (medical device)	6 =0.47%	GE (1), Medtronic (1)
Packaging, box, or bottle Total share: 56 = 4.44%	Beverage bottle/can (10), food (8), cosmetics (8), hair and skincare (7), healthcare (6), tobacco (4), chocolate (3), perfume (2), cleaning products (2)	50 = 3.96%	Unilever (6), P&G (5), Revlon (4), Pantene (4), British American Tobacco (4), Heineken (3), L'Oréal (3), Schwarzkopf (2), Cadbury (2), Gin (1), Rum (1), Whiskey (1), Dior (1), Chanel (1), Fab (1), Coca-Cola (1), Pepsi (1), Olay (1), Lancome (1), Natura Sou (1), Lindt (1), Dove (1)
	Miscellaneous (packaging)	6 = 0.47%	Unilever (2), P&G (1)
Furniture Total share: 94 = 7.46%	Home indoor furniture (30), office furniture (14), table (9), public furniture (8), dining room furniture (6), outdoor	94 = 7.61%	Ikea (7), Mothercare (5)

	(6), bedroom (4), sofa set (4), baby furniture (4), chair set (3), cradle (3), baby stroller (2), baby car seat (1)		
	Miscellaneous	-	
Interior, architectural design, and accessories Total share: 29 = 2.3%	Tapware and accessories (6), kitchen and cabinet (3), bathroom accessories (3), smart window (1), smart door (2), washing room accessories (2), bath and toilet accessories (2), office/firm interior design (2), fireplace (1), luxurious hotel interior design (1), palace landscape design (1), flooring (1), bank interior design (1), luxurious restaurant interior design (1)	27 = 2.14%	Grohe (6), TOTO (1), Hansa (1)
	Miscellaneous (interior design)	2 = 0.15	
Electronics and digital products Total share: 101 = 8.01%	Digital camera and main accessories (9), telephone (5), smart watch (4), high-tech audio system (3), audio device (3), fan (3), electric toothbrush (2), shaver (2), digital photo frame (2), navigation device/GPS (2), drone (2), power bank (2), digital clock (2), high-tech robot (2), electronic musical instrument (2), e-reader (1), CCTV (1)	47 = 3.73%	Panasonic (5), Nikon (3), Sisco (3), Sony (3), P&G (1), Oral-B (1), Braun (1), Nixplay Iris (1), Kindle (1), DGI (1), Canon (2), Apple (2), Yamaha (2), B&O (2), Anker (1), Aukey (1), Philips (1), GoPro (1)
	Miscellaneous (electronics/digital device)	54 = 4.28%	Sony (3), Samsung (2), Philips (3), Ericson (2), Braun (2), Siemens (2), Dyson (1), Canon (1), Panasonic (1)
Cell phone and related products Total share: 57 = 4.52%	Cell phone (38)	38 = 3.01%	Apple iPhone (17), Samsung (8), Xioami (2), Huawei (2), Nokia (1), Motorola (1), LG (1)
	Main accessories (12), iPod (3), AirPods (2), Earbuds (2)	19 = 1.5%	Apple (6), Samsung (3), B&O (1)
	Miscellaneous (cell phone accessories)	-	
Computer and related equipment Total share: 41 = 3.25%	Mouse and keyboard (8), printer (7), scanner (2), external hard drive (2), headset (5), speaker (4), Wi-Fi modem (2), flash drive (2), gaming equipment (4)	36 = 2.85%	A4Tech (6), Canon (5), HP (4), WD (2), Sony (2), Beats (2), SanDisk (2), JBL (1), Konica Minolta (1)
	Miscellaneous (computer equipment)	5 = 0.39%	IBM (2), Intel (2), Microsoft (1)
Laptop and tablet Total share: 23 = 1.82%	Laptop (13), MacBook (4), ZenBook (3), Galaxy tablet (2), iPad (1)	23 = 1.82	Apple (5), Asus (5), MSI (4), Samsung (2), HP (2), Microsoft (2), acer (2), Lenovo (1)
	Miscellaneous	-	
Application and website Total share: 14 = 1.11%	Application (3), entertainment app (2), mobile app (2), smartphone app (2), e-commerce website (2), healthcare app (1), store app (1), CRM app (1)	14 = 1.11%	Apple (3), Samsung (2), Google (2), Microsoft (1), Amazon (1)
	Miscellaneous	-	
Heavy machinery Total share: 54 = 4.28%	Track (9), construction equipment (9), excavator (8), forklift (6), crane (4), mine mixer (3), loader (3), tractor (2), dozer (2), bridge crane (2)	48 = 3.8%	Caterpillar (12), Mitsubishi (5), CIFA (4), Mammoet (4), Hyundai (4), Crown (3), Toyota Huski (1)
	Miscellaneous (heavy machinery)	6 = 0.47%	Caterpillar (3), Mitsubishi (2), Hyundai (1)
Industrial products Total share: 47 = 3.73%	ICT and communication devices (4), store machinery (3), lawn mower (3), industrial machinery (3), industrial fridge (3), power tool (3), governmental	38 = 3.01%	Bosch (5), NASA (3), Mikita (2), Jordao (1), Zoin (1), HitLine (1), WiFi (1), Mitsubishi Electric

			(1), Konica Minolta (1), Honda (1)
	security device (2), satellite (2), power saw (1), power drill (1), industrial tools (1), driller (1), solar plates (1), storm system (1), alarm system (1), agri-tech equipment (1), aqua-tech equipment (1), repeater (1), elevator (1), beverage dispenser (1), governmental safety device (1), ladder (1), photocopier (1)		
	Miscellaneous (industrial products)	9 = 0.71%	
Aircraft Total share: 22 = 1.74%	Interior (5), seats (4), exterior (3), cabin and seats (3), lavatory (2), interior for 777X (1), exterior for 777X (1), attack helicopter (1), fighter aircraft (1), Vtol electric jet (1)	22 = 1.74%	Boeing (10), Airbus (6), KLM (1)
	Miscellaneous	-	
Unknown Total share: 15 = 1.19%		15=1.19%	

Appendix 2: Managers' Product Categories and Brands

Main categories	Products	Share	Mentioned brands
Home appliances Total share: 196 = 16.25%	Refrigerator and fridge (13 products), washing machine (13), oven (12), hoover (12), coffee maker (10), TV (10), mixer/blender (9), juicer (8), water purifier (7), air conditioner (6), microwave oven (6), smart home system (6), clothes steamer (5), dishwasher (5), air purifier (5), hair dryer (5), electric kettle (4), iron (4), heater (4), toaster (3), food maker (3) cooker (1), boiler (1), electric ice cream scoop (1), portable AC (1), cordless hoover (1)	155 products = 12.82%	Dyson (13 products), Westinghouse (12), Bosch (11), GE (9), Whirlpool (6), Kenwood (5), Philips (3), Tefal (3), Sony (2), Black & Decker (2), Electrolux (2), Nespresso (1), Panasonic (1), B&O (1), Belkin (1)
	Miscellaneous (home appliances)	26 = 2.15 %	Dyson (4), Westinghouse (3), Bosch (3), GE (3), AEG (2), Whirlpool (1), Black & Decker (1), Morphy Richards (1), Indesit (1)
	Miscellaneous (kitchenware)	15 = 1.24%	Tefal (3)
Homeware and household products Total share: 127 = 10.53%	Decorative products (13), toy (12), cutlery (10), sex toy (9), lighting and lamps (9), glassware (8), quilt and pillow set (7), stationery (6), pet product (6), suitcase (5), tableware (5), plates (3), bed and bath set (3), bed sheets (3), textile (3), rug (2)	104 = 8.62%	Philips (7), Lego (5), Samsonite (5), Ikea (3), Parker (3)
	Miscellaneous (homeware or household)	23 = 1.9%	Ikea (2)
Fashion: apparel and accessories Total share: 138 = 11.44%	Jewellery pieces (16), accessories (14), watch (14), shoes and bag (13), footwear (12), knitwear/knitting (8), bedroom and sleeping apparel (6), bag (6), glasses frames (6), apparel (6), dress (5), sunglasses (4), knit sweater (3), knit sweater (3), military jacket (2), jeans (2), underwear (2), suit (1)	123 = 10.19%	M&S (12), Zara (9), CK (7), Lululemon (7), Esprit (6), Mango (3), Levi's (5), Tom Ford (3), Swatch (2), Under Armour (1)

	Miscellaneous (fashion design)	15 = 1.24%	Burberry (3), Zara (3), M&S (3), Hermes (3), YSL (2), LV (1)
Sport products Total share: 89 = 7.37%	Fitness equipment (19), footwear (11), sports clothes (9), bicycle (7), e-bike (6), motorcycle (3), backpack (3), camping equipment (3), martial arts equipment (3), fishing tool (3), climbing equipment (2), rifle (1), helmet (1)	71 = 5.88%	Puma (8), Nike (7), Adidas (5), Life Fitness (3), StarTrac (1), StairMaster (1)
	Miscellaneous (sport products/accessories)	18 = 1.49	
Car and transportation Total share: 63 = 5.22%	Car (37), yacht (6), public transportation (5), e-automobile (3), boat (3), solar powered car (2), bus (2), ferry (1)	59 = 4.89%	Tesla (8), GM (8), Rolls-Royce (7), Jaguar (6), Ford (2), Buick (1), Cadillac (1), Chevrolet (1)
	Miscellaneous (accessories: lamps, tire wheel, bumper, etc.)	4 = 0.33%	
Med-tech and healthcare devices Total share: 70 = 5.8%	Medical equipment (11), personal test device (9), medical furniture (8), medical scanner (7), medical robot (6), MRI scanner (5), dialysis device (3), prosthetic arm and leg (2), laser surgical equipment (2), cardiograph (2), remote surgery robot (2), massage furniture (1), hearing aid (1), inhaler (1), dental unit (1)	61 = 5.05%	GE (5), Medtronic (4), Royal Philips (3), Canon (2), Pfizer (1)
	Miscellaneous (medical device)	9 =0.74%	Medtronic (3), GE (1)
Packaging, box, or bottle Total share: 72 = 5.97%	Cosmetics and beauty products (13), Beverage bottle/can (11), food (9), hair and skincare (8), healthcare (6), cleaning products (3), coffee (3), shampoo (2), wine bottle (2), dairy products (2), toothpaste (1), toothbrush (1), air freshener (1), eggbox (1), dry pet food (1), engine oil (1)	65 = 5.38%	P&G (6), Unilever (6), Revlon (6), P L'Oréal (5), Pantene (4), Nivea (3), Pond's (3), Dove (3), Avon (3), Vaseline (2), Olay (2), Air Wick (1), Clinique (1), MAC (1), Oral-B (1), Colgate (1)
	Miscellaneous (packaging)	7 = 0.58%	Unilever (1), P&G (1)
Furniture Total share: 74 = 6.13%	Home furniture (27), office furniture (11), public furniture (8), outdoor (7), table (6), dining (6), baby furniture (3), bedroom (2), chair (2), stool (1), couch (1)	74 = 6.13%	Ikea (4), DIJ (3)
	Miscellaneous	-	
Interior, architectural design, and accessories Total share: 27 = 2.23%	Tapware and accessories (3), kitchen unit (3), bathroom accessories (3), bath and toilet accessories (3), flooring (2), washing room accessories (2), window (1), door (1), pool and spa interior design (1), landscape design (1), patio (1), hanging shelf (1), bookshelf (1), hot tube shelter (1)	24 = 1.99%	Grohe (3), Hansgrohe (2), Crosswater (2), Kudos (1) Kohler (1)
	Miscellaneous (interior design)	3 = 0.24	
Electronics and digital products Total share: 61 = 5.05%	Digital camera and main accessories (6), smart watch (6), high-tech audio system (5), navigation device/GPS (3), shaver (3), high-tech robot (3), audio device (2), telephone (2), Eco Plus (1), smart digital lock (1), home voice controller (1), electric toothbrush (1)	34 = 2.81%	Panasonic (5), Nikon (3), Sisco (3), Sony (3), P&G (1), Oral-B (1), Braun (1), Canon (2), Apple (2), B&O (2), Philips (1), Amazon (1), Google (1), Pioneer (1)
	Miscellaneous (electronics/digital device)	27 = 2.23%	Sony (2), Samsung (2), Philips (2), Panasonic (2), Ericson (2), Braun (2), Siemens (1), Canon (1)

Cell phone and related products Total share: 66 = 5.47%	Cell phone (21), smartphone (16), folding phone/foldable mobile (6)	43 = 3.56%	Apple iPhone (18), Samsung (11)
	Main accessories (8), iPod (6), AirPods (5), Earbuds (4)	23 = 1.9%	Apple (7), Samsung (4)
	Miscellaneous (cell phone accessories)	-	
Computer and related equipment Total share: 40 = 3.31%	Gaming console (7), Mouse and keyboard (6), headphone (5), speaker (3), printer (3), scanner (3), PlayStation (2), Xbox (2), portable gaming console (1), external hard drive (1)	33 = 2.73%	Microsoft (5), Sony (4), Canon (3), HP (3), Nintendo (2), WD (1), Beats (1)
	Miscellaneous (computer equipment)	7 = 0.58%	IBM (1), Intel (1), Microsoft (1)
Laptop and tablet Total share: 34 = 2.81%	Laptop (14), MacBook (5), iPad (4), Flip 2-in-1 (4), ZenBook (3), Galaxy tablet (2), MacOS (2)	34 = 1.82	Apple (10), Asus (8), MSI (5), Microsoft (4), Samsung (2), Lenovo (2), Dell (2)
	Miscellaneous	-	
Application and website Total share: 10 = 0.82%	Application (5), entertainment app (3), e-commerce website (1), e-commerce app (1)	10 = 0.82%	Apple (3), Samsung (2), Amazon (2), Adobe (1), Widget (1), Netflix (1)
	Miscellaneous	-	
Heavy machinery Total share: 51 = 4.22%	Construction equipment (6), excavator (6), track (5), crane (5), robotic forklift (4), mine mixer (4), loader (4), tractor (2), forklift (2), blasthole drill (2), track drill (2), tunnel boring machine (1), concrete mixer truck (1), spritz system (1)	45 = 3.73%	CIFA (5), Caterpillar (4), Mammoet (3), Hyundai (3), Komatsu (2), Mitsubishi (1), Crossrail (1) Hitachi (1)
	Miscellaneous (heavy machinery)	6 = 0.49%	CIFA (1), Caterpillar (1)
Industrial products Total share: 39 = 3.23%	Industrial tool (7), industrial machinery (5), power tool (5), power saw (3), power drill (2), pressure water (2), 3D printer (1), solar power device (1), agri-tech equipment (1), robotic mower (1), lawn mower (1), horticultural equipment (1), customer assistance pager (1), smart meter (1), biomass boiler (1)	33 = 2.73%	Bosch (5), Mikita (2), Jordao (1), Zoin (1), HitLine (1), WiFi (1), Mitsubishi Electric (1), Konica Minolta (1), Honda (1), Karcher (1)
	Miscellaneous (industrial products)	6 = 0.49%	
Aircraft Total share: 6 = 0.49%	Plane (3)	6 = 0.49%	Boeing (6)
	Miscellaneous	-	
Unknown Total share: 43 = 3.56%		43 = 3.56%	

CHAPTER 5: CONCLUSION AND DISCUSSION

5.1 Introduction

The extant studies in this thesis, point out that lack of strategic marketing thinking hinders the development of product design to gain continuous innovation and market success. The creativity of the involved parties in the process is highly taste-based, rather than a formulated one. The involved parties own different and separate ways of thinkings and approaches, while learning loops should be constituted for formulating the creative strategies in product design development. Furthermore, the product designers' role in the new product development process has been underestimated in marketing studies. It is while designers' views can be very helpful in formulating design strategy. Design as art should be closer to business strategy. On a lighter note, managerial thinking and design thinking should be more associated and parallel. On the one hand, business strategy should be taught to product designers, and on the other, designers' experiences should be documented and formulated to be taught. Moreover, the relationships between marketers as the clients and designers should be a B2B relationship, rather than a manager-employee one (see A. Sharma, 1997). Finally, problem-solving by creative design should be considered more as a strategic process, for product design/development scholars, product managers, and product designers, respectively. Consideration of these points will improve the quality of product design in the competitive market.

5.2 Synthesis of Research Findings

Article 1, comprehensively and critically reviews all the topics in the related body of literature. That study focuses on consumers' responses to product design quality and explains how product design can be continuously developed by formulating design strategies. In fact, article 1, indicates product design scholars' analyses and views associated with product development by design. In line with searching for design strategies for creativity and innovation in the first paper, article 2, compares the extant literature that shows product design/development scholars' views with product designers' views on product design creativity and the discussed topics in the literature. Following papers 1 and 2, paper 3 investigates and measures the main influential factors in the product design/development process that affect the process's successful outcome and compares product designers' with product managers' views of the process and its outcome. These three articles focus on all the involved parties to explore their views comparatively and to improve their insights through an understanding of each others' views.

Strategic thinking in product design creativity is an important issue that has been neglected in the literature. Based on the strategic review, a design strategy would be the right combination of design thinking and managerial thinking. In addition to improvement of the knowledge in the field for product marketing scholars, the studies included in this thesis take steps further by examining the paths, and factors, and shedding light on means by which, product marketers/managers and designers can strategically improve their design creativity to achieve continuous success.

5.3 Theoretical Implications

Design essentially is intuitive or heuristic. Hence, studies that focus on the design process are somehow faced with lacking theoretical and strategical frameworks (Cash, 2018, 2020; Gemser & Barczak, 2020; Nagaraj et al., 2020). The current research opens a great avenue to academic thinking in the design process as an art-related business. In bridging "marketing" and "industrial design" studies, the extant research suggests theoretical frameworks for formulating/codifying creative product design strategies. By focusing more on designers' role in the new product development process, this research covers several literature gaps and expands the related knowledge. Design theories are as complicated as the design itself, thus, the managers-designers relationship is something beyond what we know in B2B and contractual theories. However, designers are considered and professional service providers in a B2B relationship, they are also artists with different characteristics. For example, while in professional B2B or principal-employee exchange, relationships can be defined based on logical thinking, we see that designers do not think very logically, but rather tend to think visually. Therefore, managers cannot be very creative to find the solutions, due to logical thinking, and designers cannot strategically control their visual thinking to find problems of the extant design. The point where that design theory development starts from "finding the right problems and the right solutions", an important point that should be considered more by scholars of product marketing.

5.4 Managerial Implications

Results show how product design/development scholars, product managers, and product designers consider and should consider creative product design, its process,

attributes/characteristics, and interrelations between them to achieve successful outcomes. This establishes a fundamental step for improving the managerial insights towards creative design strategy. The research makes organizational/managerial thinking and design thinking close to devise more creative design strategies (cf. Spanjol & Noble, 2020).

The findings from the existing research assist both product managers and designers to improve their knowledge about the roles of the product design process and product design attributes. This research highlights creative design thinking and creative problem-solving by design, which helps managers and even designers to improve their insights for a better decision-making process. In comparing designers' and managers' views on the new product development process and its outcomes, this research expands both managers' and designers' insights and increases the professional B2B relationships and quality of the product design. In a nutshell, the findings help the involved parties become aware of, and manage their cognitive and behavioural biases to view creative design more strategically.

5.5 Limitations and Directions for Future Research

This thesis has comprehensively considered the literature and tried to cover the related gaps. However, in terms of the respondents, in this research, we highly focused on professional award-winning product designers, and we did not control the product categories. However, complimentary research can be conducted based on the specific types and with the participation of designers/marketers with different experience levels. Further, service design also needs these sorts of studies. In the meantime, it should be noted that this research establishes a strong basis for future studies on consumers' responses, also on professional B2B relationships between marketers/managers and designers.

5.6 Conclusion

Design as an art has been drifting apart from business studies, but the system is not pure art. Design creativity or innovativeness is an art that serves businesses and solves problems. Both product managers and designers should consider creative design more strategically and reinforce their strategic alliances on this basis. The gaps between scholars', managers' and designers' ways of thinking should be reduced by increasing a better understanding of each other's thinkings. The relationship between product managers and designers should be moved from the manager-employee level to a professional B2B strategic exchange/relationship, in order to absorb the parties' capacities as much as possible, for achieving more innovation and success. The hierarchy should be diminished, and managerial thinking must be closer to design thinking, for reaching the strategies that can solve the user and business problems by leveraging creative design. The artistic characteristics of designers and their ways of thinking help managers, and managers' insights, in turn, can assist designers to create competitive advantage by employing creative design. This is the starting point for strategic marketing thinking in the field, something with an artistic and strategic flavour in creative design, beyond what we know about a regular professional B2B relationship. This thesis criticises product design scholars, product managers, and designers, to highlight the need for a strategic view to creativity in product design/development in the present competitive market.

5.7 References

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5.8 Appendices

Appendix 1: Ethics Approval for Article/Paper 2

Business and Economics Subcommittee
Macquarie University, North Ryde
NSW 2109, Australia

MACQUARIE
University

01/03/2019

Dear Prof Koslow,

Reference No: 5201949617366
Project ID: 4961
Title: Creative Product Design

Thank you for submitting the above application for ethical review. The Business and Economics Subcommittee has considered your application.

I am pleased to advise that ethical approval has been granted for this project to be conducted by Professor Scott Koslow, and other personnel: Mr Ardalan Sameti.

This research meets the requirements set out in the National Statement on Ethical Conduct in Human Research 2007, (updated July 2018).

Standard Conditions of Approval:

1. Continuing compliance with the requirements of the National Statement, available from the following website:
   https://nhmrc.gov.au/about-us/publications/national-statement-ethical-conduct-human-research-2007-updated-2018.

2. This approval is valid for five (5) years, subject to the submission of annual reports. Please submit your reports on the anniversary of the approval for this protocol. You will be sent an automatic reminder email one week from the due date to remind you of your reporting responsibilities.

3. All adverse events, including unforeseen events, which might affect the continued ethical acceptability of the project, must be reported to the subcommittee within 72 hours.

4. All proposed changes to the project and associated documents must be submitted to the subcommittee for review and approval before implementation. Changes can be made via the Human Research Ethics Management System.

The HREC Terms of Reference and Standard Operating Procedures are available from the Research Services website:
https://www.mq.edu.au/research/ethics-integrity-and-policies/ethics/human-ethics.

It is the responsibility of the Chief Investigator to retain a copy of all documentation related to this project and to forward a copy of this approval letter to all personnel listed on the project.

Should you have any queries regarding your project, please contact the Faculty Ethics Officer.

The Business and Economics Subcommittee wishes you every success in your research.

Yours sincerely,

Associate Professor Jana Bowden

Chair, Business and Economics Subcommittee

The Faculty Ethics Subcommittees at Macquarie University operate in accordance with the National Statement on Ethical Conduct in Human Research 2007, (updated July 2018), [Section 5.2.22].

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Appendix 2: Ethics Approval for Article/Paper 3

Macquarie Business School Committee
Macquarie University, North Ryde
NSW 2109, Australia

09/09/2019

Dear Professor Koslow,

Reference No: 52019565610285
Project ID: 5656
Title: Creative Product Design, part two

Thank you for submitting the above application for ethical review. The Macquarie Business School Committee has considered your application.

I am pleased to advise that ethical approval has been granted for this project to be conducted by Professor Scott Koslow, and other personnel: Mr Ardalan Sameti.

This research meets the requirements set out in the National Statement on Ethical Conduct in Human Research 2007, (updated July 2018).

Standard Conditions of Approval:

1. Continuing compliance with the requirements of the National Statement, available from the following website:
   https://nhmrc.gov.au/about-us/publications/national-statement-ethical-conduct-human-research-2007-updated-2018.

2. This approval is valid for five (5) years, subject to the submission of annual reports. Please submit your reports on the anniversary of the approval for this protocol. You will be sent an automatic reminder email one week from the due date to remind you of your reporting responsibilities.

3. All adverse events, including unforeseen events, which might affect the continued ethical acceptability of the project, must be reported to the subcommittee within 72 hours.

4. All proposed changes to the project and associated documents must be submitted to the subcommittee for review and approval before implementation. Changes can be made via the Human Research Ethics Management System.

The HREC Terms of Reference and Standard Operating Procedures are available from the Research Services website:
https://www.mq.edu.au/research/ethics-integrity-and-policies/ethics/human-ethics.

It is the responsibility of the Chief Investigator to retain a copy of all documentation related to this project and to forward a copy of this approval letter to all personnel listed on the project.

Should you have any queries regarding your project, please contact the Faculty Ethics Officer.

The Macquarie Business School Committee wishes you every success in your research.

Yours sincerely,

Associate Professor Jana Bowden

Chair, Macquarie Business School Committee

The Faculty Ethics Subcommittees at Macquarie University operate in accordance with the National Statement on Ethical Conduct in Human Research 2007, (updated July 2018), [Section 5.2.22].

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Appendix 3: Conference Presentation

Product design strategy: professional designers' views on creativity. *Innovation and Product Development Management Conference (27th IPDMC, Antwerp, Belgium, online presentation, June 2020).*

www.eiasm.org/frontoffice/event_announcement.asp?event_id=1421

CERTIFICATE OF ATTENDANCE

This is to certify that

MR. ARDALAN SAMETI

- Has participated in the IPDMC 2020 - GOES TO VIRTUAL !, held in ONLINE, JUNE (7) 8-9, 2020

- Has presented the paper entitled:
  ◦ PRODUCT DESIGN STRATEGY: PROFESSIONAL PRODUCT DESIGNERS VIEWS ON DESIGN CREATIVITY

Graziella Michelante
CONFERENCE MANAGER

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Website www.eiasm.org