Implementation of Kansei Engineering on academic information system interface design based on Android

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Abstract. One of the goals of the Android Application is to improve the quality of the Academic Information System. This study uses the Kansei Engineering method where the emotional power of users is involved in getting design material that has a strong influence on the Android Application design concept. This study used 17 Kansei Word and 12 specimens as samples of Android applications. Kansei Word is selected from words related to an Android Application display. While specimen samples or Android applications are selected based on different characteristics between Android applications with each other. This study involved 35 participants. To describe the emotion concept to the E-Learning specimen structure, where there are several relationships between variables, multivariate statistical analysis is carried out by involving the Coefficient Correlation Analysis (CCA), Principal Component Analysis (PCA) and Factor Analysis (FA). The results of the CCA analysis of all participants; it can be seen that the emotional correlation between Kansei Word has two relationships, namely strong relationships and weak relationships. Strong relationships are characterized by high values rather than other Kansei Word values.

1. Introduction

In this digital age, the development of information systems is needed not only in companies but also in education circles [1]. With the increase in digitalization, facilities can facilitate good work, and on time. And can be accessed by competent parties, anywhere, anytime and by anyone according to their needs. One of them is educational institutions, providing satisfying services for their students.

Material Design determines the quality and beauty of an Android Application [2]. Various kinds of specifications are presented to build the beauty of Android applications; this is of course based on information needs that are raised or included.

Another development method for increasing user satisfaction is the Human-Computer Interaction (HCI), which is a method used to assess communication or interaction between users and the system [3]. In addition to users with the system, this method involves several other components, namely interactions, activities and work environment. However, the main key to this method is Usability. Usability is a value given to the product in terms of its use so that it can complete its work clearly and useful [4].

The need for interface design an Android-based application turns out not only limited to those factors. User rating factors for an Android-based application such as layouts and buttons are interesting and do not consume the user's Read Only Memory. Kansei engineering is one method to measure and assimilate affective responses which are then implemented into Android-based Material Design Applications.
Kansei Engineering can also be seen as a science that treats human needs as a priority, a new product development technology that transfers consumer feelings and images into products of Material Design [5,6]. This design material is in line with what consumers want from the product, including shape, color, material, size, and other factors. All product attributes will affect the psychological feelings of consumers. The goal is to make consumers reach the realm of physical and mental harmony when using the product so that it can stimulate the desire to use and buy it [5].

Based on the explanation on the background, the authors set the title of this thesis namely "Implementation of Kansei Engineering Against the Interface Design of Android-Based Academic Information Systems."

2. Methodology
There are several questionnaires obtained when interviewing respondents are Kansei words that are still raw or still many from Kansei word that has similar meanings with one another [7-10]. Then it is necessary to do the selection process of Kansai word to get a Kansei word that does not double and represents the answers of all respondents. The process of merging from several Kansei words that have the same meaning is done by selecting one or combining the word with one another so that the word can be obtained which can represent several other word words.

Then 30 words are presented to 35 students to be surveyed as preliminary respondents to choose the words that are expected to represent the feeling of displaying an Android-based application. After being sorted according to the ranking, the lowest five groups were set aside.

3. Results and discussion
To describe the emotion concept to the E-Learning specimen structure, where there are several relationships between variables, multivariate statistical analysis is carried out by involving the Coefficient Correlation Analysis (CCA), Principal Component Analysis (PCA) and Factor Analysis (FA). The following are the results of the three analyzes:

3.1. Coefficient Correlation Analysis (CCA)

![Figure 1. CCA analysis results of all participants.](image-url)
Viewed from figure 1 results of CCA Analysis of all participants, it can be seen that the emotional correlation between Kansei Word has two relationships, namely strong relationships and weak relationships. Strong relationships are characterized by high values rather than other Kansei Word values while a weak relationship is indicated by a negative value and has a value close to 0 (<0.3).

The variable "Fast Process" has a strong emotional relationship with the variable "Plain" with a value of 0.950. But the variable "Import Data" has a weak usage relationship with the variable "Security" with a value of -0.170.

3.2. Principal Component Analysis (PCA)
PCA is performed to determine the relationship between specimens and emotion by reducing emotion factors that are not too significant. PCA analysis uses XLStat 2014 software involving participant average recapitulation data as data analysis material. Based on the calculation of PCA analysis several factors are generated or called Principal Components (PC) as shown in table 2:

| Table 1. Principal component values for all participants. |
|--------------------------------------------------------|
| Eigenvalue     | F1   | F2   | F3   | F4   | F5   | F6   | F7   | F8   | F9   | F10  |
|----------------|------|------|------|------|------|------|------|------|------|------|
| Variability (%)| 68.192| 15.371| 10.981| 3.110| 1.880| 0.268| 0.143| 0.030| 0.019| 0.007|
| Cumulative %  | 68.192| 83.563| 94.544| 97.654| 99.534| 99.802| 99.945| 99.974| 99.993| 100.000|

The results of the Principal Component (PC) are called the factor (F) shown in the results F1, F2, and so on. Table 2 PC results and F1 and F2 Eigenvalue values of 11,593 and 2,613 with Variability levels of 68,192 and 15,371 and Cumulative values of 68,192 and 83,563. This means that the results of the PC are representative enough to show the emotional structure and usage of the user. This shows that the structure of emotions is strongly influenced by PC results. The PC results are then translated into a scree plot as shown in figure 1.

![Figure 2](image-url)  
**Figure 2.** The overall scree principal component participant plot.

Figure 2 is the result of a translation of the Principal Component value table. The data involved include eigenvalue values, variability values, and cumulative values. The graph in figure 2 shows that F1 and F2 represent enough to show the user's emotional structure.

3.3. Factor Analysis (FA)
To detail and strengthen the results of PCA, further analysis is needed, namely Factor Analysis (FA) using XLStat software. The average recapitulation data is used as material for FA analysis by using varimax rotation to obtain more accurate values. Table 2 shows the results of actor analysis with varimax rotation.
Table 2. Factor analysis results with varimax rotation.

|          | D1     | D2     | F3     | F4     | F5     | F6     | F7     | F8     | F9     | F10    |
|----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Variability (%) | 68.05  | 15.50  | 10.98  | 3.110  | 1.880  | 0.268  | 0.143  | 0.030  | 0.019  | 0.007  |
| Cumulative %    | 68.05  | 83.56  | 94.54  | 97.65  | 99.53  | 99.80  | 99.94  | 99.97  | 99.99  | 100.00 |

Table 3 is the result of the analysis of percentage variants after varimax rotation using Factor Analysis (FA). The table shows two factors that are considered to have a dominant influence on the user's emotional factors. Symbols of factors in Factor Analysis (FA) use symbol D. The same is the case with Principal Component analysis, in Factor Analysis (FA) there are two values, namely the value of variability and cumulative value. The D1 and D2 values are quite representative in determining which variables will be a reference in designing the development of an Android Application. Table of correlation between factors and emotions after varimax rotation is shown in table 3.

Table 3. Correlation between factors and emotions.

|                                | D1     | D2     |
|                                |        |        |
| Ease of Operation of Software  | 0.871  | -0.305 |
| Faster Process                 | 0.979  | 0.152  |
| Beautiful                      | 0.969  | -0.129 |
| Cool                           | 0.945  | 0.253  |
| Language Usage Understood      | 0.967  | 0.145  |
| Plain                          | 0.961  | -0.131 |
| Informative                    | 0.898  | -0.082 |
| Question and answer            | 0.837  | -0.314 |
| Not Eating Memory              | 0.478  | 0.354  |
| Import Data                    |        |        |
| Elegant                        | 0.209  | 0.893  |
| Export Data                    | 0.877  | 0.371  |
| Relax                          | 0.970  | -0.186 |
| Download Data                  | 0.676  | -0.591 |
| Security                       | 0.984  | 0.082  |
| Classic                        | 0.726  | -0.391 |
| Layout Interface Settings      |        |        |
|                                | 0.687  | 0.102  |
|                                | 0.499  | 0.826  |

The values contained in table 4 are the values resulting from factor analysis. Variables that have the greatest value will be a reference in designing the design of an Android application. Viewed from Table 4 the concept of emotion is based on the factors of all participants that the design of the Android Application that you want to build is an Android Application that has the concept of emotions "Cool" and "Classic." The concept of emotion used is the concept of emotion which has a high value > 0.7. If the emotional value is more than 0.7, the emotion is considered to have a high value. But to sharpen the number of emotions that are used is a value that has a high value > 0.9. Values that have high values are indicated by shaded and bold cells. While the design of the Ushuluddin Faculty hopes Android application is "Cool."

4. Conclusion

In this study, the interface design elements in designing an Android Application consist of 5 major parts namely. Linear Layout, Button, ImageButton, ImageView, and Toolbar. Of the five sections divided
into 40 sub-sections, then from 40 sub-sections are divided into 105 design elements. To detect the feelings of users of the Research Islamic University Android Application using 17 Kansei Words. Specimens consist of 12 Android Applications, each of which has a rating in Play Store above 4.0. Participants taken from the Faculty of Islamic Education totaling 35 people. The process of analyzing the elements needed in designing the interface design of an Islamic University Android Application with the Kansei Engineering approach uses a multivariate statistical calculation method. These methods are Coefficient Correlation Analysis (CCA), Principal Component Analysis (PCA), Factor Analysis (FA) and Partial Least Square (PLS). Application of Kansei Engineering in making interface design recommendations for Android Applications Islamic Higher Education produces one design display of Android applications. The display design is sourced from all participants, which will be used for public display, at the Ushuluddin Faculty. With the concept of emotions "Cool."

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