

Characterizing Product Performance as Visual Imaging in Influencing Designer Design Thinking in Product Development

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Abstract

The main purpose of this research is to explore Product Design Images influencing factors to designers prior to Visual Methods to be presented within the Design Research context at the stage of Design Activity. The researcher has chosen the Sequential Explanatory Design to easily communicate the procedures for this mixed-method study. The significance of this project enables researchers to discover the underlying relationship and potential of Research Photography in the product development process for product performance analysis. Qualitative data through the Verbal Protocol Analysis model will potentially be supporting the researcher to investigate within the activity of designers understanding product performances and user needs.

Keywords: Product Design; Visual Methods; Photography; Design Activity

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1.0 Introduction

Determinants of design factors in design research activities are of long-term interest to researchers and practitioners because to have a good design; the designer needs to understand the user. Since product photography directly aids consumers' understanding of products, retailers often put much effort into polishing them. However, there is limited research on the impact of product photos in the designing process collectively. Most previous studies took an experiment-based approach, which delivered strict theories on some aspects of product design photos. This research uses image-processing techniques to holistically study product photos' impact, especially in Design Research (DR).

One of the most important interpersonal skills of being a designer is profound observation. Designers are naturally curious people. They are the type who is constantly explored by the desire to know. In design, having an eye for product ideation and the process is critical and being inquisitive on end-users and their behaviors to the designed product. Dig deeper into their needs to try to uncover all the 'why's'.

Abidin, S. Z. et al., 2008, described that in daily life, people like to use image words based on aesthetic features such as 'beautiful' and 'ugly' to invoke moods in an object or a product. However, the psychological problem focused on image perceptions or mental feelings for a product is full of fuzziness and uncertainties. Traditionally, this mental recognition problem with high fuzziness is usually solved by the designer based on his/her intuitive feeling, experience, inspiration from artistic works and habit. Later these intuitive feelings were formalized and structured through Kansei Engineering, where consumer feelings and demands were used to design a new product (Nagamachi, M., 1999).

Vermol et al., 2017, discussed how designer reflection formalizes principal understanding within the product sequence in action photo images. By having profound observation, the designer can better connect with the subject and associate empathy during the designing

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process by allowing them to immerse in the whole process. It is also helping to focus their perspective on the user and further be compassionate in detailing the purpose of the design.

The end goal of photography is to convey a message to the audience. Hence, a photo needs to have good composition, colors, subject matter, and lighting to achieve that goal. The elements in the scene provide an overall message more vital as random objects and glaring elements in a photo distracts designers as viewers to focus on the main subject and its story. It is also entirely accurate in terms of the design process. The design that the designer creates must be able to address specific pint-points and at the same time, support the functional objectives. There is no room for fancy and clueless styling that ends up looking 'nice' but unusable.

As photography provides vast information to the direction within product design development, it is proven that photo images are highly visual data that are easier to understand and remember. However, the literature is not clear when it comes to characterizing imaging factoring through product use information that may lead to optimizing designers' potential within their activities.

Series of research activities modalities in understanding designer's behavior during product development indicates visual images as an influencing factor that stimulates concurrent and retrospective experience. Vermol et al. (2017) explain how visual images of blind user activities influence designer perspective and understanding within the product in action. Further collective studies within Verbal Protocol Activity (VPA); Anwar, R et al. (2015) and Abidin, S. Z et al. (2009) portray the influence of 'influencing research panel' to be the source of designers mediating reflection when it comes to product ideation.

Therefore, this research brings forth designers' perspective and performance prior through empirical and pragmatic modalities. Weber (2008) adds that Visual Methods (VM) entail using images to learn about the social world via product image influence.

The terms "visual methods," "visual research," and "visual approaches" are considered nearly synonymous and they were depicting images that are factored through photography practices. VM functioned as a methodology and steer an entire research design, or it can act as one data-gathering technique within a multi-method study. Either way, such approaches are timely, given that images saturate contemporary life. Words or numbers are the primary types of proof in social science study, but data in visual forms may be an alternate or complementary means of discovery that is just as successful in transmitting results.

2.0 The Relationship Between Designer Intent and User Experience

The design process is a constitution formed by negotiations between several inequitable stakeholders, including designers, consumers, manufacturers and other parties involved in the production and consumption processes. Designed artifacts can be experienced in many different ways, including stimulation of the senses, the assignment of meaning and various forms of emotional response (Desmet & Hekkert, 2007; Schifferstein & Hekkert, 2008). This assortment of understandings is a design significant not simply to the physical results of modern outline for industrial design, also to the structures and spaces of engineering, but also the forms and spaces of architecture, the user interfaces of software applications, and the outputs of architecture many other design activities. Designers shape these artifacts to display specific components, and they can intend these elements to inspire certain understandings. As users experience artifacts, their understandings may be interrelated with those that were planned. However, they may construct different meanings depending on factors such as context, motivation, and values. This chain of understanding and knowledge sharing provides fundamental communication-based models in design bridging from designer intend to user response. The issues arise on communication-based models of design. However, most of these models are discussed in multiple areas of multiple disciplines of design literature (Crilly, 2004). Although communication-based models of the design appear in many branches of the design literature, they have typically been employed to illustrate particular issues and their relationship to more general communication-based design models is not readily apparent.

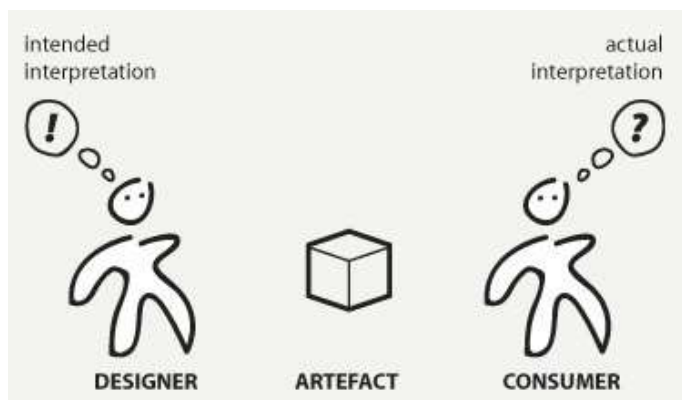


Fig. 1: The basic structure of communication-based model of design

2.1 Three Types of Product Experiences

There are three (3) levels or segments of item experience: aesthetic pleasure, meaning attribution, and emotional response. According to this definition, product experience is "the entire set of effects elicited by the interaction between a user and a product, including the degree to which all our senses are gratified (aesthetic experience), the meanings we attach to the product (experience of the meaning), and the

feelings and emotions that are elicited (emotional experience)" (Hekkert, 2007, p.160). A framework of product experience (Hekkert, 2007) below demonstrates how the three (3) levels of item experience being classified.

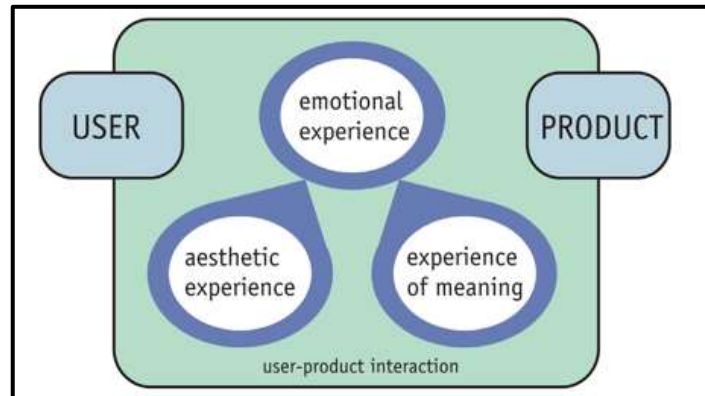


Fig. 2: Framework of product experience (Hekkert, 2006)

Aesthetic experience is observing from the point of production capacity in giving the pleasure and sensation from human faculty modalities, (Hekkert, 2006) explains how a product can be excellent to gander at, making an incredible sound, feel great to touch, or even notice pleasant. The collaborative study of literature reviewed provides information explaining the modalities of aesthetic value looking through by examining the evolutionary basis of the human perceptual system (see Ramachandran & Hirstein, 1999; see Hekkert, 2006 for an overview). In other words, partly a mechanism that influences the understanding of the human ability to appreciate products from perceiving their appearance. Norman (2004) refers to this state as 'visceral level of emotional design' and while there is also collective researchers consider it as the cognitive response category 'aesthetic impression (Crilly, Moultrie, and Clarkson, 2004).'

Emotional experience provides brief information on the level of human emotion that affects the relationship to surroundings. It is essential to understand how human emotion involves in such activities where detailed preferences coming from the product may arouse comfort or discomfort affection. Feelings are beneficial because they build up human position versus their surroundings, pulling them toward specific individuals, items, activities, and thoughts and pushing them far from others (Frijda, 1998). This essential guideline applies to all feelings; the fantastic feeling that human involvement may result in a circumstance that debilitates fundamental survival needs and the inconspicuous feeling that we may see involvement because of human-product interaction.

At the level of meaning, Deckert described it as a process where cognition plays a factor. It is considered as the process where interpretation, memory retrieval, and associations come into play. Through meaning, human metaphors assign personality or other expressive characteristics and assess the personal or symbolic significance to products that can be recognized. This experience segment compares with (Crilly et al., 2004) cognitive response categories 'semantic interpretation' and 'symbolic association.' Crilly described product semantics has minimal relevant interpretation to what may appear in communicating about itself. An extension of knowledge of what becomes the fundamental identity of a product may represent the symbolic association, where the distinction is made between how the product is seen and what indicates the owner.

2.2 Product Photograph As Visual Stimuli

To conduct a thorough analysis of the effectiveness of product photography in influencing consumer perception, a photo is categorized into three-level: Esthetical level (the form of a photo), referential level (the content of a photo) and communicative level (meaning of a photo). Weber (2008) explains ten reasons why images in research can prove valuable.

1. Images can be used to capture the ineffable, the hard-to-put-into-words.
2. Images can make us pay attention to things in a new way.
3. Images are likely to be memorable.
4. Images can be used to communicate more holistically, incorporating multiple layers and evoking stories or questions.
5. Images can enhance empathetic understanding and generalizability.
6. Through metaphor and symbol, artistic images can carry theory elegantly and eloquently.
7. Images encourage embodied knowledge.
8. Images can be more accessible than most forms of academic discourse.
9. Images can facilitate reflexivity in research design.
10. Images provoke action for social justice.

3.0 Methodology

The quest begins by introducing the research models used by the researcher in staging the design activity of this study. As this research utilized the mixed method design approach, both quantitative and qualitative data were collected sequentially. This study starts with a

broad survey to generalize findings to a population before focusing on qualitative, open-ended interviews to collect detailed opinions from the informers.

In designing the study using a mixed-method design, four factors contribute to the procedures of this study – timing, weight, mixing and theorizing. The researcher has chosen the Sequential Explanatory Design to quickly communicate the procedures for this mixed-method study, as adapted from Morse (1991), Tashakkori and Teddlie (1998), Creswell and Plano Clark (2007) and summarized by Creswell et al. (2003).

Therefore, the Sequential Explanatory Design strategy as shown (refer Fig.3: Sequential Explanatory Design strategy below) will be the starting point pertaining to the activity of preliminary data collection and analysis through quantitative approach during the first phase of the research and followed by the collection and analysis of qualitative data which was build based on the results from the first quantitative study. Typically, the weightage of collected feedback data will be analyzed through the quantitative approach, determining the variables for the qualitative phase.

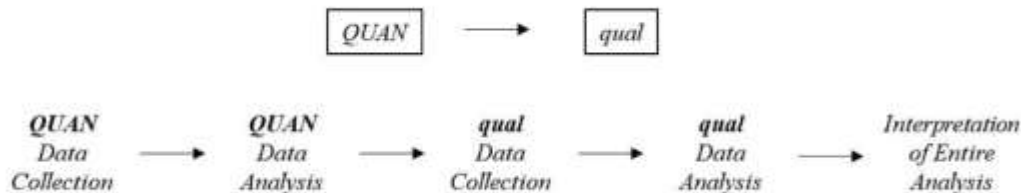


Fig.3: Sequential Explanatory Design Strategy

The scope of this research will be on the communication between photographer and designer regarding the image's substance and how to make the image relevant to the designer and vice versa. The protocol analysis of critical live performance design analysis will be engaging with the designer and image result from the photographer.

Referring to Banerjee & Chaudhury (2010), a sample is a part of the defined population where each person in the sample is adequately chosen, with the inclusion and exclusion criteria are well defined. For a designer selection basis, they are selected as per their experience group.

Table 1. Level of expertise according to Watson Wyatt Worldwide

An example of a column heading	Column A (t)	Column B (t)
Entry	0-1 years professional experience	Lead Level
Intermediate	1-3 years professional experience	Lead Level or First Level Management
Senior	3-5 years professional experience	Lead/Section Head Level or First Level Management
Lead	5-8 years professional experience	Middle Management

(Source: <http://www.sidathyder.com.pk/downloads/Guide-to-Job-Mapping>)

The research sample selection will be subjected to the designer within the product design background, 20 – 57 years old (average age 39.7) and clustered via the level of their experience – Dagman, 2010.

The aim of the qualitative approach is to provides illumination and understanding of complex psychosocial relationships within users' product experiences through the aspects of communication, ergonomic and technical as helpful in answering humanistic questions of 'what?', 'why?' and 'how?' in generating design information technical supports in providing design information feedback for designer to look into in performing design ideation on paperwork. Thus, this communication bridge provides advancement to a dynamic information transfer looking into the relationship of users and product designers. Sample selection, therefore, will be conducted following the level of expertise according to Watson Wyatt Worldwide (Table 1).

3.1 Verbal Protocol Analysis

Verbal protocol analysis (VPA), referring to Miller (2003) and Abidin (2012), represents a method of data collection through analyzing human verbal data on cognitive processing. It is also known as the method that involves the detailed recording of humans' verbal reports while carrying on a specific task—for example, from this research, performing product in the context of use referring to individual experience. Miller (2003) also explains that VPA is also known as 'thinking loud protocols.' This thinking loud represents an individual inner voice of what he or she thought about the issues involved. Verbal reports are developed through specific instructions that making someone involved as the respondent 'think aloud' through minimum prompting from the researcher. During the process, verbal reports

can be divided into types of approaches is "Concurrent Protocols" and "Retrospective Protocols," depending on the structure planned for the research (Miller, 2003; Hoc and Leplat, 1983; Bowers and Snyder, 1990).

3.2 On-Site VPA Camera Setting

First pilot tests were completed before deciding to move on to the final pilot test. The pilot tests conducted lead to adding up an extra two cameras on the right and left side behind the respondent shown in Illustration. 5. It is mainly influencing procedural changes in obtaining a better overview on what and which are influencing the viewing from the respondents view and how do respondents' hands explores these elements (See view "Cam 3" and view "Cam 4" on Fig.4). On-Site VPA refers to the study by Woods (1993) focusing on the study approach of human decision-making and problem-solving outside the usual psychology laboratory. It provides natural settings for the respondents' cognitions to process and reflect.

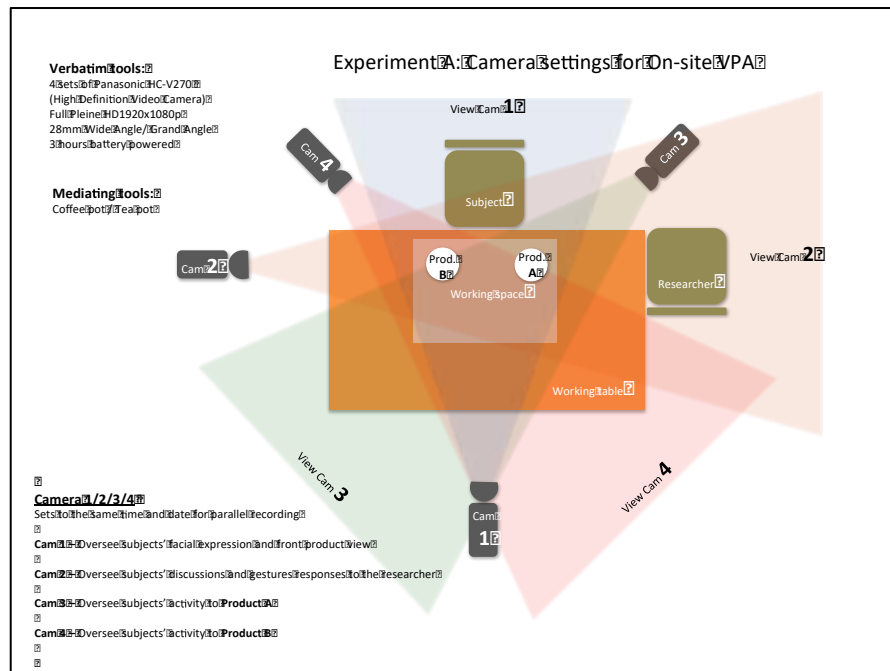


Fig. 4. VPA Lab Setting adapted from Vermol et al., 2017

3.3 Research Design

For the quantitative part of the study, the sampling method uses a non-random sampling of (n=30) from a population of designers of 3 levels (Senior Designer; Novice Designer; Junior Designer). Each member of the population has an equal chance of being included, but the first 30 individuals who volunteered were used as samples. The size of the samples is ensured to be appropriate with the time frame and budget. A snowball sample is used in the qualitative study, where one case identifies others of his kind.

For the present study, two sources of data collection are applied: primary sources and secondary sources. Primary sources include the responses from the research sample, as will be stated below. The later secondary sources consist of the literature reviews from scholarly articles, publications and others.

A survey through the distribution of questionnaires is one of the forms of primary data collection method, which allows the collection of data directly from the samples. In this study, the survey was given through an online form, considering the limitations that may be faced for the respondents to respond on physical papers. Before constructing the questionnaire, the researcher identified the respondents' medium of preference to access the questionnaire. The other half of the data collection phase will be conducted through observation and interview within the modality of Verbal Protocol Analysis, reflecting the work of Green, Alison (1998) in collecting observation of concurrent and retrospective respondent experience through verbatim information. An interview will be conducted based on the key results from the earlier survey. It seeks to validate the acknowledgment of a phenomenon from the opinion of respondents. Observation of qualitative data will offer to the identification of a shared pattern of human behavior over time among the populations by engaging in their on-site experience feedback through series of product images as mediators.

As mixed method design is applied in this study, qualitative and quantitative data are analyzed differently. The program's ability to handle a large set of variables allows mass data to be collected and statistically analyzed. The data will be analyzed for the qualitative collection of data by identifying the common patterns within the responses. The patterns will then be analyzed in a way that is in line with the research objectives. Observation will be conducted and sequentially analyzed on-site. Data will be collected through a note, photo and video recording.

4.0 Conclusion

This research intends to look into the results that will enable researchers to discover the underlying relationship and potential of Research Photography (RP) in product development for product performance analysis.

A qualitative data of this study through Verbal Protocol Analysis model will potentially support the researcher to investigate within the activity of designers understanding product performances and user needs. As a whole, the significance of this study creates a spectrum research approach to cater to user needs from design, especially to those coming from the group of special needs.

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