Designing A Reading Chair using Kansei Engineering Approach

Mira Rahayu¹,², Hilman Ardian Ekananda¹,³ and Ilma Mufidah¹,⁴

¹Telkom University, Bandung Indonesia
²mirarahayu@telkomuniversity.ac.id, ³hilmanardian@student.telkomuniversity.ac.id, ⁴ilmamufidah@telkomuniversity.ac.id

Abstract. Supporting facilities such as reading chair are often used as a scene to read books. However, the existing reading chair has not satisfied the user. This Research uses Kansei Engineering which purpose to design a reading chair that fulfil user needs. Kansei Engineering was chosen in this research because it can translate customer’s impression, feeling, and demands on existing products or concepts to design concrete solutions and parameters into product design. This research is done on students in the Bandung area who use reading chair. Using a questionnaire as a tool to collect data that distributed online with google form to 347 respondents. Questionnaire data was processed using KMO statistical test and Barlett test, so from 23 Kansei word that had been obtained there was a reduction to 15 Kansei word would be used into designing reading chair in this research. The results of this research states, the implementation of Kansei Engineering could be done in the design of reading chairs, and there are innovations to meet user needs such as, armrest, headrest and footrest. Also USB port, lights, and book storage area. All of that can be used by users.

Keywords: Kansei Engineering, Kansei word, reading chair

1. Introduction

Nation is a group of people who share the same identity, language, religion, ideology, culture and history. In Indonesia the culture of fondness for reading is still very low, even though reading will determine the quality of the nation. By reading humans can know everything they don’t know. Reading is a skill that can be possessed by every human being, no special skills are needed to be able to read. According to Peri-yeti (2017) reading can determine the quality of a nation or society, especially for the community with the status of students because with low reading interest will have an impact on the nation's underdevelopment. According to Yassin (2019) one of the factors that influence a person's lack of interest in reading is inadequate means. Inadequate reading facilities will have a negative effect on someone's interest in reading. Whereas adequate reading facilities will encourage someone to read. Supporting facilities such as reading chairs are often used as a place to read books. However, the existing reading chair has not satisfied the user and has not attracted interest in reading. The reading chair is a chair that has a backrest that allows people to sit facing a shelf and can promote relaxation, security, and can be used for hours when reading novels, newspapers and others (GEAR PATROL, 2019).

From the results of interviews and questionnaires that have been conducted from a total of 40 respondents reading chair users, the factors that influence reading interest when using a reading chair are features (95%), reading chair design (92.5%), sitting position when using (90%) , sitting position
with reading time (87.5%), reading chair size (50%), and reading chair colour (45%). In the current reading chair there are also complaints that are often experienced by users when using a reading chair. From these results it was found that the complaints experienced by users when using the reading chair in general were aches in the back (67.5%), neck (60%), buttocks (40%), waist (27.5%), shoulders (25%), feet (12.5%), thighs (7.5%), and no complaints in any part (7.5%). This research uses Kansei Engineering to produce a product concept in the form of a reading chair that is comfortable and in accordance with user needs by involving feelings and emotions that exist in consumers.

2. Methods
Based on the above explanation to improve facilities in terms of reading, the Kansei Engineering approach is used. Kansei Engineering was chosen because it translates customers’ impressions, feelings, and demands on existing products or concepts to design concrete design solutions and parameters into product design (Schütte, 2002). According to Schütte (2002) Kansei is the impression one gets from an artefact, environment, or certain situation using all the senses of sight, smell, hearing, feeling, feeling, and recognition of the user. While Kansei Engineering is a product development methodology that translates the impressions, feelings, and demands of customers towards existing products or concepts to design concrete design solutions and parameters into product design.

At Kansei Engineering there are methods that are very structured and can be modified based on the objectives to be achieved. The following is the structure of Kansei Engineering.

- Choice of participant groups, namely choosing group members who have good knowledge about market segmentation.
- Collection of Kansei words namely kansei words that describe the product.
- Data Reduction Methods for Selection of Kansei Words is to reduce data to find the right number of Kansei words.
- Types used scales are different rating scales in the Kansei Engineering context.
- Computerized data collection, which is statistical Kansei Engineering data, requires a large number of different opinions to obtain statistically reliable results.

Connecting the Kansai words to product properties, namely Kansei word, which provides the properties of the product.

3. Result & Discussion
The population that will be used in this study are students who have used a reading chair when reading. And Bandung area as the object of sampling. In this study the number of samples needed using a population-based sample size determination table developed by Isaac and Michael. So the number of respondents needed is 347 respondents with an error rate of 5%. In this study using a questionnaire as a data collection tool consisting of 23 questions that have been adjusted to the number of words obtained. Primary data collection is done by distributing questionnaires online to users using google form with a link that is divided into two parts, namely http://bit.ly/KionerHilmanArdian and http://bit.ly/KionerHilmanArdian2. The first questionnaire link was used to test the validity and reliability of each questionnaire obtained and the second questionnaire link was used to process data in factor analysis and KJ method

4. Result and Discussion

4.1 Identification of Target Markets
Before making improvements to the product, it is necessary to identify the target market for users using reading chairs. In this study the target market is students who have used a reading chair when reading because students are required to broaden their horizons and enrich themselves by reading a lot of books as well as working on assignments from various literature as a reference.
4.2 Kansei Word
Kansei words obtained in number can vary but generally use 50 to 600 words (Schütte, 2002). After collecting the Kansei word, a reduction in the Kansei word is done to reduce the words that have similarities with other words. This is done to reduce ambiguous words between Kansei words to minimize the use of words that are in accordance with the needs of reading chair users. The following are 23 Kansei words that have been reduced as follows:

| No | Kansei Word | No | Kansei Word |
|----|-------------|----|-------------|
| 1  | Smooth      | 13 | Appropriate |
| 2  | Stable      | 14 | Waterproof  |
| 3  | Feature     | 15 | Ergonomic   |
| 4  | Backrest    | 16 | Minimalist  |
| 5  | Headrests   | 17 | Easy to use |
| 6  | Armrest     | 18 | Attractive colours |
| 7  | Premium     | 19 | Elegant     |
| 8  | Safe        | 20 | Futuristic  |
| 9  | Comfortable | 21 | Unique      |
| 10 | Relax       | 22 | Slope       |
| 11 | Functional  | 23 | Artistic    |
| 12 | Ideal       |    | -           |

The word from the word that has been successfully reduced will then be used to make a question in the form of a questionnaire that will be distributed to reading chair users.

4.3 Test Validity and Reliability
- Test Validity
  Validity test can be said to be valid if the correlation coefficient value is 3 0.3 (Indrawati, 2015). Based on the results of the validity test using Spearman shows the results of each Kansei word more than 0.3 which states that the data from the post-test questionnaire is said to be valid.
- Reliability Test
  According to Indrawati (2015) reliability concerns the level of trust, reliability, consistency or stability of the results of a measurement. Cronbach alpha coefficient value ≥ 0.7 indicates that the questionnaire has a fairly good level of reliability. Based on the reliability test using Cronbach alpha shows that the results obtained are above 0.7, which means the questionnaire data is reliable.

4.4 Factor Analysis
Figures KMO and Barlett Test according to Santoso (2012) can be analysed by factor analysis if the value of KMO and Barlett Test is above 0.5 and the significance value is below 0.05. The hypothesis for testing is as follows.
- H0: There is no significant relationship between variables that affect the concept of the reading chair.
- H1: There is a significant relationship between variables that affect the concept of the reading chair.

Based on the results of the KMO and Barlett Test values obtained 0.818 or> 0.5 with a significance value of 0.000 or <0.05 which means accepting the H1 hypothesis or there is a significant relationship between the variables that affect the concept of the reading chair. In the KMO and Barlett Test there is
a PCA that can be used to find out the classification of each word word from each grouping result that can be seen in the table 2.

| No | Kansei Word   | Component | Cluster          |
|----|---------------|-----------|------------------|
| 1  | Smooth        | 1         | Basic            |
| 2  | Feature       | 1         |                  |
| 3  | Backrest      | 1         |                  |
| 4  | Headrests     | 1         |                  |
| 5  | Armrest       | 1         |                  |
| 6  | Comfortable   | 1         |                  |
| 7  | Relax         | 1         |                  |
| 8  | Functional    | 1         |                  |
| 9  | Minimalist    | 1         |                  |
| 10 | Attractive colours | 2         |                  |
| 11 | Futuristic    | 2         | Positive Physical|
| 12 | Unique        | 2         |                  |
| 13 | Slope         | 2         |                  |
| 14 | Waterproof    | 5         | Adventurous      |
| 15 | Ergonomic     | 6         | Compromising     |

4.5 Product Concept Description

After doing a factor analysis and getting four group components from each kansei word, the next is to classify the four groups using the KJ method. According to Nagamachi and Lokman (2011) the KJ method uses affinity diagrams in grouping kansei words called affinity clusters. In the cluster there are several levels of levels, namely zero level, 1st level, and 2nd level, which means that the higher the level, the more detailed it will be.

According to Nagamachi and Lokman (2011) when it can deepen the concept of a product that is initially very general and vague so that it becomes the lowest level concept, we can decide on physical characteristics such as size, design, colour and function. Physical characteristics also need to be translated into technical specifications. The following Figure 1 are the physical characteristics and technical specifications for the reading chair concept.

**Figure 1.** Characteristics and specifications of the structure

**Figure 2.** Characteristics and specifications of dimension
4.6 Design Idea
Before visualizing using CAD, it is necessary to design a reading chair design first. Design is done by benchmarking to find references or ideas that are in accordance with the design that will be made. The selection was chosen based on the suitability between the kansei word and the technical specifications obtained on the product design to be made.

4.7 Visualization of Design Concept
After getting the technical characteristics and specifications using the KJ method, the next step is to create a 3D design using solidworks software. The visualization of this design is derived from the benchmarking process on read-read products on the market. So that gives an overview to researchers to make visual designs. The design of this design is also adjusted to the process that the researcher has done in the previous stages so as to get the following visual design innovations.

When the design of the proposal was completed using solidworks software, the researcher conducted a trial to find out the user's response regarding the design of the reading chair that the researcher had designed to 40 respondents and an expert in manufacturing. As a result, users have no problems regarding the form of design that the researchers design, but there are only a few adjustments and additional features in the reading chair needed by users. The adjustments are like the lights that can be adjusted by the user, the backrest which can be adjusted tilt and the brown colour for the frame and the black for the cushion more chosen by the user. As well as additional features needed in the reading chair that is designed is the presence of a folding table that can be used as a place to put books while reading. Then the researcher got expert input regarding the structure of the skeleton used so that there was an improvement in the skeletal structure that the researcher designed. So from that the researchers conducted a design evaluation in the hope that the design evaluated by researchers can be better than the previous design to meet user needs. The following is an evaluation design carried out by the researcher.
5. Conclusion

Based on the results of the research that has been done in designing reading chairs that are in accordance with user needs by using Kansei Engineering, conclusions can be drawn as follows.

1. Implementation of Kansei Engineering in making the design of a reading chair can be done because of the design of the view of the user's feelings and needs.

2. The Kansei word test uses processing statistical data to test words that match the user's needs in the design of the reading chair. The result of the 23 words that have been reduced there are 8 words that cannot be used, namely smooth, premium, safe, ideal, appropriate, easy to use, elegant and artistic so that the design of the reading chair only uses 15 Kansei words namely stable, features, backrest, headrests, armrests, comfortable, relax, functional, waterproof, ergonomic, minimalist, attractive colors, futuristic, unique and slope.

3. The use of Kansei Engineering in the manufacture of reading chair design results in several innovations to meet user needs, including the armrests and headrests that are expected by users in the designed reading chair, there are footrests that users can use to give a more relaxed impression when reading, then there is a USB port that functions as an electric charger for users who use gadgets when reading, there are lights that can be used by users when the lighting when reading is felt lacking, there is a book storage area that users can use when they have finished reading. Backrest that can be adjusted by the user. And a folding table that can be used to put books or gadgets while reading.

6. References

[1] GEAR PATROL 2019 ‘The 10 Best Reading Chairs of 2019’. Available at: https://gearpatrol.com/2019/02/12/best-reading-chairs/ (Accessed: 22 April 2019).

[2] Indrawati, P. D. 2015 Metode Penelitian Manajemen dan Bisnis Konvergensi Teknologi Komunikasi dan Informasi. 1st edn. Edited by D. Sumayyah. (Bandung: PT Refika Aditama).

[3] Nagamachi, M. and Lokman, A. M. (2011) Innovations of Kansei Engineering. 1st ed. (Tokyo: Taylor & Francis Group).

[4] Periety 2017 ‘Usaha Meningkatkan Minat Baca Mahasiswa’, Jurnal Pustaka Budaya, 4(1), pp. 55–67.
[5] Santoso, S. 2012 *Aplikasi SPSS pada Statistik Multivariat*. 1st ed. (Jakarta: PT Elex Media Komputindo).

[6] Schütte, S. 2002 *Designing Feelings into Products*. (Linköping: Linköpings Universitet).

[7] Yassin, B. A. 2019 *Faktor-Faktor yang Mempengaruhi Minat Membaca, Perpustakaan Universitas Andalas*. Available at: https://pustaka.unand.ac.id/component/k2/item/193-faktor-faktor-yang-mempengaruhi-minat-membaca (Accessed: 1 March 2019).