A Pleasant Product from the User's Points of Views
-Case Study: A Vehicle Design in Japan-

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Abstract: Universal design was developed in the US in late 1980s, and has become an important concept for product development [1]. The concept of Universal design has focused on accessibility, ease of use and functionality based on measurable and observable cognitive activity. However, it is not enough that we build products that function, that are understandable, and usable- we also need to build products that bring pleasure, fun and joy, to people's lives [3]. Emotion plays an important role in daily lives, helping assess situation as good or bad, safe or dangerous. Reaching into user's emotional being takes a tremendous amount of understanding about how users live, and what they want, need and dream about. There are some properties and features needed to consider for creating pleasant products that fulfill users' emotional satisfactions, such as; aesthetics (beauty), quality and cost. The present study aims to identify the important features and properties for improving Universal Design products from users' point of views. To achieve our aim, a questionnaire was conducted with 70 Japanese people, including older and disabled and able-bodied people. Vehicles design in Japan was selected as a case study due to their rapid advance and development. We selected two commonly used Universal Design vehicles in Japan, Mini-Van and Compact. Each participant was asked to put the above four properties (usability, quality, aesthetics and cost) in order of importance. The main results of a literature survey and a questionnaire revealed the following; first, four elements are recommended for designing products triggering "happiness" in one's mind. Secondly, usability is not enough for meeting the participants' requirements and desires. Most of the participants agreed that usability, beauty, quality and cost should be put in harmony for creating a pleasant product. Thirdly, there are clear relationships between the importance of each feature and the participants' abilities, ages and incomes. As a result, the gap between what a universal design product can do and what a user needs was identified. This paper will be of interest for design researchers, practitioners and educators, and/or anyone who are interested in this area of design.

Key words: Emotion, Usability, Product Design.

1. Introduction

Universal Design (UD) is defined as "the design of products and environments to be usable by all the people, to the greatest extent possible, without the need for adaptation or special design" [12]. The seven principles of UD are not intended to constitute all criteria for good design, only universally usable design. Certainly, there are other important features, such as quality, beauty and cost [3]. These features must also be taken into consideration for developing UD products. The design of smart and universal products involves undesirable, yet frequent, cases when compromises between the quality of appearance, functionality, price, beauty and usability are required [9]. This study aims to identify the important features for developing UD product from user's point of views. We tried to identify how a user thinks of usability, quality, beauty, and cost. Furthermore, how he/she prioritizes them according to their requirements and desires.

2. Methods

In the beginning, we carried out a literature survey, so as to understand the main features of UD product. Furthermore the important features for getting "pleasurable design" were identified. Based on a literature survey, four features were selected to prioritize according to the users' requirements. These features are; usability, quality of design, beauty and cost. For a case study, UD vehicles in Japan are selected because of their rapid advance and development. Secondly, a set of questions was delivered to 70 Japanese people, including disabled, older and able-bodied people. The participants were asked about their age and income. The main questions focused on putting identified four features in order of importance from each participant's perspective. Thirdly, the participants' answers were analyzed.

3. Results and Discussions

3.1 Pleasure with Universal Design

The seven principles of UD intend to regard usability as a main feature for designing UD product. When discussion matters of usability, focus is usually kept on functionality whilst other aspects, such as aesthetics, are neglected. The International Standards Organization [7] defines usability as "the extent to which a product can be used by specified users to achieve goals with effectiveness, efficiency and satisfaction in a specified context of use. Universal Design emphasizes the importance of usability. However it is not enough that we build products that function, that are understandable and usable- we strongly need to build products that bring joy and pleasure to people's lives. Pleasure is defined as "the agreeable emotion accompanying the expectation, acquisition, or possession of something attractive, good or desirable" [8]. Pleasurable product has to generate and sustain good feelings. It must be fun to use, delightful and exciting [11].

Pleasure (positive emotion) has not only elicited from usability, but also from product aesthetics. Aesthetics "beauty" considers an important feature to the design of products and services [3]. It is defined as "the qualities that give pleasure to the senses" [10]. According to Norman's ideas of emotional design, beauty many affect usability.

Emotion plays an important role in daily lives and aids in decision making. In other words, it affects how the mind works. An emotion is defined as "a mental and physiological state associated with a wide variety of

feelings, thoughts, and behavior. Emotions are subjective experiences, or experienced from an individual point of view". It is often associated with mood, temperament, personality, and disposition. Emotions have two kinds: negative "such as, annoyance, anger" and positive "such as, happiness, pleasure". Positive emotions are critical to learning, curiosity and creative thought. According to this finding, how could aesthetics affect how a product is easy to use? The role of aesthetics in product design: attractive things make people feel good, which in turn makes them think more creatively and find solutions to the problem they encounter. We in a positive state are more likely to be creative and seeing the big picture instead of concentrating on minor difficulties [4]. This theory indicates that usability is subordinate to visual attractiveness "aesthetics" in the human mind.

The next part will discuss the important and beneficial principles of aesthetic pleasure for developing a product design [5]. These principles mostly operate across the senses.

Principle 1: Maximum effect for minimum means

It means that a minimal amount of means, such as effort, resources, brain capacity should attain the highest possible effect, in terms of survival, reproduction, learning or explaining. So a visual pattern is pleasing to the eye when relatively simple design features reveal a wealth of information, such as in caricatures or impressionistic paintings.

There are two special cases of this principle, conjunctive ambiguity and metaphor. When a pattern is ambiguous, it allows for more than one interpretation. Conjunctive ambiguity is a way to enhance the beauty of a pattern. Metaphor has been seen as a stylistic device to say something that is difficult to express in words. For this reason, we often use metaphors to express our emotional feelings, as in "frozen with fear".

Principle 2: Unity in Variety

Going back to the functions of the senses, we see that most of them are active in gathering information about the world and identifying what is bad or harmful or what is good or contributes to our survival. The world out there is however loaded with information and we can simply not pick up any source that happens to be within reach. It is therefore beneficial to perceive connections and make relationships; to see what belongs together and what not. In sum, in order to perform these tasks, our sensory systems must detect order in chaos or unity in variety. This principle is often applied in meals to make us appreciate the variety between the courses, while at the same time the taste within each course have to correspond, hence in variety. Solving puzzles, finally, is an interesting case. Because we like to see connections, we also consider it aesthetically pleasing to invest effort in finding them. This may explain why we are attracted to people and designs that do not give everything away at once, such as complex buildings and products that make use of translucent materials to partly conceal the internal components from human eyes, like the famous Apple I-mac.

Principle 3: Most advanced, yet acceptable

One of the most tested theories in aesthetics is the preference-for-prototypes theory. According to this theory we prefer the most typical examples of a category, the ones that are often also very familiar and we have been exposed to repeatedly. Such a preference for familiar things is adaptive since it will lead to safe choices instead of risking the unknown. At the same time, people have always been attracted by new, unfamiliar, and original things, partly to overcome boredom and saturation effects. Since these two theories seem incompatible, it is to

some extent possible to increase the novelty of a design while preserving its typicality.

From the above discussions, this study identifies the relationship between usability and aesthetics, furthermore, their importance for developing a product design.

On the other hand there are other features/aspects essentially needed to be considered for creating pleasura ble products: manufacturing and cost. The manufacturing component involves quality [2]. Quality is defined as a degree of excellence or worth, e.g. materials, finishing, etc. [13]. Both usability and beauty affect quality [6].

After giving an overview on the relationship between usability and the three features identified (beauty, quality and cost), it can be said that usability does matter, but only as a p art the entire complex of factors. To create "a pleasant product", knowledge and understanding of the users must be investigated.

The following part identifies the users' opinions on these four features (usability, beauty, quality and cost). A questionnaire was conducted with 70 Japanese people (9 disabled persons, 20 older persons, and 41 able-bodied persons). A vehicle design is selected as a case study. We selected two commonly sized UD vehicles in Japan; Mini-van and Compact. The participants were asked to put the four features identified in order of importance.

3.2 Pleasurable Design from Users' Perspectives

A. Disabled People's Answers

First, 7 participants out of 9 (their ages ranging from 19 to 24 years) selected Mini-Van as a preferable car size to use. The other two participants selected compact car to use. Secondly the results of the questionnaire regarding the important features for designing UD vehicle are as follows (Figure 3): in case of Mini-Van car, usability and beauty are the top priorities. Cost comes in the second level of importance and the last feature is quality. As for compact vehicle, usability and quality take priorities over all other features. Beauty comes in the second level of
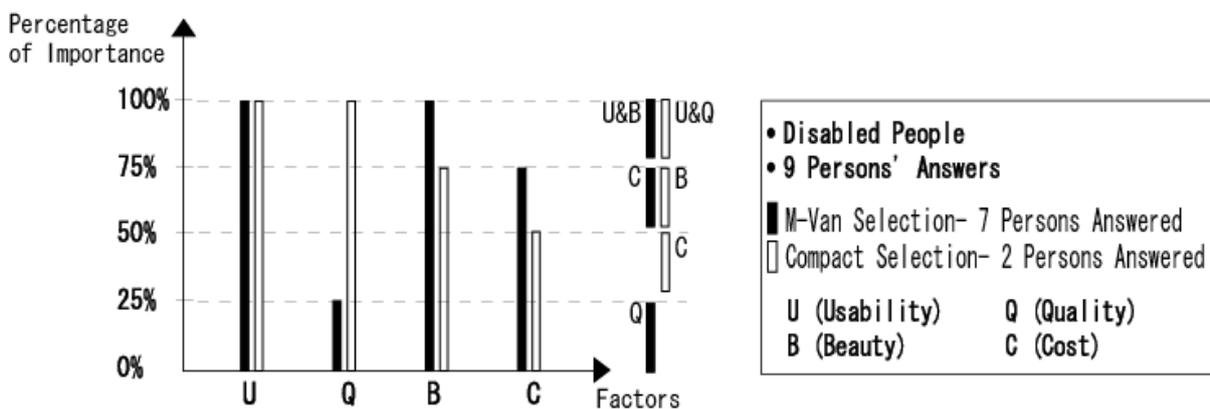

Figure. 3   Disabled People Put "Usability, Quality, Beauty and Cost" in Order of Importance

importance and cost is in the last. Some disabled persons mentioned that usability is no longer enough to satisfy their needs. Usability has become something that they take for granted. And many features must be considered.

B. Older People's Answers

First, 8 participants out of 20 (their ages above 60 years) selected Mini-Van vehicle size to use and the other 12

participants selected compact vehicle. Secondly, the results of a questionnaire regarding the important factors for designing UD vehicle are as follows (Figure 4): in case of Mini-Van vehicle, usability has a first priority, then
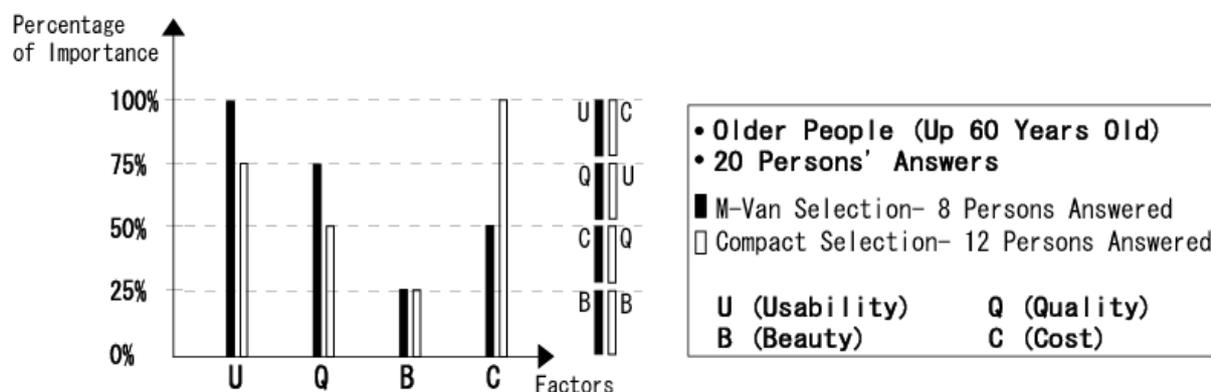

Figure. 4   Older People Put "Usability, Quality, Beauty and Cost" in Order of Importance

quality. Cost is the third feature of importance and beauty comes in the last. As for compact vehicle, cost has the highest priority, as many participants retired and don't have regular income. Usability, quality and beauty come in the second, third and fourth levels of importance respectively. Older people believe that usability and other features must be in balance.

C. Able-bodied People's Answers

The participants are classified into three categories according to their ages. First category (19-24 years old) is college students. 6 people out of 12 chose Mini-Van car to use, and the other 6 people chose compact car. As for the important features for designing UD vehicle, we found the following (Figure 5): in case of Mini-Van car, beauty is the top priority. Usability, cost and quality come in the second, third and fourth levels of importance respectively. Concerning compact vehicle, usability and beauty take priorities over all other factors. Cost and quality come in the second and third levels of importance respectively.

Second category (25-40 years old) is workers. 12 participants out of 17 selected Mini-Van car to use, and the other 5 participants selected compact car to use. In case of Mini-van car, beauty has the first priority. Quality, usability and cost come in the second, third and fourth levels of importance respectively. As for compact car, beauty and cost are the top priorities. Usability and quality come in the second and third levels of importance respectively (Figure 6).

Third category (41-60 years old) is also workers. 4 participants out of 12 selected Mini-Van as a preferable car size to use. The other 8 participants selected compact car to use. In case of Mini-Van car, quality is the top priority. Beauty, usability and cost come in the second, third and fourth level of importance respectively. Concerning compact car, usability and cost have the first priorities. Quality comes in the second level of importance and beauty is in the last (Figure 7). Many participants of this group believe that a beautiful vehicle is more usable and desirable. In other words, any product looks beautiful works better. But one thing we need to

add that a product has to work well, easy to use and learn, as well as attractive in order to be truly beautiful.

The results of a questionnaire indicate that there is a relationship between each feature and the participants' ages and status (Figure 8). In case of Mini-Van vehicle, "usability" is in the top priority among younger (19-24 years, including disabled and able-bodied people) and older participants (above 60 years). Concerning "beauty", it has a critical relationship with the people's ages. The need for beauty may not be universal. People are not equally sensitive to beauty. But most people do care. The need for beauty is high among the participants who their ages are ranging from 19 to 40 years. In contrast, we found that "beauty" is not strongly required for the participants whose ages are above 60 years. As for "cost", it is an important factor for younger (19-24 years) and older participants (above 60 years) due to the income limitation. Obviously, the requirement for "quality" is high among the participants who their ages are ranging from 25 to 60 years. In case of compact vehicle, the need for usability is high among all the participants. Beauty is more required among younger participants than older one. Cost and quality are essential features for almost all the participants.
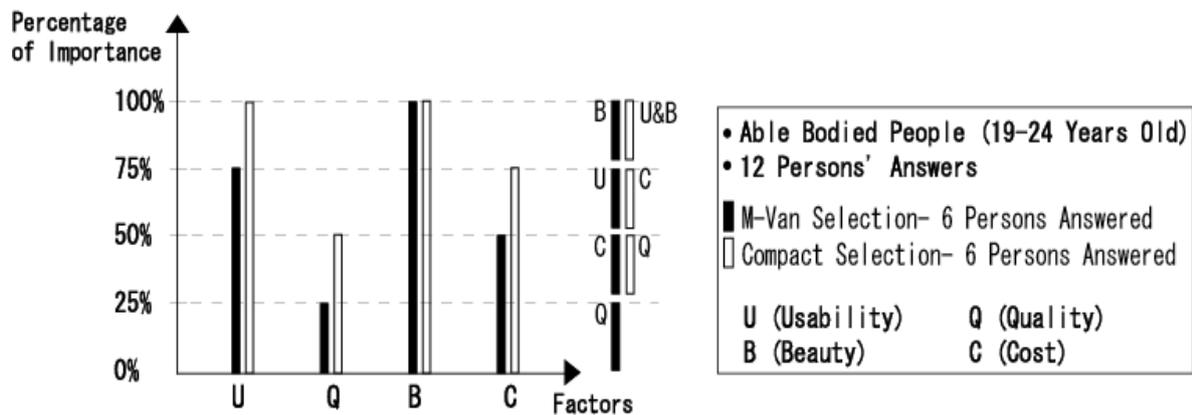

Figure. 5   Able- bodied people (19-24 years old) Put the Four Features in Order of Importance
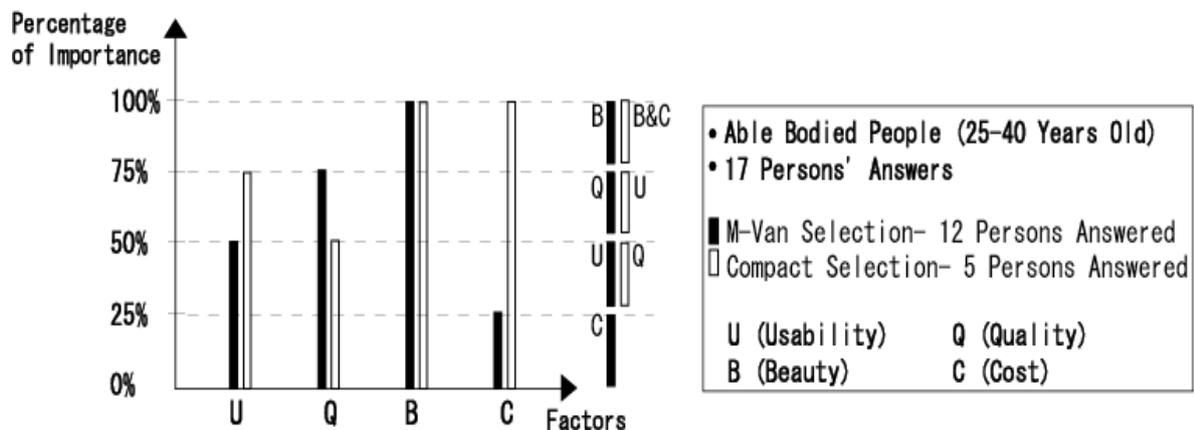

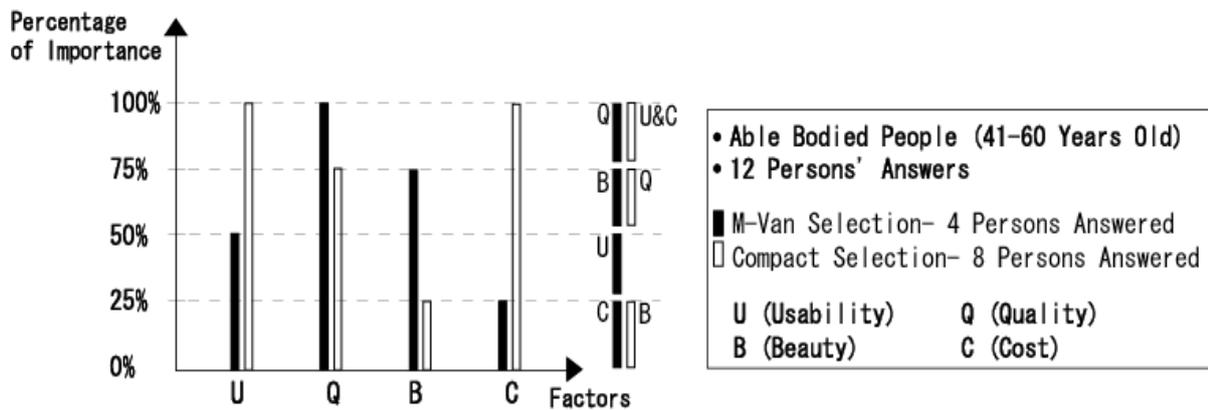Figure. 6   Able- bodied People (25-40 years old) Put the Four Features in Order of Importance

Figure. 7   Able- bodied People (41-60 years old) Put the Four Features in Order of Importance

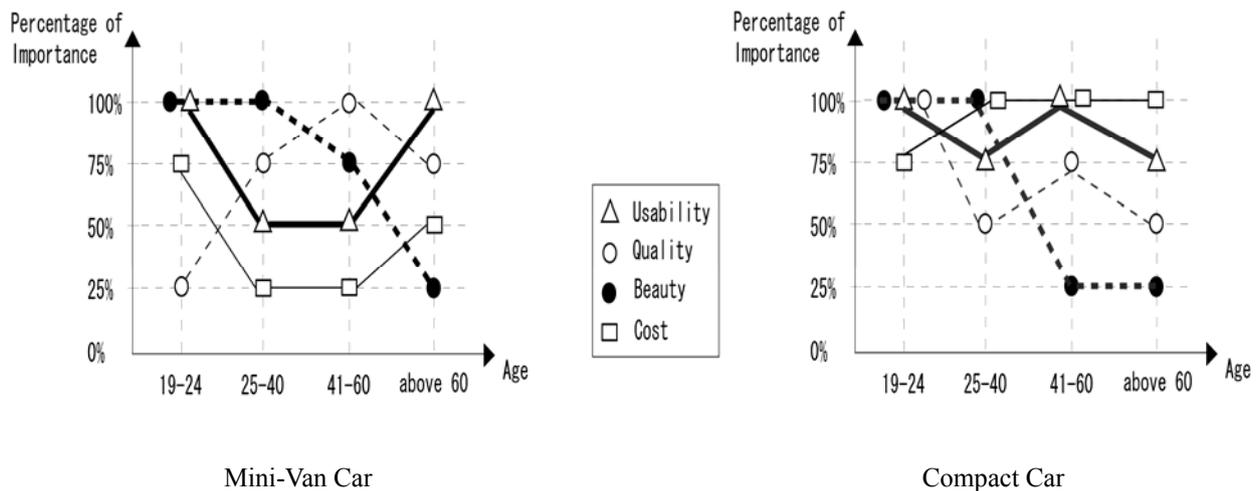Mini-Van Car   Compact Car

Figure. 8   the Relationship between Each Factor and Participants' Ages and Status

This study detected that usability is not enough for creating good product. We need to branch out beyond making something usable into making it desirable and pleasurable.

4.   Conclusions

This paper ai med at i dentifying t he m ost im portant fea tures for developing Universal Desi gn product t hat satisfies a majority of users across the generations. The authors tried to provide Universal Design marketing with a po int where u sability will no t be eno ugh i n satisfying the u sers' req uirements. The resu lts of this p aper indicated that users want a product that affords a pleasure to them and to use. It is important to consider usability, quality, beauty and cost for developing Universal Design product and put these objective features/properties in harmony. The se feat ures a re means for providing u ser/s w ith p leasure an d satisfaction. And th is mu st be th e Universal Designer's goal.

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