NILAI AFEKTIF BULUH: PEMBANGUNAN PRODUK BERNILAI SEMANTIK BAGI PENILAIAN KEJURUTERAAN KANSEI

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Abstrak

Memahami persepsi masyarakat saat ini tentang bambu sebagai material sangat penting untuk mendesain produk bambu menggunakan Teknik *Kansei* (KE). Mempertimbangkan perasaan atau kesan dari masyarakat terhadap material dari produk melalui pengalaman mereka akan membantu mengembangkan nilai-nilai berbasis semantik sebelum menghubungkannya dengan ciri fisik produk. Karena kebutuhan akan nilai bisa berbeda di antara masyarakat, penyelidikan nilai-nilai yang penting secara umum perlu dilakukan. Tujuan dari penelitian ini adalah untuk membangun nilai-nilai afektif yang penting, yang diungkapkan dalam beberapa kata untuk diterapkan pada produk baru yang terbuat dari bambu yang diawali dengan pemahaman tentang persepsi masyarakat saat ini tentang bambu sebagai material. Dengan menggunakan metode etnografi, diagram afinitas, dan diskusi kelompok terarah, kata-kata dikumpulkan, dan diurutkan menjadi enam kata yang mewakili nilai afektif. Ditemukan bahwa terdapat persepsi negatif seperti kesan miskin, rapuh, atau ketinggalan zaman pada bambu sebagai material dan bahwa kesan mewah, kuat, modern, bagus, menarik, dan alami adalah nilai afektif penting untuk dikembangkan ke dalam produk bambu yang baru.

Kata kunci; Bambu, Nilai Afektif, Persepsi, Teknik *Kansei*.

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THE AFFECTIVE VALUES OF BAMBOO: DEVELOPMENT OF PRODUCTS SEMANTIC VALUES FOR KANSEI ENGINEERING EVALUATION

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Abstract

Understanding current people's perception of bamboo as a material is definitely important for designing a new bamboo product using *Kansei* Engineering (KE). Considering people's feeling or impression of materials for the product through their experience will help to develop the semantic-based values before connecting it to the properties of the product. As the need for values could be different among people, an investigation of general important values should be conducted. The aim of this study was to build important affective values expressed in some set of words for new product made of bamboo preceded with an understanding of current people's perception of bamboo as a material. Using the ethnographic method, affinity diagram and focus group discussion, words were collected, and sorted into six words represent the affective values. It was found that there are negative perceptions such as poor, weak, or outdated in the bamboo as material and that the impression of luxurious, strong, modern, nice, interesting, and natural are important affective values to be developed into new bamboo products.

Keywords; Affective value, Bamboo, *Kansei* engineering, Perception.

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1.0 Introduction

1.1 Background

New technology in the utilization of bamboo for building construction and product making is more varied today adding to the traditional technique. The emerging of engineered bamboo as one of the modern techniques considerably can substitute wood and other material with some technical advantages (Chaowana, 2013; Van der Lugt, P.; Otten, G. 2006). Despite this reality, bamboo utilization for product and its demand is still within small to medium scale, and most of the raw bamboo currently harvested is used to create small products (S. Rittironk & M. Elnieiri 2008). There are many reasons for low demand on the product made of bamboo; one of them could be caused by people's perception on the bamboo itself (Van der Lugt, P., Otten, G. 2006; Akoto, 2017).

Generally speaking, there is many aspects need to be considered in applying material for product besides its technical properties. For example, to apply material visible on the surface of the product must consider aspects related to visual stimuli such as aesthetics and impressions (Motte, D. 2009). It is understandable that when a product made of wood exhibits its beauty of texture, it always ask for a higher price. It is not because of its usability, durability, or strength, rather caused by its visual stimuli that more to be a subjective feeling (Han and Hong, 2003). It happens with all materials, including bamboo as a surface material. The physical characteristics of bamboo are well known, but not with their affective value. It's directly connected to the experience of the user who interacts with the product (Motte, D. 2009).

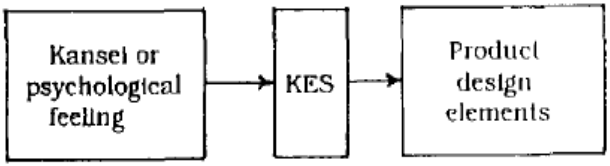
User experience approach in design method that encompasses all aspects of the end user's interaction is getting more acceptable today in planning a product. One of the aspects that considerably important is the affective value of the product. Therefore, evaluations of products based on visual stimuli are needed to connect the subjective aspect of the user to the physical properties of the product. The array of user experience in correlation with product design includes emotion, enjoyment, aesthetics, hedonic quality, engagement, and motivation (Bargas & Hornbaek, 2011). As a product is not only a matter of technical solution, the method for planning a product is also broadly developed in connection with many disciplines such as psychology, physiology, social science and so on. *Kansei* Engineering (KE) is one of the design methods applying user experience approach that developed into an interdisciplinary study. The term *Kansei* is defined as ''a Japanese word which implies a customer's psychological feeling and image regarding a new product''(Nagamachi, 1997). The method is now developed into six types using a varied technical approach (Grimsaeth, Kjetil et.al, 2010). Every type can be applied to some specific circumstance depend on its project's needs (Nagamachi & Lokman, 2016).

1.2 The Study

Evaluation of products base on visual stimuli tends to subjective, but important at the same time (Nordvik, Schutte, & Broman. 2009). On the base of the visual stimuli, the objective of this study was to develop important affective values for new product made of bamboo supported with an understanding of current people's perception of bamboo as a material. The type I of KE was the subject that connected to this study. It is the method that using semantic differential analysis on a set of pairing-adjective indicating the affective values of products, base on technique by Osgood (Osgood and Snider, 1969).

Mitsuo Nagamachi, the founder of Kansei Engineering in 1970 create the methods to facilitate the human emotion or feeling to be integrated into the products, working system, the social system as well as service system (Nagamachi, 2018). The success of product development by Nagamachi, such as the sports car Mazda Miyata, Wacoal brassiere, a refrigerator by Sharp make the method to be adopted by companies in Japan and abroad. The type I Kansei Engineering System as used in developing the Mazda Miyata is basically a process of transferring a zero concept such a feeling into more realistic and design detail of tangible product properties (Nagamachi, 1995). As illustrated in the following graphic:

Figure 1: A Diagram of a Process of Kansei Engineering System (KES) (Nagamachi, 1995)



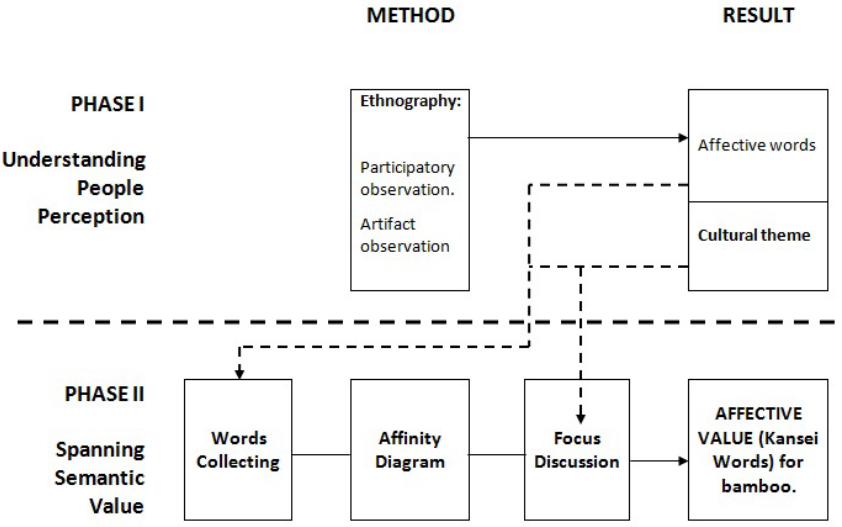
The psychological feeling on the products can be identified in expressed words called Kansei words put in value or semantic space. A Kansei product implies a connection between semantic-based values and physical properties, both presented as vector spaces (Nagamachi & Lokman, 2016). To connect the semantic value to the product properties, statistical method is applied, such as factor analysis and multiple regression. As a tool for product development, the KE can be used to introduce or to improve affective values to the new product (Schutte, Eklund, Jan R & Nagamachi, 2004), like bamboo-based products. However, before translating the values into new design solution and parameters, as an effort to develop the bamboo into products, it is better to understand firstly how the existing people's perception on the product made of

bamboo. It will make possible to determine what affective values need to be changed, maintained, or introduced into the new products.

2.0 Research Methodology

The study carried in two main phases; 1). Phase I was obtaining a comprehensive understanding of people's perceptions of bamboo as a material, 2) Phase II was spanning the semantic value for the bamboo product and extracting it into important affective words (*Kansei* words). Both phase and its connection were explained graphically in "figure 2", in which the dash-lined arrow symbolizes a contribution.

Figure 2: Research Method, Result, and its Connection.



2.1 Phase I: Understanding People's perception of Bamboo as Material

When studying a fundamental aspect of human experience, we can learn from what people do, what people know and the things they make and use (Spradley 1980). Its expressed on artifact, knowledge, and behavior, that all are called as a culture. Therefore, a cultural approach using

ethnography was considered suitable to understand the people's perception (Davies, 1998) as well as exploring affective values expressed in words (Shaari, 2010). Illustrated in "Figure 2", the ethnographic method has two important roles in this study: 1). To understand current people's perceptions of bamboo to get recommendations in developing positive affective value, and 2). To collect *Kansei* Words for spanning the semantic space in KE.

2.1.1 Participatory Observation

Our method was base on "Participant Observation" by James P. Spradley in which cultural inferences technique can be made through listening to what people say (speech messages) (Schutte, 2002) related with artifact existence to understand what they feel and what they know. In this study, "people's perception of bamboo as material" is determined as domain analysis.

A participatory observation was conducted in several well-known places located in Java, Indonesia. Purposive sampling (O'Reilly, 2009) for the location was carried, and three locations were selected; a recreation facility, private cultural preservation, and a bank. These three environments applying bamboo for many parts of its building, that participant visitor can feel its existence. We immersed in the selected social setting and serves as a visitor in the chosen situation with the permission of the authority owner. Observations took places over six-month (between March - September 2016) and meet 32 visitors (18 male, 14 female) with age around 40.

During participatory observation, a semi-structured interview about bamboo was carried in an informal daily talk-like and convenient way in which the researcher queries informant questions that can emerge adjective from their opinion in applying bamboo for products or building components around the locations. Field note and audio recorder were used to collect data. The interview started with the following introductory question; how is your opinion about the bamboo applied in this place? do you feel something different for its appearance? could you express how should they used?. Other open-ended questions were then used as a guide to elicit the views of the visitors, such as on whether they perceived the bamboo application was good visually; what is the reason for use or not use bamboo as material and why?

2.1.2 Artifact Observation

Artifact correlated with interpreting experience, in which human beings act toward things on the basis of meaning that the things have for them (Spradley 1980). In this study, the artifact observation was started with some questions in mind; what the environment is all about? Is there any connection between bamboo existed in the location, with whether a tangible or intangible aspect

of the location? How is the bamboo used and treated in the environment? Since the answer to the question was interpretative, it should be clarified and/or connected to the result of the interview with the visitor, authority owner or other information sources in a snowballing technique. It serves as a confirmatory study or triangulation method for validation as well as extraction of affective words.

Figure 3: (a) BTPN office, (b) Kampung Bambu, (c) Saung Angklung Ujo

"Figure 3" shows the three selected location in which bamboo intensively used and utilized in diverse techniques; (a) interior of BTPN (*Bank Tabungan Pensiunan Nasional*), (b) recreation facility: *Kampung Bambu*, (c) private cultural preservation: *Saung Angklung Ujo*. These three locations applying bamboo in many parts of its building, in which participant visitor can feel its existence and atmosphere. Field note was used to record on site self-answer to be compared to other information resources.

2.1.3 Data Analysis

Transcript of the interviews and field notes of the observation regard as the component of analysis (Spradley, 1980) in Phase I. Open coding was structured using keywords, phrases, sentences, and paragraphs from it (Strauss, 2008; LeCompte, 2013). Meaning was built by reading and re-reading the transcript and the original interviews and field notes to get contextual understanding. The result of coding was always compared to the relevant concept or meaning and then to be grouped into subcategories or categories.

The revision of the generated codes is an iterative process, including repeated analysis of data that result in category modification and verification. It was then followed by creating axial coding (Strauss, 2008) in order to find subcategories that emerge from the initial category, and then more codes that are relevant were discussed and conceptualized to emerge possible themes. The themes function as an element in the pattern that makes up a culture (Spradley, 1980).

The main theme related to the people's perception of bamboo was then discussed. The discussion was basically to seek any ideas of the major theme and its description that can be emerged from across the sub-themes in the culture being studied. A model of data triangulation was created from field notes during participatory observations, artifact study, transcripts of interviews with visitors, and other resources. This strategy provides a better understanding of the cultural domain and also serves the purpose of validation. The transcripts made of artifact observation field notes, visitor's comment, and interviews provided a particular view of the individual in the specific visual environment, validating the meanings and interpretations of perception of bamboo as material in the locations observed during the fieldwork.

2.2 Phase II: Spanning Semantic Value

2.2.1 Words collecting from media

In the basic principal of KE type I, a semantic space of product should be broadly spanned to find many possibilities of value. The affective values that expressed verbally in an adjective form of words, whether spoken or written are needed for *Kansei* engineering evaluation Type I. It may be adjective expressing an ordinary and already accepted quality, or new conceptual ideas to be introduced into the new product. Although the new conceptual affective values can be explored anywhere without any cultural border, the selected words should be easy to be

understood by the participant in the semantic differential evaluation. Therefore, it is important that the participants accustomed to the words and feel the same sense of it. Therefore, the investigation was all carried in Java with *Bahasa Indonesia* as the main language.

The adjective correlated to the impression of material can be found in online media (e-magazine, web blog, e-catalog, manuals, ads, and social media) or off-line media (newspaper, magazine, brochure, pamphlet), including from the TV show. The media to be explored was published between the year 2012 until 2016. Since the general objective in developing new product design was creating a new good affective value for bamboo to be accepted by the user, the adjectives to be collected was all possible positive impression of materials. As guidance in collecting the words, “material impression in building and product” was the domain analysis.

There was a total of 250 adjectives of impression collected from the media, combined with adjective keywords extracted from field note of ethnographic study. The 250 words were then evaluated and clustered hierarchically in a dynamic and iterative process (Schutte, 2002). As a result, there were 15 clusters created during reading the textual messages. Before entering the second sorting through affinity diagram, the 250 adjectives should be reduced again into a smaller number for limit survey administration time to the desired maximum of 20 minutes. The end-up result of the sorting was 144 words in 8 cluster. The 8 cluster was; Impression of beauty, Impression of strength, Gender Connotation, Associated with nature, Associated with prestige, Associated with a period, Impression of comfort, and Attractiveness. Other 7 clusters are combined into an identical cluster of 8 categories, or eliminated by considering the results of previous ethnographic studies.

Table 1: Cluster created from collected words in the domain "material impression in building and products"

Category			
CHARM	TECHNICAL	CONNOTATION	FEELING
Beauty	**Strength**	**Gender**	**Prestige**
Aesthetics	Arrangement	**Nature**	Originality
Attractiveness	Spatial effect	**Period**	**Comfortness**
Wonderness		Style	
		Resemblance	

* Boldface is used as the cluster for selecting *Kansei* Words

For easy understanding in the adjectives clustering process by participant member, the selected words of categories were re-construct by adding words like; "associated with…", "the impression of…", in the affinity card.

2.2.2 Clustering Through Affinity Diagram

This step involved 10 designer and 5 experienced user in clustering words through an affinity diagram procedure. There was an architect, interior designer and product designer as a material applicator that has a minimum of 8 years experience in their field. The experienced user meant to gain a comprehensive result of words, since they have a good appreciation in design and art, already applied materials on their project although do not have a formal educational background in art and design. Clustering procedure was conducted online in which every participant separated one to another to avoid inter-influencing. As a team member, they should

choose 10 among 144 words and put into the boxes considering as impression word group, as showed in sample result ("Figure 4"). Two different instructions propose to the two groups of the respondent. To the first group, the given instruction is as follow:

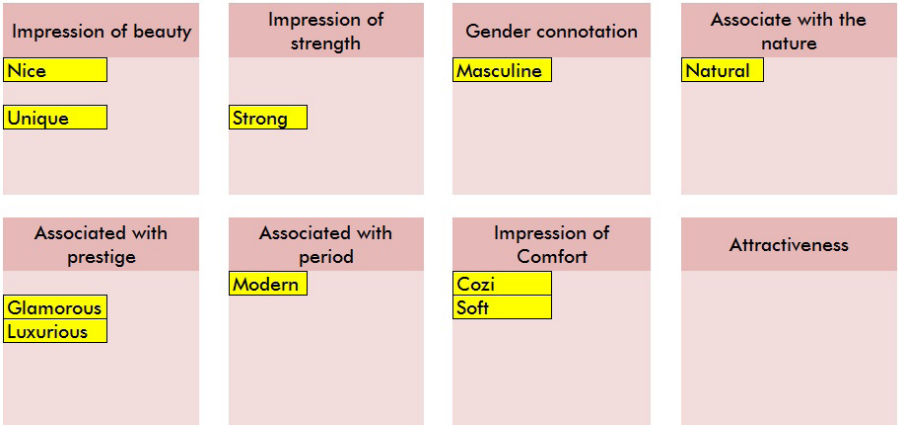
"Select 10 words frequently used by your clients when they ask for impression through materials in their project", "Just copy the words from the left side and paste into appropriate boxes on the right side."

While to the second group, the given instruction is as follow:

"Select 10 words you consider important impression appear in materials for your building or products (house, office, restaurant, clinic, etc) ". " Just copy the words from the left side and paste into appropriate boxes on the right side."

The 144 words in 8 cluster proposed to the 15 participants, resulting in total selected 50 words were appear in a different frequency. The result was then brought to focus group discussion, in which the participants joined.

Figure 4. A Sample of Affinity Diagram.



2.2.3 Focus Discussion

For comprehensive result in a specific important affective word, the selected words from the previous clustering then discussed in a focus group consisting of 4 designers, 1 expe-

rienced user and guided by a linguistic expert to identify the correct meaning of words and simplification base on the synonym. As a result, there were affective words considered as high and low *Kansei* in which a high *Kansei* can represent other low *Kansei* words.

When discussing the result of affinity method, the team should consider some aspects in grouping the words; the related cluster, the word synonym and should be compared to the highlights of the ethnographic study of perception in Phase I as a consideration in making a decision. It was found in the main theme and keywords that appear.

3.0 Result and Discussion

3.1 Scope and Limitation

The research was conducted in Java Indonesia with its specific cultural background that influences people in both ethnographic observation and *Kansei* word selection. As the impact of globalization through the information media, the language (*Bahasa Indonesia*) in the daily conversation that tends to informal is now growing, and richer in words compare to the formal one. Beside *Bahasa Indonesia*, some words in English are used, and some other from local/traditional words. Some expressions in daily conversation even have a different meaning from the grammatical form. Mostly the English words are adopted to state an impression, especially found in the magazine. Since the research was conducted in *Bahasa Indonesia*, some translation of words are not sufficient for exactly the same meaning to the English words used in this article.

3.2 People's Perception of Bamboo as Material

There were two main themes identified from the ethnographic study on people's perception of bamboo as material; 1) Technical difficulties, and 2) Specific purposes and impression. The "technical difficulties" perceived by people exist in bamboo correlated with "durability and shape making". It was found that people generally know that bamboo is easily damaged and broken based on their own experience or information from others. It created an understanding that bamboo had little chance of being used for longtime usage or that requires high strength and endurance. Some people knew that one of the causes of damage to bamboo was due to the attack of bamboo-eater insects. Others understand the weakness of bamboo because of the small or thin stem size, different from wood that thick and dense. The following quote implies the perception of people about the technical difficulties of bamboo;

"Bamboo cannot compete with wood in many aspects. For a maximum of ten years, you must replace with new items, the form of bamboo products is also very limited compared to wood. Most bamboo can only be made for small items and kitchen utensils. Like in this place, the building is still made of concrete and iron, bamboo is just decorating or to look unique used for lantern and decorations."

It was also found that people recognized bamboo easily when it was in its original tubular shape or when outer skin of bamboo was exposed. In other observations, people easily guessed bamboo materials when used in traditional woven forms. Conversely, people found it difficult to identify when bamboo was used in a flat form and broad, most of them think it was wood, specifically identified at the research site of BTPN. It is clear that the two aspects (durability and shape making) dominate the perception in technical difficulties of bamboo.

The second theme in people's perception of bamboo as a material is mainly about the application itself, whether in building or products. When discussing bamboo utilization people tend to mention bamboo in a single independent product like a souvenir, traditional utensil, furniture, and rarely mention bamboo as a product component or collaborates with other material to form a product. The products always connected to a specific impression e.g.; traditional, natural, inexpensive, village, old-time, etc. It indicates a perception that bamboo mostly used for "specific purposes" with specific impressions. The following quotation from a visitor is illustrative:

"I used to have a bamboo gazebo in my house in the backyard, just like the one on the artificial lake in this place. We usually use it for relaxing in the afternoon. It creates a calm atmosphere like in the village. Compared to the main building, the shape and the atmosphere are indeed different. Unfortunately, the gazebo was broken, so when I want to relax I have to go to this place."

It also to be found in artifact observation in which bamboo always clearly exposed as an attraction in the three locations of observation. In the tourist spot called "*Kampung Bamboo*" means "Bamboo Village", bamboo was presented in relation to its name or theme and manifested in the form of traditional bamboo buildings, bamboo lamps, bamboo bridges, bamboo statues or exposed bamboo columns. It also occurs in the private cultural preservation facility called "*Saung Angklung Udjo*" in which traditional music instrument made of bamboo is preserved. When the existence of bamboo is no correlation with a name neither the function, as the bank of "BTPN", it has a correlation with its interior theme. It clearly proves people perceive that bamboo should be treated specifically for certain purposes and impression that are visually exposed.

During participatory observation, especially in the conversation with the visitor in the three locations, we found many words whether an adjective or noun form that lead to the same perception connected to both themes. The words constantly repeated appear in the interview transcript. The adjectives mostly show a tendency to a negative association, like weak, old, and cheap. Some sample of keywords extracted from the interviews transcript and field notes are presented in “Table 2”. The keywords show several adjectives that indicate a negative perception of bamboo.

Table 2: Sample of Keywords Extracted

Antique	**Dull**	Natural	Simple
Brown color	Economical	Old fashion	Traditional
Cheap	Expose	Old style	Tropical
Classic	Green	**Outdated**	Tubular
Contemporary	Inexpensive	**Plebeian**	form
Countrified	Insect	**Poor**	Unique
Dirty	Light	Powder	**Untidy**
		Relaxing	Village
		Short usage	**Weak**

*Words in bolt-face are adjectives regarded as the negative perception of bamboo.

Some negative perception of bamboo whether for product or building also occur in other countries like India (Jamir, I., & Natrajan, P 2014), and it seems to be a general cases in which a widespread stigma of bamboo as poor man’s material (APN, 2015) because it is cheap, short lifetime and only appropriate as craft material for low-cost items. It results in low acceptance of bamboo for other purposes in modern life (Yanta H.T. Lam, 1995).

3.3 Important Affective Values to be Developed

It was found in the result of an affinity diagram, some ideal or important impression need to be shown in building material and products. In contrary, we found some negative impression of bamboo indicated in words (Table 2) extracted from interview transcript that created a negative perception of bamboo as a material. These words give an important contribution in spanning the semantic aspect by using them in opposite form. For example, the words “cheap, plebeian, and poor” in opposite form will be “precious, noble, and rich” can be accommodated in the words “Luxurious” as a positive value of the *Kansei* words.

Table 3 shows the result of affective word grouping that effects in changing of used word frequency and the selected high *Kansei*. For easy manageable in data analysis by sorting the words (Schutte, 2002), only the word groups that show the frequency used above 12 or above 8% are used in the *Kansei* evaluation. The word with the highest amount of selection within the group is selected as high *Kansei* to represent other *Kansei* words. Therefore, the word luxurious, strong, modern, nice, interesting, and natural are selected as an affective value that should be developed into a new product made of bamboo.

Table 3: Grouping of Words and Result of Combined Frequency Used Words.

GROUPING OF RECOMMENDED WORDS					FREQUENCY OF USED WORDS AFTER GROUPING																	COMBINED FREQUENCY	%
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		
		Durable 2	Strong 9	Sturdy 6																				17	11.33
			Perfect 1	Owesome 2																				3	2.00
		Ecological 2	Tropical 5	Natural 5																				12	8.00
Aristocrat 1	Elegant 4	Luxurious 9	Expensive 4	Prestigious 1																				19	12.67
Trendy 3	Stylish 2	Cute 2	Nice 4	Aesthetic 1																				16	10.67
			Original 4	Genuine 2																				6	4.00
			Felicitous 2	Neat 3																				5	3.33
Eyecatching 3	Inspirational 1	Creative 1	Unique 2	Interesting 6																				13	8.67
			Macho 1	Masculin 4																				8	5.33
			Cozi 3	Comfortable 6																				9	6.00
Up to date 2	Formal 1	Simple 2	Contemporary 3	Modern 8																				16	10.67
				Heavy 2																				2	1.33
				Finished 4																				4	2.67
				Fancy 2																				2	1.33
				Clean 2																				2	1.33
				Dynamic 3																				3	2.00
				Wooden-like 2																				2	1.33
			Soft 2	Delicate 3																				5	3.33
				Outdoor 1																				1	0.67
				Stone-like 1																				1	0.67
				Vintage 2																				2	1.33
				Plain 1																				1	0.67
				Flexible 1																				1	0.67
																						TOTAL :		150	100.00

* Numbers following every word explain the amount of selection. Words in dark grey color highlight are regarded as high *Kansei* or important value represents other low *Kansei,* in the same group.

4.0 Conclusion

The affective values that plan to be developed into products need to be investigated for a more effective and efficient task in design by finding the correct and important value in order to succeed the design objectives. A cultural approach help to understand a correlation between the existing bamboo

artifact as stimuli, and the people perceived through their speech messages. The ethnographic method that we use to understand the current people perception clearly found some negative perception of bamboo as a material. It expressed in words they used, like; cheap, plebeian, poor, weak, etc. Therefore, such a poor perception of bamboo should be a concern and need to change with positive values in order to increase the acceptability of bamboo products.

Correlated to the *Kansei* Engineering method, in which the semantic perspective of bamboo product should be spanned, the ethnographic study contribute in making decision and confirming that the impression of luxurious, strong, modern, nice, interesting, and natural are the values considerably important to be designed to products made of bamboo while a tendency to negative perception of bamboo by people is exist. The next crucial step that has to be carried is to connect the affective value to the product properties through the *Kansei* Engineering.

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