

Understanding Emotions and their Role in the Design of Products: An Integrative Review

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Abstract

Background Today consumers expect more from a product than mere fulfillment of the intended function for which the product is designed. Modern-day consumers demand products that match and satisfy their preferences. Contemporary trends in design show consumer inclination towards objects which motivate them, improve their quality of life and spark emotions. Consequently, along with the functionality requirements, a product needs to serve consumers' emotional needs, and for that, the product must relate with them at their emotional level. The product's visual appearance is responsible for engendering first impressions and initiating a connection at the emotional level before product purchase. Previous research suggests that the emotional element of design could be more crucial in deciding the success of the product than the functional aspect as it affects consumer's decision-making in choosing a product. Therefore, design directed by emotional content is gaining more and more importance in current design practices, research, and education. Thus, designers must possess the necessary knowledge and skills to deal with this design paradigm of product emotions, analyzing the relationship between emotion, consumer behavior, and product design. This paper investigates associations between fundamental product design elements, product judgment attributes, consumer emotional response, and consumer behavior in the context of before product purchase scenario through an integrative review of literature in the domain of product design and emotions.

Methods The study is an integrative review of papers from major journals in design, consumer research, management, philosophy, cognitive science, psychology, and marketing on the topic of Emotional Design from January 2000 to August 2020. 133 relevant articles were shortlisted and analyzed considering the purpose, methods, and main findings of the studies.

Results The four major categories that emerged through the analysis of the shortlisted articles were 1. The Terminology used in Emotion Research, 2. Consumer Emotions and their relation with the other factors such as fundamental product design elements, product judgment criteria, consumer behavior, and environmental factors in the 'before product purchase' scenario, 3. Theories of Product Emotion, and 4. Assessment of Emotion.

Conclusions A multi-faceted evaluation of articles of the first two categories resulted in proposing a new theoretical framework investigating consumer emotional response before product purchase context. The framework has been described illustrating key terms and associations between them with future directions on Emotional Design. It is expected that design practitioners, cognitive scientists, and ergonomists would find the developed framework helpful while designing products that elicit desired emotional responses.

Keywords Emotion, Emotional Design, Product Design, Integrative Review

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1. Introduction

Many researchers have stressed the importance of emotional design because, first, emotionally neutral products do not exist. Any design elicits emotions from consumers, whether a designer intends it or not (Gaver, 1999). Thus, to avoid any undesirable or unanticipated emotional 'side-effects' of design decisions, it is necessary to have a prior understanding of the effects of design on consumer emotions (Desmet & Hekkert, 2009). The second reason is, companies often focus on technology-driven products. However, as the market enters into the maturation phase, the technology penetration becomes high, and technically similar products co-exist (Gonzalez et al., 2017). In such circumstances, technology starts losing its potential to become a differentiator, and companies can no more rely only on technology for competitive advantage. At this point, emotional design can be applied as a useful differentiation strategy that utilizes knowledge of consumer emotional response to impart a delightful experience. Consumer researchers also have established that emotions elicited by products add to the pleasure of purchasing, using, and owning them (Hirschman & Holbrook, 1982). Creusen (1998) and Norman (2004) even argued that the emotional aspect of the design is more crucial than the functional one in deciding the market success of a product. Designers, therefore, need to transcend the traditional approach of conceptualizing and optimizing based on function, ergonomics, manufacturing, cost and be more sensitive to what emotions product design evokes from consumers.

Designers devote a substantial period to conceive and develop their design. In comparison, they have an extremely short window of opportunity to convey their design intention to the consumers through their product. The factors like the visual design of the product, often the first point of consumer-product interaction, are utilized to elicit desired emotion (Bloch, 1995). Gorp & Adams (2012) also highlight the importance of evoking emotions to capture consumers' attention in such situations. The emotions elicited by a product during the first interaction also affect the judgment of other attributes of the product (Jennings, 2000). Therefore, it becomes essential to study the factors which impact consumer emotional response in the 'Before Product Purchase' scenario. In this regard, first, it is crucial to understand what emotions are and what their associations to the design are.

2. Method

This study is an integrative literature review, defined as one in which the published research studies are critically analyzed and synthesized into a significant contribution to new knowledge about the theme under study. The new knowledge generated by weaving together ideas from literature can take different forms such as alternative theory or conceptual frameworks, classification of constructs, reshaping ideas and meanings (Torraco, 2016). The development of an integrative review includes six steps: the selection of research questions, defining the criteria for literature screening, defining categories or themes that emerged from the existing research articles, analysis, and synthesis, logical and conceptual reasoning,

implications for future research (Bezerra et al., 2012).

The questions that this research sought to answer were:

- What are the fundamental terminologies in emotion research?
- Which are the factors affecting consumer emotional response in the 'before product purchase' scenario?

A systematic search was conducted using online databases: Google Scholar, Scopus, and Web of Sciences. The keywords used for this purpose were "emotional design", "emotion assessment", "consumer emotions", and "emotional response" with limitations to studies conducted in design, consumer research, management, marketing, psychology, cognitive science, philosophy, and technology. The inclusion criteria were: (a) Works written in English language only in the timeframe of January 2000 to August 2020, (b) the presence of the search term in keywords or title, (c) full-text availability, (d) original and relevant articles in the product design and emotion domain. Furthermore, additional papers from reference lists of the articles reviewed were also identified. The initial search resulted in the identification of 715 articles. After the application of inclusion and exclusion criteria, 133 articles remained for our review. Through the assessment of selected articles, four main categories emerged, which are represented in Figure 1. The critical analysis of identified literature was conducted phase-wise based on the first two categories.

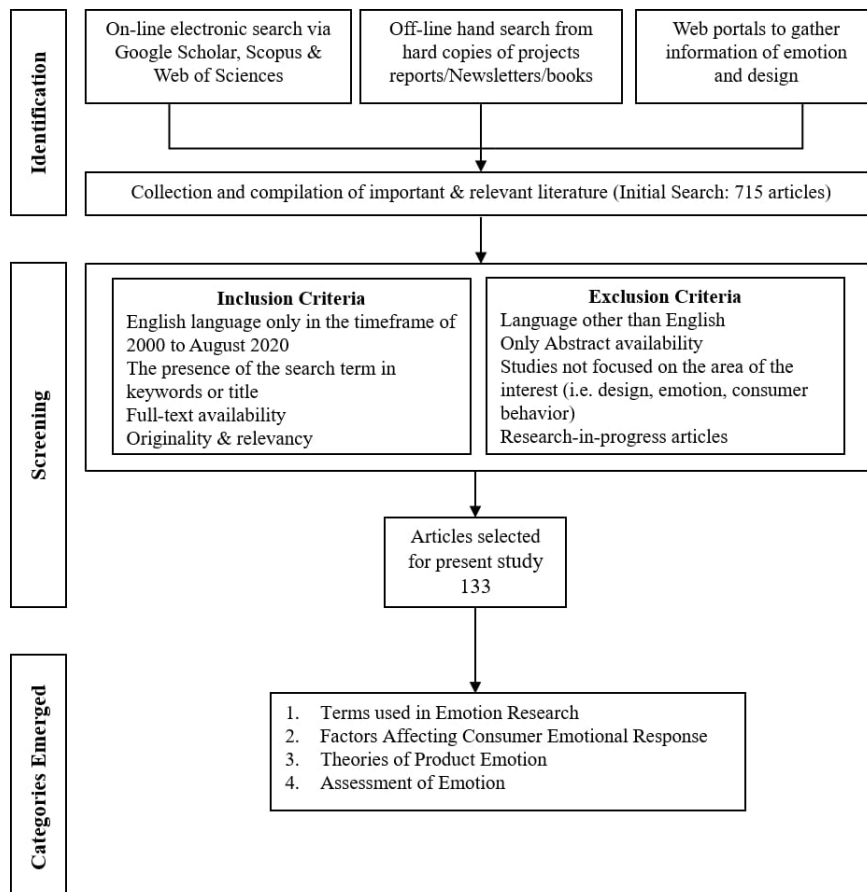


Figure 1 Process and Method of Research

ategories. The concept map shown in Figure 2 is the visual representation of the categories and sub-categories of the current research topic, created to enhance the understanding and explain the structure of the paper.

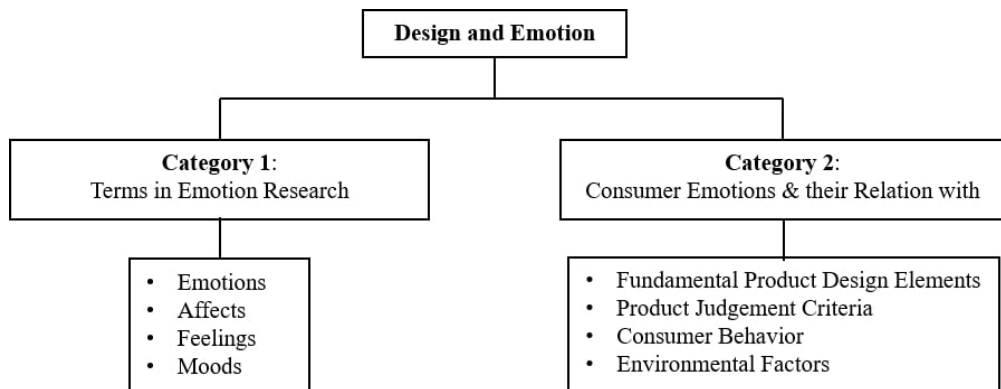


Figure 2 Concept Map of the Critical Analysis

3. Analysis of Literature

3. 1. Terms used in Emotion Research

The literature discussing emotion often includes terms like 'affects', 'emotions', 'feelings', and 'moods'. All the terms express various dimensions of emotional experience, and hence it becomes necessary to define each of them. The perspective of other researchers needs to be outlined to understand these terms.

Emotions are considered the mechanisms that trigger when circumstances are favorable or adverse to one's concern (Hekkert & Desmet, 2002). Emotions are directed at something, and they are generated by actions taking place exterior to the body or thoughts, internal depiction of memories and experiences (Gorp & Adams, 2012). Desmet (2003a) argues that everything humans do has a subconscious shade of emotion. Furthermore, Desmet (2003a) advances the argument stating that emotions have an expressive or physiological component and a subjective experience component. The physiological reactions are emotional responses that create biochemical reactions changing the physical condition of the body without conscious efforts or reflection (Carlson, 1997). As emotions cause physiological reactions such as eye movement, blood flow, facial expressions, body posture, respiration rate, these physiological manifestations can be objectively measured (Hampton, 2015), and emotion associated with a particular physical response can be detected (Desmet, 2003b). Hayes-Roth, et al. (1998) and Arnold (1960), in their articles, use the terms 'affect' and 'emotion' interchangeably.

Emotions and feelings are like two faces of the same coin, inseparable yet different. According to Antonio Damasio (1999), professor of neuroscience at the University of California, feelings are the conscious perception of an emotional state. In other words, emotions are the state

due to the reaction to the stimuli, and feelings arise when the brain interprets or assigns meanings to these emotions. Feelings (also called moods in literature) are also influenced by personal experiences, memories, beliefs, surroundings (N. Frijda, 1994; Sloman, 2002), and hence they are highly subjective, less intense (Ekman & Davison, 1994) as well as difficult to measure objectively. While emotions are temporary, feelings may last long (Carlson, 1997). The difference between emotion and feeling is summed up in Table 1.

Table 1 Emotions vs Feelings

Emotional Responses (affects)	Feelings (mood)	
Produce Bodily Responses	Interpretation of bodily responses	(Carlson, 1997; Damasio, 1999; Desmet, 2003a)
Quick	Less Intense	(Frijda, 1993)
Temporary	Long-Lasting	(Carlson, 1997; Robbins & Judge, 2013)
Objectively Measurable	Difficult to Objectively measure	(Hampton, 2015)

3. 2. Factors Affecting Consumer Emotional Response in the 'Before Product Purchase' Scenario

The first impressions about a product are typically formed in the first few milliseconds (Ekman, 1992; Lindgaard et al., 2006). Several aspects like product appearance are responsible for generating these first impressions. Previous research suggests that appearance or visual appeal factors are noticed first, determining how consumers evaluate subsequent experiences (Jennings, 2000; Tractinsky et al., 2000). The other attributes of the product are also judged based on the first impression it creates. For instance, in the case of a very positive first impression, a person may downplay potentially negative aspects (Campbell & Pisterman, 2010). Moreover, an immediate emotional response to a product is critical for engaging consumers and eventually influencing their purchase decision (Gorp & Adams, 2012). Thus, it becomes necessary to study the factors which impact consumer emotional response in the 'Before Product Purchase' scenario.

3. 2. 1. Fundamental Product Design Elements and Emotions

Literature (Chang & Wu, 2007; Kim & Boradkar, 2002; Ürgen, 2006) confirms that form, material, and color are the fundamental aspects of product design responsible for emotional impact. Thus it is necessary to know the role and capacity of each element in evoking emotions in the first consumer-product interaction.

Form

Product exterior form, frequently the first point of interaction for consumers in store aisles or on websites, is the way to gain consumer notice that can produce long long-lasting impact and ultimately shapes purchase decisions (Bloch, 1995). Product form communicates a message coded by the designer to the consumer by acting as a bridge between them. Spontaneous emotions elicited by the visible structure of the product overshadow many other aspects (Jacobs, 1999). Ultimately, a product's market success depends upon its ability to evoke emotions in the consumer (Giannini & Monti, 2002). Designers can create products that can influence consumer's visual impression with the help of variation in design elements (e.g., attributes of the form like line, surfaces) considering design principles (proximity, similarity,

symmetry) (Coates, 2002; Lauer & Pentak, 2012). To achieve this, designers must have a clear understanding of the characteristics of design elements and design principles.

Material

The product appreciation by consumers starts with acknowledging the design of the surface (Chang, 2018). A well-designed product surface through a conscious choice of material texture, graphics, printed or engraved logo can help achieve emotional stimulation through visual communication. A logo, which is nothing but a symbolic representation through graphics, texts, and shapes, could create a consumer's deep emotional attachment with a product by communicating a memorable and symbolic meaning. Therefore, subtly manipulated material surface elements are an effective means of the visual design of the product to elicit intended emotions. Norman (2004) also affirmed that the visceral level of emotions is influenced by by-product material, and it also results in an immediate visceral reaction. The research findings (Ashby & Johnson, 2003; Crippa, Rognoli, & Levi, 2012; Hilton, 2008; Karana, Hekkert, & Kandachar, 2009; Rognoli, 2010) state that consumer interaction with the product material is composed of seeing it, feeling the texture, hearing its sound by tapping on it and inhaling its smell. An elaborate combination of visual, tactile, smell and audio sensory stimuli from the product material shapes the overall emotional experience for the consumer.

Color

The role of color in influencing the psychology of the consumer has been studied extensively in marketing and consumer research (Westland & Shin, 2015). Color is an essential and influential mode to build and sustain brand images and corporate identity in consumers' minds (Madden et al., 2000). Kumar (2017) found that the quality of the brand can be communicated effectively through color. Tutssel (2001) argued that consumers could judge a brand by its color without reading the written matter. The pertinent use of color can create a long-lasting impact and is beneficial for market success. However, color perception is also affected by cultures (Armstrong, 1991) and subsequently learned associations. Moreover, age, gender, ideology, and ethnicity too are significant in color preferences. Thus, companies like Coca-Cola, Nestle, Procter & Gamble are seen paying extreme attention to the brand colors.

Form, material, and color are the factors that exist at the forefront of our awareness. Furthermore, several other background characteristics like intended function, ergonomics, constraints in the manufacturing method, production budget influence the design outcome. The design brief is created keeping these factors in mind and hence termed as 'Design Objectives'. For instance, a design team may be given a target or objective of designing a product with a fixed production budget. In that case, product material/color selection is constrained because of the objective set beforehand. The design team sets the brief, keeping these constraints in mind, and these are the objectives that need to be achieved along with creating desired consumer emotional response. The Design Objectives are nothing but the extraneous variables influencing the design of the product (external stimuli) directly and eventually consumer emotional response. Further, seminal studies of emotions in consumer research such as Izard (1977), Westbrook (1987), Oliver (1993), and several others showed that at the most abstract level, an emotional response is either a positive response or a negative

response. The constructs discussed in the above sections are represented visually in Figure 3.

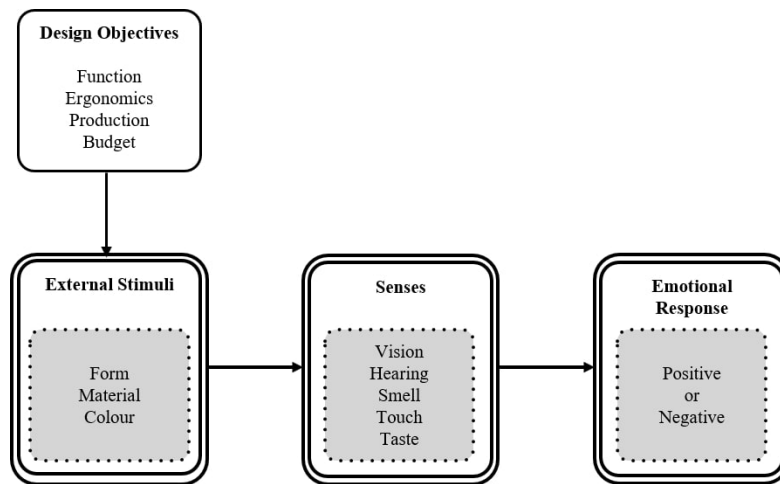


Figure 3 Fundamental Product Design Elements affecting Consumer Emotional Response

3. 2. 2. Product Judgement Criteria and Emotions

Product form, material, and color can influence consumers roaming in retail aisles of shops without any particular purchase intention. However, if a consumer has predetermined judgment criteria (such as price, utility, quality, brand) about purchasing a product based on his needs, these factors influence his emotional response. A consumer with an intention to buy a product evaluates it on each of these predetermined factors, and products that do not fulfill his judging criteria will be avoided. Tversky (1972) calls this 'elimination by aspect'. Moreover, product judgment criteria also influence the design as well. For instance, a brand would want to stick to its brand guidelines while designing a new product to maintain its identity. These brand guidelines determine the selection of form, material, color.

Marketing directed at the quality of the product also influences consumer emotions. For example, consider a consumer who wants to buy edible oil. Marketing taglines such as "oil with a unique blend of taste with health" may create thoughts about how good the oil is for health and also has a taste. These thoughts may ultimately result in positive emotions about the oil. The business of brand marketing uses consumers' emotional connection with the brand rather than highlighting product benefits (Woods, 2004). Brands tend to elicit positive emotions in the consumers having a positive experience with them previously (Yu & Dean, 2001) and are likely to be loyal to that brand.

Brand awareness plays a crucial role as consumers select and evaluate products. Different businesses use "brand strategy" as their primary goal in the process of promoting and selling goods to effectively grow their market share and create consumer brand loyalty for repeated purchases. Research findings show a significant effect of advertising on brand awareness and its popularity. Moreover, products with high brand awareness could better acquire positive emotional responses of consumers (Chang & Chang, 2014).

Most of the parameters mentioned above belong to the broader concept of quality. Quality is defined by Juran & Godfrey (1998) as product characteristics that fulfill consumer requirements and provide them satisfaction. Consumers have different perceptions of a quality product depending on their willingness to pay, preference, and usability expectations.

3. 2. 3. Consumer Behavior and Emotion

In the perspective of design, consumer behavior response can be characterized by the approach or avoid action of the consumer (Bitner, 1992; Donovan et al., 1994; Mehrabian & Russell, 1974). In the 'before product purchase' scenario, the approach activity reflects the greater engagement of the consumer with the product exploring, viewing, listening, or touching it, and avoiding action is just the opposite of approach action. Previous research points out that positive emotion is generally associated with positive consumer behavior towards products (Adaval, 2001; Barone et al., 2000; Isen et al., 1987; Norman, 2004). It implies that if a product can elicit positive emotions, it will be favored by consumers. However, Gorn et al., (1993) also argued that if the consumers are made aware of their emotional state, then it does not create bias in their judgment. Sometimes, even though the product elicits negative emotions, it may result in positive consumer behavior. For example, the most common notion about medicine is that bitter is the test, more is its effectiveness. Thus, even if medicine taste evokes a negative sense of emotions, consumers tend to showcase approach behavior towards it.

3. 2. 4. Environmental Factors

The purposeful design of the shopping environment to influence consumers is considered to enhance consumers' emotional responses. The appropriate design of space is eventually expected to positively influence the attitude, perception, and behavior of consumers (Bellizzi & Hite, 1992). Levy et al. (2017) showed that the space layout is a significant contributor in evoking a specific emotional response. Mehrabian and Russel (1974) proposed that emotional states mediate the effects of the environment on behavior. Furthermore, several other studies also supported this framework (Babin & Darden, 1996; Donovan & Rossiter, 1982). A study exploring the effect of mall décor on consumers showed a significant impact in terms of consumer emotional response (Chebat & Morrin, 2007). Bruner (1990), through an investigation, found that music can impact consumers' emotional responses and expenditure patterns. Moreover, in their experimental approach, Baker and colleagues (1992) established that a significant relationship exists between the consumer emotional response and ambient factors such as temperature, lighting, noise, music, and ambient scent.

4. Result

As a result of analyzing the research contents of product design and consumer emotions, the following key research developments are identified. First, the existing research studies related to product design and emotion have developed a comprehensive knowledge of the complex phenomenon of layered emotional response to products. Several seminal studies like Emotional Design (Norman, 2004), Appraisal Theory (Hekkert & Desmet, 2002), Pleasure

Model (Jordan, 2005), Technology as Experience Framework (McCarthy & Wright, 2004), and Product Personality Assignment introduce conceptual models that identify the source of product emotions and attempt to recognize their relevance to product design. However, none of these studies specifically explore the context of 'before product purchase'. Furthermore, the research contribution of the reviewed studies on the Assessment of Emotion is particularly noteworthy. Some of these studies are mentioned in Table 2. A number of these studies have developed instruments and approaches for measuring emotions evoked by products. These instruments range from simple pen-and-paper rating scales to high-tech equipment set-ups. In the context of current study, the relationships emerged through the proposed framework could be verified using any of these existing suitable emotions assessment methods in future research.

Table 2 Categories Emerged through the Literature Review and Studies Related to those Categories

Category	Title	(Author(s), Year)
The Terminology used in Emotion Research	Design for Emotion	(Gorp & Adams, 2012)
	A Multilayered Model of Product Emotions	(Desmet, 2003a)
	What's The Difference Between Feelings And Emotions?	(Hampton, 2015)
	The Feeling of What Happens	(Damasio, 1999)
	Varieties of Affect: Emotions and Episodes, Moods, and Sentiments	(Frijda, 1994)
Consumer Emotions and their relation with the other factors in the 'before product purchase' scenario	Organizational Behavior	(Robbins & Judge, 2013)
	Theory and models for creating engaging and immersive ecommerce websites	(Jennings, 2000)
	Exploring types and characteristics of product forms	(Chang & Wu, 2007)
	Design Basics	(Lauer & Pentak, 2012)
	Materials and emotions: A study on the relations between materials and emotions in industrial products	(Crippa et al., 2012)
	The Relationship Between Consumer Colour Preferences and Product-Colour Choices	(Westland & Shin, 2015)
	Servicescapes: The Impact of Physical Surroundings On Customers and Employees	(Bitner, 1992)
	An Experimental Approach to Making Retail Store Environmental Decisions	(Baker et al., 1992)
	A Fitting Approach to Interactive Service Design: The Importance of Emotional Needs	(Campbell & Pisterman, 2010)
	Retailing Management	(Levy et al., 2017)
Theories of Product Emotion	Music, Mood, and Marketing	(Bruner, 1990)
	Emotional Design : Why we love (or hate) everyday things	(Norman, 2004)
	The Basis of Product Emotions	(Hekkert & Desmet, 2002)
	Designing Pleasurable Products	(Jordan, 2005)
Assessment of Emotion	Technology as Experience	(McCarthy & Wright, 2004)
	Measuring emotion: the self-assessment manikin and the semantic differential	(Bradley & Lang, 1994)
	Designing Emotions	(Desmet, 2002)
	What are emotions? and how can they be measured?	(Scherer, 2005)
	The sensual evaluation instrument: Developing a trans-cultural self-report measure of affect	(Isbister et al., 2007)
	Emotion Recognition based on Heart Rate and Skin Conductance	(Ménard et al., 2015)
	Wearable Emotion Recognition system based on GSR and PPG signals	(Udovičić et al., 2017)
	Sensing, smart and sustainable product analysis methodology through EEG evaluation	(Pedro et al., 2019)
Human emotion recognition: Review of sensors and methods	(Dzedzickis et al., 2020)	

In the critical analysis of literature, we deconstructed the phenomenon of consumer emotional response in the 'before product purchase' into its elemental parts. Now in synthesis, we connect these parts to generate new ways of thinking about the topic in the form of a conceptual framework. The framework has been proposed in figure 4, taking account of the multiple factors discussed in previous sections that could have a decisive influence on consumer emotions, directly or indirectly, in the 'before product purchase' scenario.

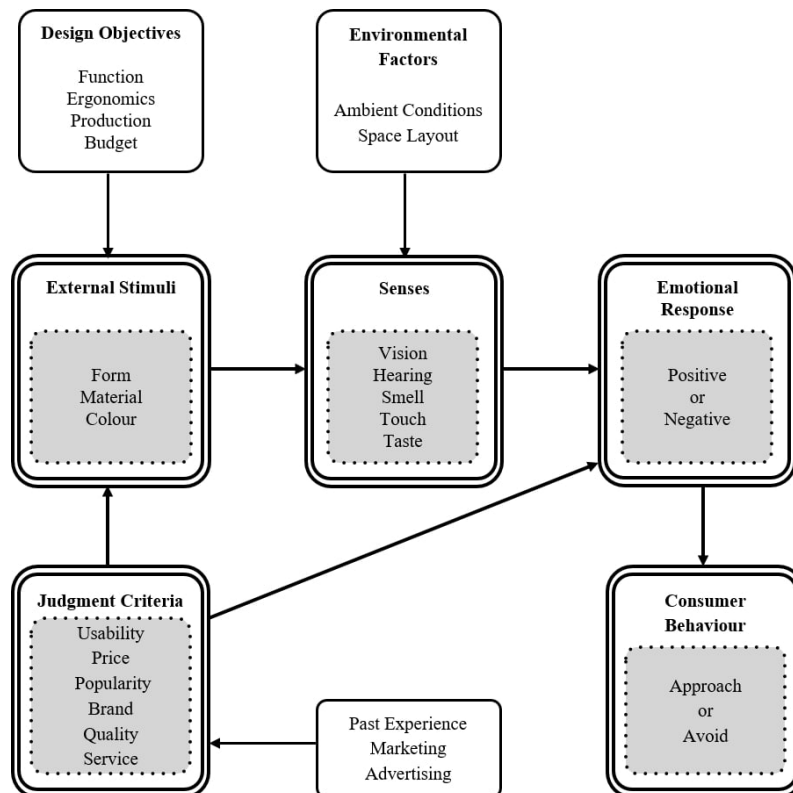


Figure 4 Conceptual Framework for Factors Affecting Consumer Emotional Response before Product Purchase

Each aspect can be investigated at a different level of aggregation. For example, the fundamental elements of product design responsible for emotional impact (viz. form, material, and color) make a cluster that is referred to as 'External Stimuli'. Furthermore, several other background characteristics like function, ergonomics, production, and budget create a different level of aggregation termed as 'Design Objectives'. The factors at the Design Objectives level are nothing but the extraneous variables influencing the design outcome. Thus, Design Objectives have an indirect influence on consumer emotional response. At a cluster-level analysis, a researcher may study the factors as a group. For instance, in their experimental research, Chang & Wu (2007) investigated the influence of the overall visual design of household products on consumer emotions. They proposed various types and characteristics of the selected factors that would result in a pleasurable consumer response. At the factor level of analysis, one may control several elements belonging to the same factor to investigate their effect on consumer emotional response. For example, Tyan-Yu et al.

(2017) studied congruity among product form elements in enhancing the positive emotional response. At a global cluster level of analysis, a researcher can use different product categories and associated emotional responses for the study. In such a case, the research focuses on the relationship between emotions elicited by a particular product category, rather than how features of the individual cluster elements are involved in evoking emotions.

Consumer predetermined attributes of product judgment directed by aspects such as utility, price, popularity, brand, quality, and service also shape an emotional response. These factors form a cluster referred to as 'Judgement Criteria'. Jordan (1998) argued that the usability of the product is a crucial factor in evoking emotions. Jordan (1998) further added that to produce a positive emotional impact, the property of usability should be crafted carefully in the product development process right at the start. Thus, the usability aspect influences consumer emotions and shapes the fundamental elements of product design. Therefore, the cluster 'Judgement Criteria' is shown to affect both 'External Stimuli' and 'Emotion'. Moreover, a substantial literature review indicates that brand marketing (Woods, 2004) and service settings (Ladhari et al., 2017) also influence consumer emotional response. A few additional factors like previous experience (Yu & Dean, 2001), marketing, advertising (Chang, 2018) are nothing but external variables affecting Judgement Criteria.

5. Implications for Future Research

In the present research, a new perspective in the form of a conceptual framework involving relationships between various constructs has been proposed. It puts forth the opportunity to investigate the constructs that have not been thoroughly explored previously. For example, consider the part of the framework represented in figure 5.

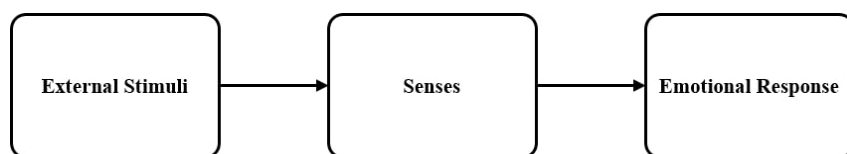


Figure 5 The Part of Conceptual Framework in focus for Future Implications

The constructs in figure 5 can be elaborated further as follows: The designer performs the task of physical manifestation of design intent by manipulating product features (external stimuli). Consumers realize the designer's intent through sensory experience and generate emotional responses from what they sense. Thus, a designer should make a careful choice of the communication channel (form, material) for imparting desired intent. Therefore, figure 5 can be modified and reconstructed as shown in figure 6.

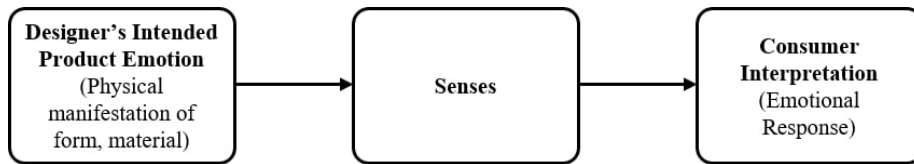


Figure 6 Designer's Intent and Consumer's Realization

Previous research points out that differences (discontinuities) will exist between the designer's intent of a product character and consumers' realization of the product character (Ahmed & Boelskifte, 2006; Crilly et al., 2008; Hsu et al., 2000). In this regard, we can state that if a product successfully evokes the same emotional response for most consumers, then there is an emotional similarity (continuity). In other words, if the designer's intended product emotions and the consumers' emotional response overlap, then it can be said that the objective of 'emotional continuity' has been attained (figure 7). On the other hand, if the product fails to evoke the same emotional response for most consumers, then there is a significant 'emotional discontinuity', and what is being intended by the designer has not been achieved. This would eventually lead to the design iteration or redesign of the product to minimize or remove the discontinuity.

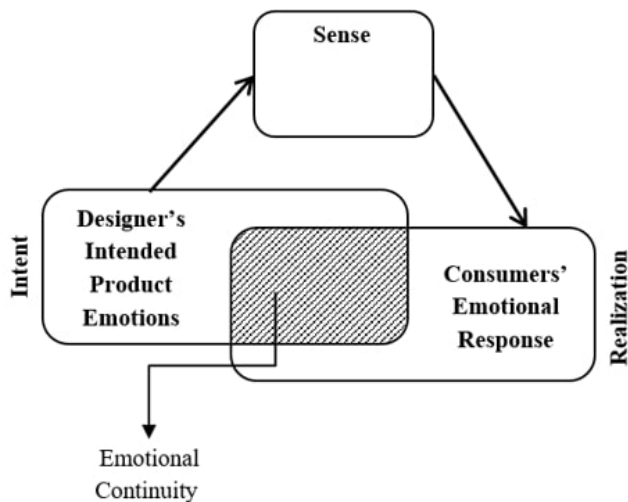


Figure 7 Emotional Continuity occurs when Designer's Intended Product Emotions and Consumer's Emotional Response Overlap

Nevertheless, first, designers need to dig deep and find out whether there exists any emotional discontinuity in the design of the product. The comprehensive review of the literature revealed that the prior work in emotional design falls short in developing a method capable of investigating the emotional discontinuities in the visual design of a product. Thus, future research can be conducted to address the question: how the designer's envisioned product emotions and consumers' emotional responses be compared to reveal emotional discontinuities in the designer's intent and consumers' realization? It would be a practical means to corroborate what a designer envisioned to do and what transpired.

6. Conclusion

In this paper, we conducted an integrative review of 133 articles relevant to the topic of design and emotion. Through the critical analysis of these articles, four main themes or categories emerged: 1. The Terminology used in Emotion Research, 2. Consumer Emotions and their relation with the other factors in the 'before product purchase' scenario, 3. Theories of Product Emotion, and 4. Assessment of Emotion. The integration of valuable insights drawn from the review of the first two categories has resulted in developing a conceptual framework of consumer emotional response before product purchase. A key contribution of this study is that the insights gained from the review of the available literature provide an overview of the range of product design factors that are most likely to influence the consumer emotional response to products in the pre-purchase context. Consequently, the proposed framework is an important guideline on how these factors link with each other. Moreover, the framework shows there are direct, indirect, or both (direct and indirect) relationships between specific factors with consumer emotions. For example, the Environmental Factors directly impact consumer emotions, while the factors in the Judgement Criteria cluster have direct and indirect influences on consumer emotions. The paper also describes the application of the proposed framework citing several relevant research examples from the domain of design and emotion. A design team can gain valuable insights by consciously categorizing the context-specific design intents based on the cluster and factors discussed in the framework. Moreover, the framework presented is an effective means for suggesting promising future research directions to conduct studies based on specific parts and contributing factors of the framework, which are unexplored previously, and investigate their role in influencing consumer emotions.

Limitations and Areas for Further Research

In the study, the subject of analysis is limited to product design and emotion. However, a much more coherent and critical literature review is needed to generalize the current findings to be applied to other design disciplines like architectural design and graphic design. Although the study involves an extensive review of the available literature and presents a framework indicating the influence of different product design factors on consumer emotions, the proposed framework is still a theoretical concept that can be verified through case studies and empirical studies. Furthermore, the framework does not accommodate certain factors such as consumer characteristics like gender, cultural background, and personality traits. The limitations of this study provide some direction for future research. For example, a quantitative study could be undertaken to confirm the relation between the choice of product material and corresponding consumer emotional response when the same set of materials are examined with different senses. The numerical data obtained through such a study would allow a detailed understanding at the elemental level of the framework. Furthermore, the relevance of the framework could be investigated considering products in different market segments to allow a broader generalization of the findings. Similarly, determining the hierarchy of all the elements in a cluster that affects pre-purchase emotional response would provide more knowledge of the nature of the relationship existing among them. Finally, the study increases our understanding of the relationship between Emotion

and Design, and designers can effectively utilize it to discover further opportunities for new product conception.

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