



Perception of Chair Materials in a Cultural Context: Indonesian Sample Group

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Abstract. Human attitudes, behavior and perceptions are shaped by their culture. Culture is deeply embedded in all aspects of human life, including design development. This study was conducted to discover perceptions regarding five chair materials (wood, rattan, bamboo, metal, and plastic) in a cultural context in an Indonesian student sample group. A previous study suggested that Indonesian participants have a positive attitude toward natural chair materials such as wood and rattan. The experimental results of the present follow-up study suggest that rattan is the chair material most representative of Indonesian culture. As a heterogeneous country, Indonesia has multiple ethnicities, which influences the perception of which material best represents Indonesian culture.

Keywords: *culture; ethnicity; Indonesian; material; perception.*

1 Introduction

Global competition makes it imperative for Indonesian furniture manufacturers to increase their domestic market competitiveness. Gaining a deeper understanding of Indonesians' furniture preferences is a possible approach of achieving greater competitiveness. Preferences, such as attitudes and perceptions, can be investigated through cultural studies. Culture and design are closely linked because cultural beliefs, values, and social practices shape the ways people relate to particular objects [1]. For a product to appeal to users with optimum experience and maximum pleasure, designers need to understand the target users and their culture.

Indonesian furniture is characterized by the use of wood and rattan as primary materials [2]. However, manufacturing technology development has increased the availability of a variety of materials, ranging from natural and synthetic materials to various material combinations, which could provide other options in furniture design. This study focuses on chair materials in the context of cultural schemata, a structure of knowledge that guides the human mind in making sense of the world. An important characteristic of cultural schemata is that they are shared among people in the same cultural group [3,4]. Shared

knowledge, values, perspectives, and attitudes in a cultural group are examples of cultural schemata.

Our previous study [5] investigated Indonesian participants' attitudes toward chair materials and material combinations. The study suggested that the participants had positive attitudes towards natural materials, particularly wood and rattan, which they considered to be the materials most suitable for chairs. However, this study did not take into account cultural aspects in its experiments. Thus, in the present follow-up study, the experiment focused on chair materials in the context of how they represent Indonesian culture and their relationship with the heterogeneous nature of the Indonesian demography. Using ranking and word association methods, the study attempted to discover the Indonesian participants' strongest schemata regarding chair materials by assuming that the strongest schemata are the ones that are most internalized and thus widely shared.

To investigate the perception of Indonesians' regarding chair materials, the cultural schema theory was applied with emphasis on automatic processing of schema and its sharedness in the sample group. Word association is an established method used to assess conceptual structures of beliefs and attitudes [6,7]. It is conducted by asking participants to immediately respond to certain stimuli and provide a verbal or written response to the stimuli. Word association is regarded as a viable method to access mental representations related to the stimuli [8] and was used in the present study. Shared knowledge as part of cultural schemata can be investigated through the most elicited words, which represent similarities in information processing.

2 Culture and Schema Concept

In the design world, cultural attributes are often expressed simply by adding aesthetical components to an object, which typically include stereotypical visual elements specific to a particular culture. To transcend stereotypes is a challenging task that should be considered in product design [1]. To design an appealing product that maximizes the users' experience and pleasure, designers need to understand its target users, including the users' culture. One approach to understanding target users is through the schema theory.

A schema refers to structures of knowledge that consist of information (objects, events, behaviors, images, etc.) and the relationships between each of its parts. It acts as a reference point to interpret new information [9,10]. Schemata represent knowledge at all levels, from abstract to concrete. The schema concept can be applied to both abstract concepts (e.g. justice and faith) and concrete things (e.g. visual appearance) [11].

In the context of schema theory, culture can be viewed as a hierarchy of schemata. People's actions result from the force of schemata that are dynamically acquired in culturally specific ways since early childhood. Schemata in culture, or cultural models, are hierarchically organized, where the broader-based strong ones are deeply internalized and encompass easily triggered narrower-based minor ones [12]. As such, the more internalized and learned schemata become ingrained in society and are viewed as a standard by which people evaluate their values. The strongly internalized schemata shared between members of a society are the strongest ones, which form culture [12]. In a cultural group, similarities in environment and experiences lead to similarities in cognitive processing and knowledge structure (in other words, similarity in schemata). The similarities are shared across cultural groups as cultural schemata (Figure 1).

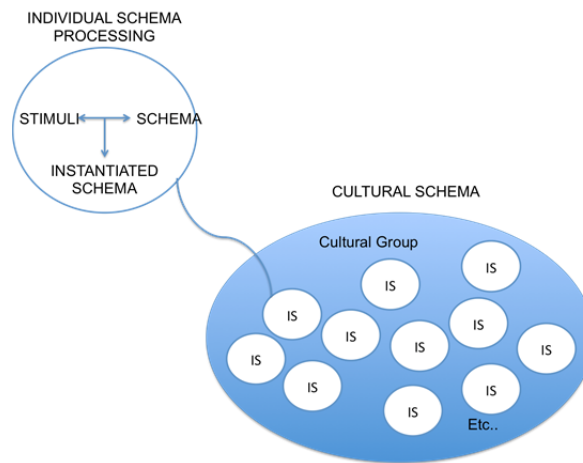


Figure 1 Individual schema processing and its position in a cultural group that forms cultural schemata.

Schema processing is the interaction between old knowledge (existing schemata) and new knowledge (episodic input) to make sense of information. It refers to unconscious cognitive structures and processes that guide knowledge and skills. A schema is a cognitive shortcut for interpreting and perceiving information. The human mind constantly draws partial inferences from incomplete information by fitting new information into existing schemata [13]. The cognitive processing of a schema is largely an unconscious and automatic behavior [10]. In this study, the new information consisted of the stimuli presented in the experiments. Schema processing involves the interaction of stimuli and schemata existing in the participants' mind. The participants' responses are the instantiated schemata resulted from schema processing (Figure 1).

A cultural schema is an individual schema shared among people within the same cultural group [3]. It refers to shared knowledge and similar ways to interpret information. This study attempted to find the strongest schemata shared among the study participants regarding chair materials in general and within a specific cultural context. The study participants were Indonesians, thus the strongest schemata shared among the participants could be treated as samples of Indonesian cultural schemata.

3 Previous Study

The experiment in [5] was conducted as a pre-test in a research on Indonesian cultural schemata in the context of furniture design. It attempted to discover the participants' perception of furniture, particularly chairs, using a cultural schema theory approach. It was hypothesized that shared knowledge, perspectives and opinions are shared by the majority of a given cultural group, signifying the existence of strong cultural schemata. This previous study was conducted to discover if a shared perception exists as part of cultural schemata regarding chair materials and material combinations. Knowledge of cultural schemata regarding chairs could be useful in the development of new furniture designs. This, in turn, could increase the competitiveness of Indonesian furniture manufacturers in both domestic and global markets.

3.1 Participants

The study's participants were 175 Indonesians. The participants were randomly chosen with no restrictions on demographics because the objective was to discover the general perception of chair materials and material combinations.

3.2 Procedure

The participants responded to two groups of questionnaires related to chair materials (five questions) and material combinations (10 questions). The materials considered in this study were wood, plastic, metal, bamboo, and rattan. The material combinations considered in this study were 10 possible combinations of wood, plastic, metal, bamboo, and rattan. These materials were selected because they are the most commonly found in the furniture industry. Fabrics and cushions were omitted since both are considered additional chair components. The questionnaires used statements regarding the best chair materials. The participants were asked to rate their answers using a 5-point Likert scale (5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree, 1 = strongly disagree). The questionnaire was created using Google Forms and distributed via the Internet.

3.3 Findings

3.3.1 Perception Toward Materials

The survey yielded 173 valid responses from 175 participants. The data were analyzed by assigning a value to each option using a Likert scale (5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree, 1 = strongly disagree) and calculating the sum of each material category's score. Table 1 elaborates the stimuli used in the experiment.

Table 1 Experiment stimuli.

Category	Statements
Material	Wood is the best material for a chair.
	Plastic is the best material for a chair.
	Metal is the best material for a chair.
	Bamboo is the best material for a chair.
	Rattan is the best material for a chair.
Material combination	Wood and plastic are the best material combination for a chair.
	Wood and metal are the best material combination for a chair.
	Wood and bamboo are the best material combination for a chair.
	Wood and rattan are the best material combination for a chair.
	Plastic and metal are the best material combination for a chair.
	Plastic and bamboo are the best material combination for a chair.
	Plastic and rattan are the best material combination for a chair.
	Metal and bamboo are the best materials for a chair.
	Metal and rattan are the best materials for a chair.
	Bamboo and rattan are the best materials for a chair.

Figure 2 illustrates the participants' perceptions regarding the best chair materials. It can be inferred from the chart that the participants generally had a positive perception towards the five materials (score sums were: wood = 582, plastic = 471, metal = 513, bamboo = 529, rattan = 586). As wood and rattan received the highest scores, it can be inferred that the participants considered these the best chair materials.

To compare differences in the participants' perception of each chair material, a paired t-test was conducted. The test showed that the mean of the data for wood was statistically significantly different from those for plastic, metal, and bamboo ($p < 0.05$, two-tailed), while the means of wood and rattan were not statistically significantly different ($p = 0.64$, two-tailed). Similarly, the tests of statistical difference between rattan and other materials led to a similar conclusion: the mean of rattan was statistically significantly different from that

of plastic, metal, and bamboo ($p < 0.05$, two-tailed) but not significantly different from that of wood.

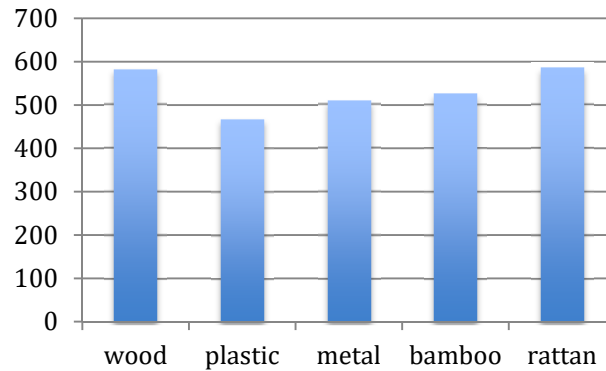


Figure 2 Chair material scores.

3.3.2 Perception toward Material Combinations

The survey yielded 165 valid responses from 175 participants. The data were analyzed by assigning a value to each option using a Likert scale (5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree, 1 = strongly disagree) and calculating the sum of each material combination scores.

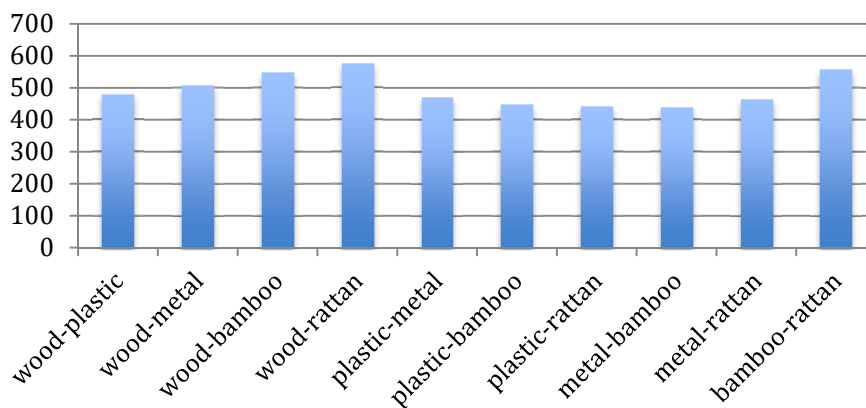


Figure 3 Chair material combination scores.

Figure 3 illustrates participants' perceptions regarding the chair material combinations. It can be inferred from the figure that the participants had positive perceptions of the 10 possible combinations of materials considered in this study (the scores were: wood-plastic = 479, wood-metal = 508, wood-

bamboo = 547, wood-rattan = 576, plastic-metal = 470, plastic-bamboo = 447, plastic-rattan = 442, metal-bamboo = 439, metal-rattan = 464, and bamboo-rattan = 558). Wood-rattan, bamboo-rattan, and wood-bamboo were preferred among the combinations.

A paired t-test was conducted to determine whether the means of the three highest scoring material combinations were statistically significantly different from those of the other material combinations. As the mean difference significance tests showed, three material combinations (wood-rattan, bamboo-rattan, and wood-bamboo) were statistically significantly different from the other material combinations ($p < 0.05$, two-tailed). Among the three highest scoring material combinations, wood-bamboo and wood-rattan had means that were statistically significantly different ($p < 0.05$, two-tailed), while the mean differences between wood-bamboo and bamboo-rattan ($p = 0.32$, two-tailed), and between wood-rattan and bamboo-rattan ($p = 0.06$, two-tailed) were statistically insignificant.

The experiment suggested that the participants considered wood and rattan as the best chair materials, while the best material combinations were wood-rattan, bamboo-rattan, and wood-bamboo. Both the material and material combination experiments showed a preference for natural materials. Further analysis conducted on pairs of materials and material combinations suggests that rattan is prominent in the participants' perception of a good material for chairs.

4 Current Study

Based on the previous study's findings, a second study was conducted to gain insight into materials that represent Indonesian culture. The experiment focused on two objectives. The first was to discover which material best represents Indonesian culture among wood, rattan, bamboo, plastic, and metal. The second objective was to explore the relationship between ethnicity and material perception in the context of representing Indonesian culture.

The study of Indonesian's perceptions of materials and material combinations (specifically in chair production) suggests that the participants regard wood and rattan and its combinations as the best chair materials [5]. However, in light of a domestic market development effort, additional experiments regarding materials and Indonesian culture are imperative to gain a better understanding of Indonesian users.

Figure 4 elaborates the study framework and the relationship of the past and current study.

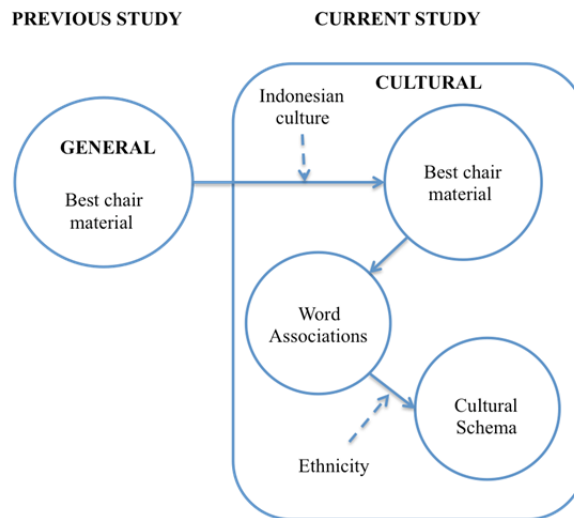


Figure 4 Study framework.

4.1 Participants

In the second study, 88 product design majors participated. In this group, 46 were male and 42 were female. The participants ranged in age from 17 to 22 (mean = 19.5, SD = 1.87). The participants' ethnicities varied, reflecting the heterogeneous nature of Indonesian demography. The largest ethnicity among the participants was Javanese (42%), followed by mixed ethnicity (Java-Sundanese, Tionghoa-Batak, Betawi-Javanese, etc. (15.9%)), and Sundanese (13.6%), as illustrated in Figure 5. The ethnicity percentages are proportional to those of the Indonesian population [14].

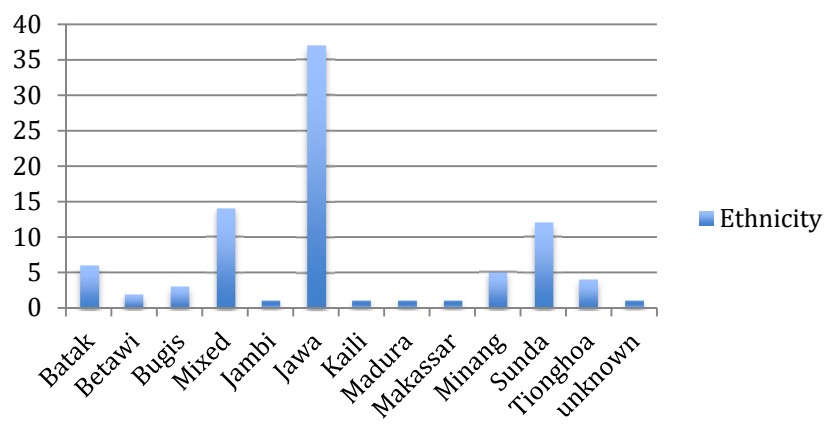


Figure 5 Ethnicity of the participants.

4.2 Procedure

The experiment was conducted at Bandung Institute Technology over a two-week span. The participants provided information about their ethnicity and answered demographic questions such as gender, age, and occupation. The test itself was conducted in two parts. In the first part, the participants were given a questionnaire and asked to rank five materials (wood, rattan, bamboo, metal, and plastic) according to their opinion of which material best represents Indonesian culture. Rank 1 was the most representative and rank 5 was the least representative of Indonesian culture. In the second part, participants were given a minute to provide words they think are associated with the word 'rattan'. There were 84 valid data sets obtained from 88 participants.

The first objective of the experiment was to find which material best represents Indonesian culture. Since the data collected were non-parametric, the ranking data were first analyzed with a Friedman ANOVA test to test the differences between each chair material [15]. A second analysis of the ranking data was conducted with a Wilcoxon signed-rank test as a *post hoc* test to compare the differences between pairs of chair materials [15].

The second objective was to explore the relationship between ethnicity and the participants' perception of which material best represents Indonesian culture. For the second objective, the participants' ethnicity data and material rankings were analyzed with a Kruskal-Wallis test to test the differences between ethnicity and chair material variables [15]. All statistical analyses were conducted with IBM SPSS Ver. 23 software. To understand the response distribution of the word association experiment, a correspondence analysis of the responses and the participants' ethnicity was conducted using text-mining software KH Coder [16].

4.3 Findings

4.3.1 Rank of Chair Material Best Representing Indonesian Culture

A Friedman ANOVA for non-parametric data tests was conducted to investigate the statistical differences of rank between the chair materials wood, rattan, bamboo, metal, and plastic. The test showed there is a statistically significant difference in the participants' perception of which material best represents Indonesian culture ($p < .001$). The ranking showed rattan (mean = 1.55) as the chair material most representative of Indonesian culture. Ranked second was bamboo (mean = 2.24), followed by wood (mean = 2.32), plastic (mean = 4.43), and metal (mean = 4.46), respectively. Since rank 1 means the highest

representation of Indonesian culture and rank 5 means the lowest representation of Indonesian culture, the mean ranks were represented in ascending order (the lower the mean, the higher the rank, and vice versa).

As the Friedman ANOVA test suggested, there are statistically significant differences among the chair materials. Wilcoxon signed-rank *post hoc* tests were conducted to investigate which chair material had statistically significant difference compared with other materials in reference to the Bonferroni-corrected p value. Ten tests were conducted within all possible pairs of chair materials. The tests showed that eight pairs of comparisons (bamboo-rattan, wood-rattan, plastic-rattan, metal-rattan, plastic-bamboo, metal-bamboo, plastic-wood, metal-wood) were statistically significantly different ($p < .001$).

Two pairs of comparisons were not statistically significant. The differences between wood and bamboo ($p > .05$), and metal and plastic ($p > .05$) were not statistically significant. These insignificant results could be interpreted as there not being a difference between the participants' perceptions of whether wood and bamboo are more representative of Indonesian culture relative to each other. Bamboo and wood, perceived as sufficient to represent Indonesian culture, were second to rattan. Plastic and metal had no significant difference in the participants' perception as chair materials that were perceived as least representative of Indonesian culture.

4.3.2 Relationship of Ethnicity and The Participants' Perception of Chair Material Best Representing Indonesian Culture

Participant ethnicities were grouped according to geographical closeness. Since Indonesia consists of islands, the ethnicities were grouped according to the islands from which the ethnicities originate. Based on island of origin there were six ethnic groups. The first group was Java, consisting of participants identified as ethnicities from Java, Sunda, Madura, and Betawi. The second group consisted of ethnicities from Sulawesi (Kaili, Bugis, Makassar). The third group consisted of ethnicities that originated from Sumatra (Minang, Batak, Jambi). The fourth group consisted of participants identified as Tionghoa. The fifth group consisted of participants identified as mixed ethnicities from different islands. The sixth group consisted of participants who were unsure of their ethnicity.

A Kruskal-Wallis test was conducted to investigate whether there were relationships between the ethnicities of the participants and their perceptions of which material best represents Indonesian culture. The result showed a significant relationship between ethnicity and the participants' perception of rattan ($p < .05$) and plastic ($p < .05$). The participants' perception of the other

materials (wood, bamboo, and metal) was not significantly related to the participants' ethnicity.

4.3.3 Word Association Test

In this study, the participants were asked to provide words they associated with the stimuli within a limited time. The use of word association methods encourages the automatic cognition of information processing based on schema theory. Word association was used as a means to collect associations with the word 'rattan' as stimuli to gain insight into shared knowledge and information processing (Figure 6). The resulting words were analyzed based on the frequency of elicitation, which was used as a means of analysis based on the cultural schema theory of shared knowledge. A high elicitation frequency suggests high internalization of knowledge and similarity of information processing in the sample group (Figure 6).

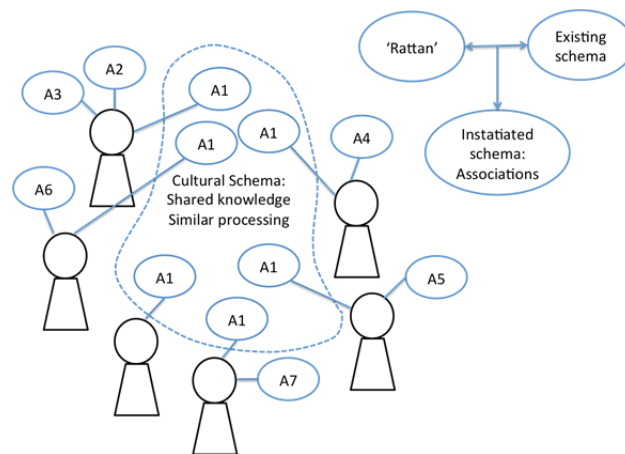


Figure 6 Word association for cultural schema investigation experiment concept (A = association).

The word association experiment generated 624 responses from 84 participants (mean = 7.4), who elicited 211 different words, of which 83 were repeated. The word repeats ranged from 2 to 40 times. Again, according to the cultural schema theory, the strongest cultural schemata are the ones most shared by a population. Table 2 shows the percentage of words elicited in association with the word 'rattan'. The word association test on the word 'rattan' showed that the strongest schema related to the stimulus was furniture, elicited by 40 (47.6%) of the participants. The 10 most elicited words were related to products (furniture, chair, table), physical characteristics (long, limber, flexible, strong), other materials (wood), image (unique), and culture (traditional). The 10 most elicited words related to suggestions that the association to 'rattan' is either positive

(related to positive physical characteristics: limber, flexible, strong; and positive image: unique) or neutral (furniture, chair, table, long, wood, traditional). Thus, the findings suggest that the strongest cultural schemata shared among the participants in association with ‘rattan’ were positive or neutral.

Further analysis was conducted to better understand the relationship between the elicited words associated with ‘rattan’ and the participants’ ethnicity. The analysis was conducted to understand the distribution of the elicited words across ethnicities, which could provide insight into similar experiences among participants that suggest similarity in information processing.

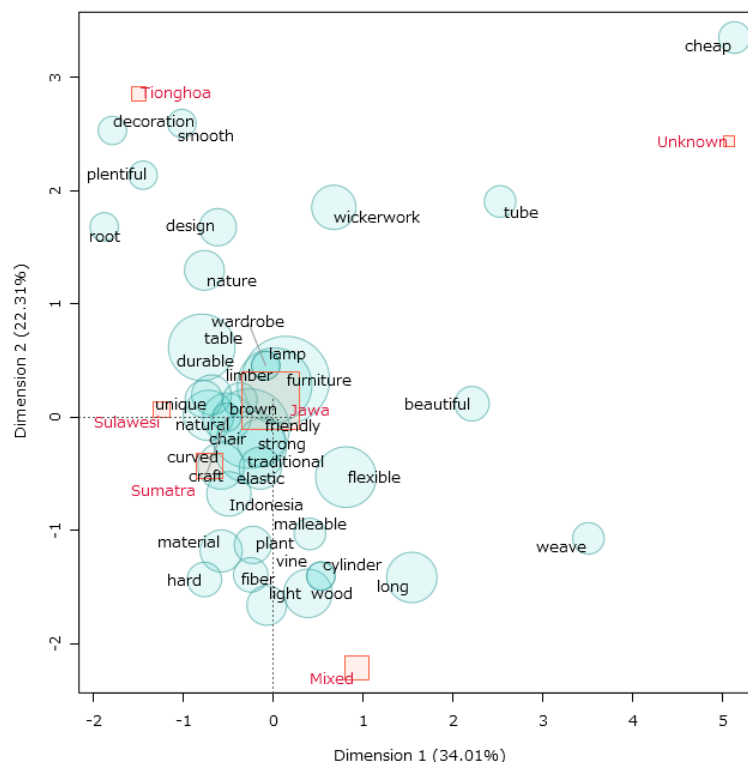


Figure 7 Correspondence analysis plot of ethnicity groups and elicited words associated with ‘rattan’.

An explanatory approach using a correspondence analysis was conducted to visualize the relationship between the elicited words and the six ethnicity groups (Java, Sumatra, Sulawesi, Mixed, Tionghoa, and Unknown). In line with the shared nature of cultural schemata, words that were analyzed were those elicited by more than 5% of the participants [7]. The correspondence analysis was run using the text-mining software KH Coder.

The correspondence analysis (Table 7) showed that from the six ethnic groups, Java, Sumatra and Sulawesi were closer to the center of the plot. This suggests that a pattern of words elicited by participants from the Java, Sumatra, and Sulawesi ethnic groups were relatively similar. In contrast, Tionghoa, Mixed, and Unknown ethnicity groups were located far apart, indicating dissimilarity in the pattern of words elicited. The correspondence analysis suggests that, across the six ethnic groups, the strongest similarity in experience and information processing in regard of ‘rattan’ word association was among the Java, Sumatra, and Sulawesi groups.

Table 2 Frequency and percentage of words associated with ‘Rattan’.

Words	Frequency	Percentage (%)
furniture	40	47.6
chair	33	39.3
limber	29	34.5
strong	27	32.1
table	23	27.4
flexible	19	22.6
curved	14	16.7
unique	14	16.7
long	13	15.5
traditional	12	14.3

In reference to the 10 most elicited words associated with ‘rattan’ (listed in Table 2), the proximity of words and ethnicity groups was examined in a correspondence analysis plot. The most elicited words (furniture, limber, and strong) were closest in proximity with the Java group. The word ‘unique’ was closest to the Sulawesi group, and the word ‘curved’ was closest to the Sumatra group. Words close to more than one group of ethnicity were as follows. The word ‘chair’ was close to the Java, Sumatra, and Sulawesi groups, at a relatively similar distance. The word ‘traditional’ was close to the Java and Sumatra groups, and ‘table’ was close to the Java and Sulawesi groups.

5 Discussion

The previous study on attitudes regarding chair materials and their combinations showed that the participants tended to perceive natural materials as most preferable for chair production. Rattan and wood are statistically significantly more preferable as chair materials compared with bamboo, metal, and plastic. Combinations of the three natural materials (wood-rattan, bamboo-rattan, and bamboo-wood) were more preferable in the chair material combination tests. The results suggest that the participants have strong and positive attitudes toward natural materials and their combinations for use in chair manufacturing.

The findings could be linked to the fact that Indonesia is a country rich in natural resources, including wood, rattan, and bamboo, leading to a wider use of natural materials in furniture manufacturing. Thus, as the cultural schemata developed, knowledge and positive attitudes toward natural materials have been strongly internalized in Indonesian users' cultural schemata.

For more evidence regarding the role of cultural schemata in the sample group's perception of chair materials, the second experiment included Indonesian culture as stimuli in the context of best representing Indonesian culture. The first experiment focused on the perception of chair materials in a general context, while the second experiment focused on the perception of chair materials in a cultural context by asking participants to rank chair materials according to their perception of which one best represents Indonesian culture. The experiments suggest that while the perception of best chair material in a general context favors wood and rattan, in a cultural context the perception of best materials moved rattan and bamboo to the highest ranks. The different results of the two experiments suggest that culture affects Indonesians' perception of materials. However, both experiments showed rattan was consistently perceived as the best chair material in both the general and the cultural context.

Wood is considered one of the best chair materials and also the best in a more general context. The use of wood in various objects is common worldwide. In various species and variants, wood is a natural resource available on nearly all continents of the world. Despite the extensive use of wood in Indonesian cultural artifacts and traditions, its general worldwide use and the participants' knowledge regarding wood remove its exclusivity in the context of Indonesian culture and its related schemata. The experiment did not account for different species and variants of wood native to Indonesia that could potentially invoke schematic association with Indonesian culture (e.g., teak, *gaharu*, *sonokeling*). As a general term, 'wood' is not considered to represent Indonesian culture.

Rattan and bamboo are also used extensively in daily life. However, their use is relatively regional compared with wood. Rattan and bamboo are used in quintessential cultural artifacts, such as the *angklung*, a Sundanese musical instrument consisting of suspended bamboo tubes in a bamboo frame bound by a rattan cord (the *angklung* is listed as UNESCO Intangible Cultural Heritage [17]), and arbitrary cultural artifacts such as furniture, woven rattan mats (*tikar*), basketry, construction elements, crafts, etc., which are more associated with cultural activities that, in turn, form the cultural schemata. Rattan and bamboo are used extensively in Indonesian cultural activities and daily life due to their abundance in Indonesia [18-20] and their relatively easy procurement compared with wood. Rattan in particular is a plant native to Indonesia with 70% of the

world rattan consumption coming from Indonesian exports [21], while bamboo has wider distribution in Asia Pacific [10]. The high exposure of rattan and bamboo contributes to the development of cultural schemata related to this material. Thus, a stronger association to Indonesian culture is invoked by rattan and bamboo than by wood and other materials (metal and plastic).

The relationship between ethnicity and perception of materials that best represent Indonesian culture was examined in Section 4.3.2. The results showed that a relationship exists between ethnicity and the participants' perception of rattan ($p < .05$). As Indonesia is an archipelago, the population is spread over many islands. The differences in perception of rattan could be caused by the rattan plant's distribution not being equal among the islands. Rattan harvested for export and to supply the rattan furniture industry comes mainly from Sulawesi and Kalimantan [22]. Members of ethnicities that originate from those islands (e.g. Bugis, Dayak) are naturally more familiar with rattan in a cultural context and its various uses in daily life. In an industrial context, the rattan industry (mainly furniture and home accessories) is blooming on the island of Java. The center of the Indonesian rattan industry is in Cirebon, West Java [22]. In turn, the population of the island of Java is also familiar with rattan, particularly as used in furniture. In this sense, members of ethnicities from Java, while familiar with rattan, have a different context of schematic association compared with members of ethnicities that originate from Sulawesi and Kalimantan.

Further analysis of the word association's correspondence analysis plot showed that the most elicited words associated with the rattan industry (e.g. *furniture*, *limber*, and *strong*) were the words in closest in proximity with Javanese ethnic groups. The words *furniture*, *limber*, and *strong*, denote product and physical characteristics of rattan, while also denoting important aspects of rattan in the furniture industry. This finding confirms the statement above that the Javanese participants had a greater tendency to associate rattan with industry. Conflicting results with the assumption that the participants from Sulawesi were more familiar with the cultural association of rattan are evident from the proximity of 'traditional' to the Java and Sumatra ethnic groups compared with the Sulawesi ethnic groups. Rather, the closest word to the Sulawesi ethnic groups according to the correspondence analysis plot was 'unique'. In this sense, 'unique' represents positive attributes of rattan rather than unfamiliarity with the material. However, the proximity of the three ethnic groups (Java, Sumatra, and Sulawesi) in the plot suggests that the perception of rattan based on the elicited words is relatively similar. This finding suggests that, based on the words elicited in the word association test, the perception of 'rattan' was shared by the participants from the Java, Sumatra, and Sulawesi groups. This shared perception suggests there are similarities between the ethnic groups in

experiences and information processing. Thus, the cultural schemata of 'rattan' are strong for members of the respective ethnic groups.

6 Conclusion

Despite the availability of alternative materials such as metal and plastic in the furniture industry, the perception of the Indonesian sample group of natural materials was the most positive. Throughout the experiments, rattan was consistently preferred in both the general context of chair materials and as best representing Indonesian culture. The findings showed that rattan has potential for further development as a material in furniture design. In both experiments, the participants were Indonesians, who indicated that the general perception of rattan is positive. Thus, rattan is a good design material for further developing in view of the domestic market. Also as a material perceived to best represent Indonesian culture, rattan has potential to be marketed globally as an 'Indonesian' material.

Although the findings of this study suggest strong preferences for natural materials, factors such as the sustainability of material supplies and environmental concerns should also be considered in developing new designs. The positive perception of rattan suggested in this study does not conflict with sustainability and environmental issues, due to rattan's relatively high sustainability. The findings also suggest that since the study's Indonesian sample group showed positive perceptions of rattan as a chair material in a general and cultural context across ethnicities, design development using rattan as a furniture material could increase Indonesian manufacturers' competitiveness in the domestic market. Considering both the environmental and sustainability concerns and based on the study's findings, rattan is a good candidate for further design development.

References

- [1] Moalosi, R., Popovic, V. & Hickling-Hudson, A. *Culture-Orientated Product Design*, International Journal of Technology and Design Education, **20**, pp. 175-190, 2010.
- [2] Global Business Guide: Indonesia, *Indonesia Furniture and Homeware Sector*, http://www.gbgindonesia.com/en/manufacturing/article/2012/indonesia_s_furniture_and_homeware_sector.php, (23 August 2016).
- [3] Garro, L.C., *Remembering What One Knows and The Construction of The Past: A Comparison of Cultural Consensus Theory and Cultural Schema Theory*. Ethos, **28**(3), pp. 275-319, 2000.
- [4] Derfer, B., *Mental Models: How Do Our Minds Work?*, <http://weber.ucsd.edu/~jmoore/courses/schemas.html>, (10 May 2016).

- [5] Prameswari, I., Hibino, H. & Koyama, S., *Indonesians' Attitudes Toward Materials and Material Combinations*, InDESIGNation International Conference 2016, Bandung, 11 November, 2016.
- [6] Scmitt, N., *Quantifying Word Association Responses: What is Native-Like?*, System, **26**, pp. 610-621, 1998.
- [7] De Andrade, J.C., De Aguiar Sobral, L., Ares, G. & Deliza, R. *Understanding Consumer's Perception of Lamb Meat Using Free Word Association*, Meat Science, **117**, pp. 67-74, 2016.
- [8] Donoghue, S. *Projective Techniques in Consumer Research*, Journal of Family Ecology and Consumer Sciences, **28**, pp. 47-53, 2000.
- [9] Axelrod, R., *Schema Theory: An Information Processing Model of Perception and Cognition*, The American Political Science Review, **67**(4), pp. 1248-1260, 1973.
- [10] DiMaggio, P., *Culture and Cognition*, Annual Review of Sociology, **23**, pp. 263-287, 1997.
- [11] Rumelhart, D.E. & Ortony, A., *The Representation of Knowledge in Memory*, in Anderson, R.C., Spiro, R.J. & Montague, W.E. (Eds.), *Schooling and The Acquisition of Knowledge*, Hillsdale, Erlbaum, pp. 99-135, 1977.
- [12] Lipset, D., *Culture as Hierarchy of Schemas*, Current Anthropology, **34**(4), pp. 497-498, 1993.
- [13] Brewer, W.F. & Nakamura, E.V., *The Nature and Function of Schemas*, in Wyer, R.S. & Srull, T.K. (Eds.), *Handbook of Social Cognition*, **1**, Hillsdale, Lawrence Erlbaum Associates, pp. 119-160, 1984.
- [14] Indxmundi, *Indonesia Ethnic Groups*, http://www.indexmundi.com/indonesia/ethnic_groups.html, (14 December 2016)
- [15] Field, A., *Discovering Statistics Using SPSS* (3rd ed.), London, Sage Publications, pp. 539-583, 2009.
- [16] Higuchi, K., *KH Coder: Quantitative Content Analysis or Text Mining of English Language Data*, GNU General Public License, <http://khc.sourceforge.net>, (20 December 2016).
- [17] UNESCO, *Indonesian Angklung.*, <http://www.unesco.org/culture/ich/en/RL/indonesian-angklung-00393> (5 February 2017)
- [18] Bystiakova, N., Kapos, V. & Lysenko L., Stapleton, C.M.A., *Distribution and Conservation Status of Forest Bamboo Biodiversity in The Asia-Pacific Region*, Biodiversity and Conservation, **12**(9), pp. 1833-1841, 2003.
- [19] Siebert, S.F., *The Abundance and Distribution of Rattan over An Elevation Gradient in Sulawesi, Indonesia*, Forest Ecology and Management, **210**, pp.143-158, 2005.
- [20] Sastry, C., *Rattan in The Twenty-First Century: An Outlook*, in Dransfield, J., Tesoro, F. & Manokaran, N. (Eds.), *Rattan: Current*

- Research Issues and Prospects for Conservation and Sustainable Development, *FAO, Rome*, pp. 237-244, 2002.
- [21] Indonesia Investments, *What is Causing Slowing Growth in Indonesia's Furniture Industry?*, <http://www.indonesia-investments.com/id/business/business-columns/what-is-causing-slowing-growth-in-indonesia-s-furniture-industry/item6532>, (6 August 2016).
- [22] Nasendi, B.D., *Socio-economic Information on Rattan in Indonesia*,. INBAR Working Paper, 2, INBAR, http://www.inbar.int/wp-content/uploads/downloads/2012/inbar_working_paper_no02.pdf, (8 February 2017).