# ADAPTATION OF HUMAN-CENTERED DESIGN (HCD) FOR DESIGNING THE MOBILE BASED USER INTERFACE OF GOVAKANSI APPLICATION

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***Abstract***

*The level of human dependency on using mobile devices reached a fantastic number. In its research, Ericsson company estimates that, in 2018, around 70% of Indonesia's population will be using mobile devices. The high flexibility makes mobile devices more commonly used by people. PT. Vakansi Mandala Nusantara or Govakansi is a company that specializes in travel agency. Unti now, Govakansi still has not had a mobile media for their product reservation, information and catalogs. To enhance the competitiveness of Govakansi to other travel agency companies, therefore, a mobile-based application is needed. A good application is the one that the users can accept and use easily and unambiguously. To achieve the goal, Govakansi needs a user-based interface design in the mobile application. The right method to create a user-based design is Human Centered Design, because this method makes the users (humans) the center for determining the design. This research discusses how to create user interfaces of the mobile-based application used by Govakansi by adapting HCD. This design was adapted from the Google Material Design Guidelines made by Google to reduce subjectivity in designing. Furthermore, the evaluation to the results of designing the user interface application is needed to determine the level of usability and to know the user-acceptability level. The evaluation of the user interface design is done by using System Usability Scale Questionnaire that contains 10 statements about usability testing. This user interface design got 78.83 of the SUS score, which means that the user interface design of Govakansi mobile-based application is well accepted by users.*

***Keywords****: application, mobile, user interface, Human-Centered Design, Usability, System Usability Scale*

## 1. INTRODUCTION

In the all-digital era, today, Ericsson (2015) in its research entitled "Ericsson Mobility Report" says that 70% of Indonesia's population will use mobile phones in 2018. Based on the research, the people's dependence on utilizing mobile phones exceeded the expected level so that mobile-based applications are very likely to be expected to become a supporting media for the company in achieving its goals.

PT Vakansi Mandala Nusantara is a company engaged in Travel Consulting and Organizing so it is also called a travel agent. Travel-related information, booking, promotion and other operating performance are still done through social media and the website of GoVakansi in which the operation is still relatively inefficient. Even though the website of GoVakansi can also be accessed via a mobile phone, the user acquires less experience from it compared to the one obtained from a mobile phone based application. Furthermore, the fact shows that GoVakansi website is not fully responsive yet. This can be observed especially when users visit the website of GoVakansi via a web browser in mobile phones (Figure 1.1), i.e. there are some parts of the web site interface that does not meet the size of the phone screen. That is why it is necessary for GoVakansi to have a mobile based application as a supporting media for managing the information, booking and promotion of the products offered. The mobile based application is expected to improve the quality and service towards the customers and to improve the competitiveness against other similar companies that have used mobile based applications.

In line with the above ideas, PT Vakansi Mandala Nusantara requires the design of an application with mobile based user interface, which can be used as a reference in the development and implementation of the application. The expected user interface design is the design that meets the user needs and satisfaction. In designing the user interface of mobile based application, the involvement of humans as users is apparently needed. Generally, the user interface design just focuses on the production of applications that can run and work as it should without considering the user experience aspects such as the position of buttons, layout, choice of color, font size and so forth.

Humans, acting as users of application also need to take part in designing a user interface design. The design of application that is easily understood and learnt and in accordance with the user experience can increase the number of users and indirectly can also help the company achieve its goals. Human Centered Design approach is

an appropriate approach to design the user interface that suits the user needs. In this method, the user is the main focus in the design of user interface.

Based on the above insights, this study is conducted to analyze and design the user interface of Govakansi mobile based application by adapting the Human-Centered Design approach, which can then be used as a reference or recommendation in the development of further Govakansi application. The designing of this application aims at adjusting the design with the users' experience, needs and characteristics so that it can provide convenience and comfort in the use the application.

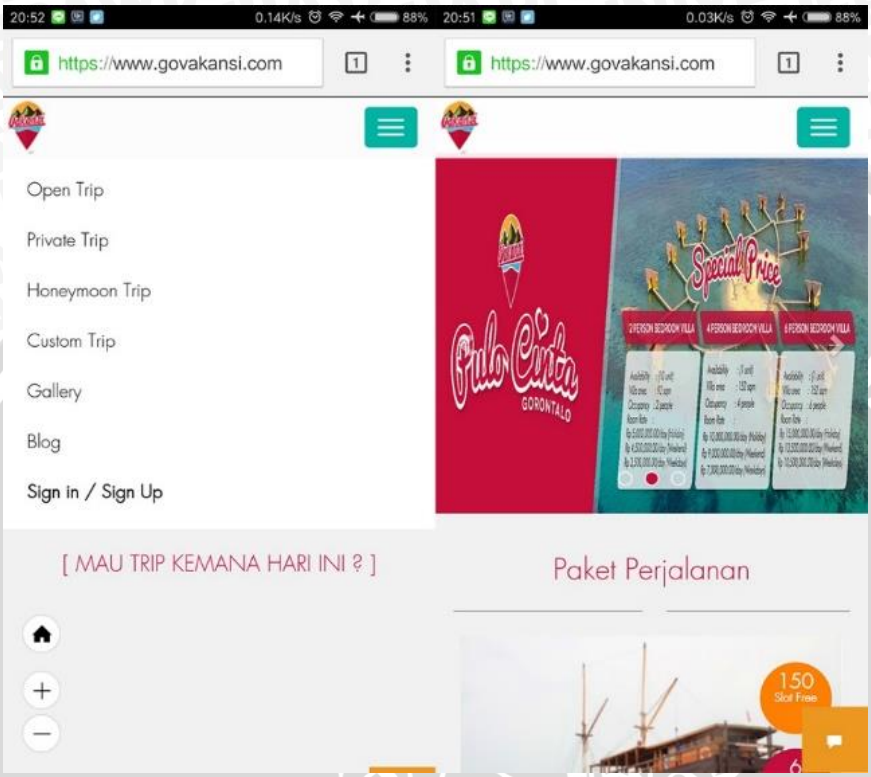


**Figure 1.1 The display of govakansi.com via mobile phone**

## 2. BASIS OF REFERENCES

### 2.1 Profile of Govakansi

PT Vakansi Mandala Nusantara was founded by Dimas Abri Haryo Tangguh in February 2015 under Govakansi trademark. Govakansi is engaged as a travel organizer, travel consultant or travel agent that grow professionally. Govakansi sells special travel package for tourism spots throughout Indonesia. The travel packages are arranged and made by the company, all of which is the result of a joint venture with many accomodation owners in the destination areas.

### 2.2 Website of Govakansi

PT Vakansi Mandala Nusantara manages a website with www.govakansi.com site address. The website owned by PT Vakansi Mandala Nusantara belongs to e-commerce website through which website visitors can book the available products. Additionally, users can read the company information, testimonials, galleries, and blogs linked to the company.

Here is a view of the website of govakansi.com:

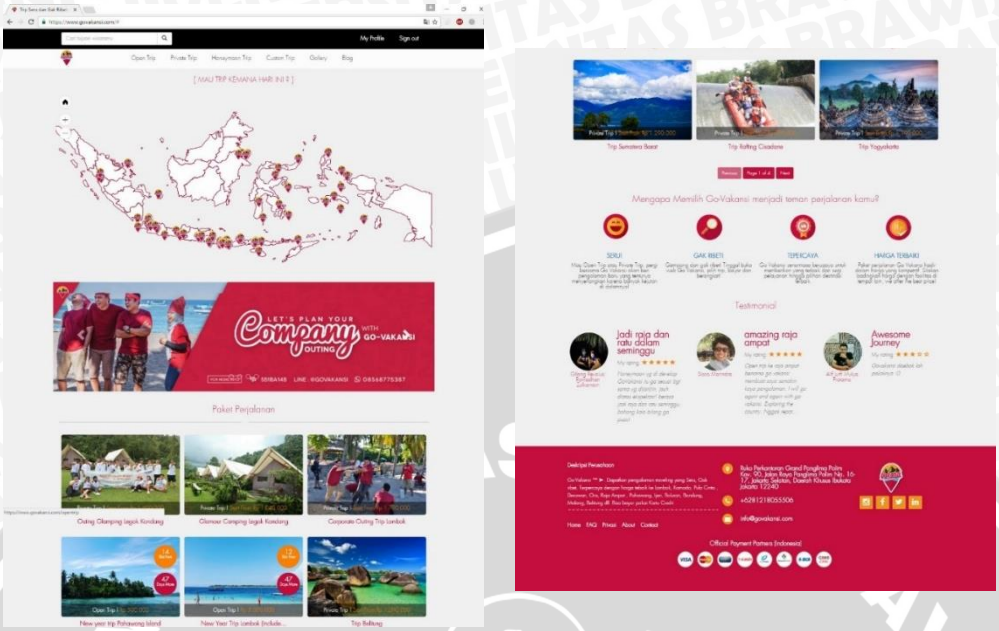


**Figure 2.1 The homepage of govakansi website**

## 2.3 Human-Centered Design (HCD)

HCD is an approach to design and develop systems aiming at making the systems more easily used (usable) by applying the factor of human and knowledge or ergonomics and usability technics (ISO 9241-210: 2010).

Why use HCD method? The reason is : using this method can reduce the risk of product failure based on needs of stakeholders and also to reduce the risk of refusal by the users (ISO 9241-210: 2010).

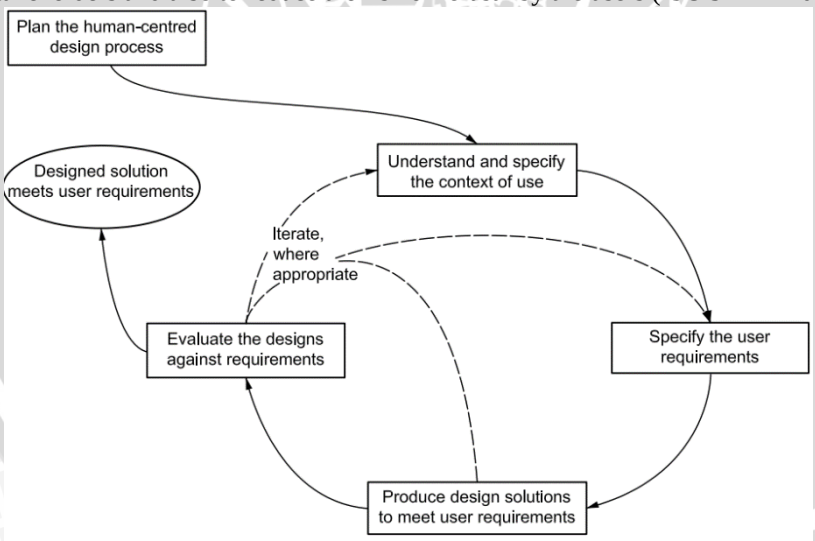


**Figure 2.2 Process of HCD**
Source: International Standards Office (2010)

## 2.4 Interview

Interview method is one of research methods used to collect data and information. This method is useful when it is combined with surveys or questionnaire, because they can be used to improve the validity of data by clarifying specific issues raised in the surveys or questionnaire (Zaphiris, et al., 2006).

The interview is divided into : structured, semi-structured and unstructured interviews. This study employs semi structured interviews because the writer has already known what information to be obtained from the respondents, so that the questions have been made and listed systematically before or made and asked during the interview in accordance with the respondents' responses.

## 2.5 Use Case

The definition of use case by Kurt Bittner (2002) is a specification of a series of activities performed by the system to achieve a goal and how the actors achieve these goals. Use case modeling is a technique which is commonly used to express the functional requirements of a system. There are some styles of writing a use case frequently used, one of which is the writing style of RUP (Rational Unified Process).

## 2.6 Usability

Usability is a qualitative analysis determining how easily a user uses an application interface (Nielsen, 2012). Meanwhile, according to ISO 9241: 11 (1998) usability is the extent to which a product can be used by specific users to achieve targets, which are set by the effectiveness, efficiency and satisfaction in certain context.

## 2.7 System Usability Scale (SUS)

System Usability Scale (SUS) is one of usability test methods that provides a fast and reliable measuring tool (Brooke, 1986). This test method was introduced by John Brooke in 1986 and can be used to evaluate different types of products and services, including hardware, software, mobile devices, websites or applications. This questionnaire was applied with 10 statements using a Likert scale of 1 to 5.

Statements of odd numbers (1, 3, 5, 7, 9) are statements with positive tone. While statements of even numbers (2, 4, 6, 8, 10) are statements with negative tone. Each statement was represented by Likert scale of five with a description as follows: 1: Strongly Disagree; 2: Disagree; 3: Neutral; 4: Agree; and 5: Agree very much. On the statements of odd numbers (positive tone), the score is calculated by subtracting the weight of each question (xi) by 1, so it is written (xi - 1).

Similarly, on the questions with even numbers (negative tone), the score is calculated by deducting 5 by the weight of each question (xi) that is written into (5 - xi).The total score is obtained by adding up all scores of all questions (even or odd). While SUS score is obtained by multiplying the total score with 2.5. The total score from each respondent will range between 0-100.

Based on the final score of the SUS the usability and acceptability levels of the application can be revealed.The assessment is based on three categories: Not Acceptable with a range of scores 0-50.9, Marginal 51-70.9,and Acceptable 71- 100 (Ghazali, 2016). The following are the 10 statements of SUS:

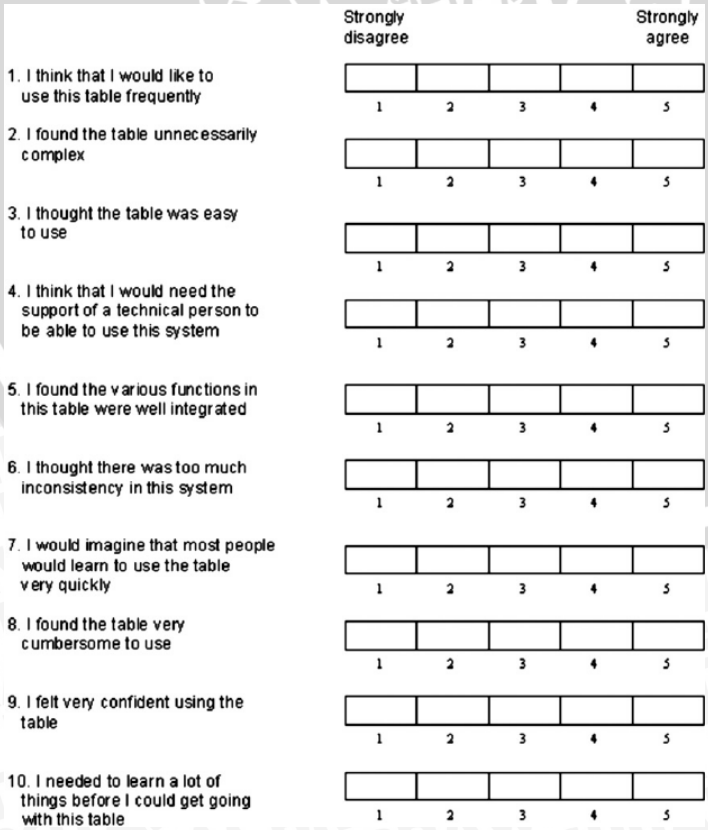


**Figure 2.3 Ten SUS Statements**

## 3. RESEARCH METHODOLOGY

The steps taken by the researcher in conducting this study is shown in Figure 3.1.

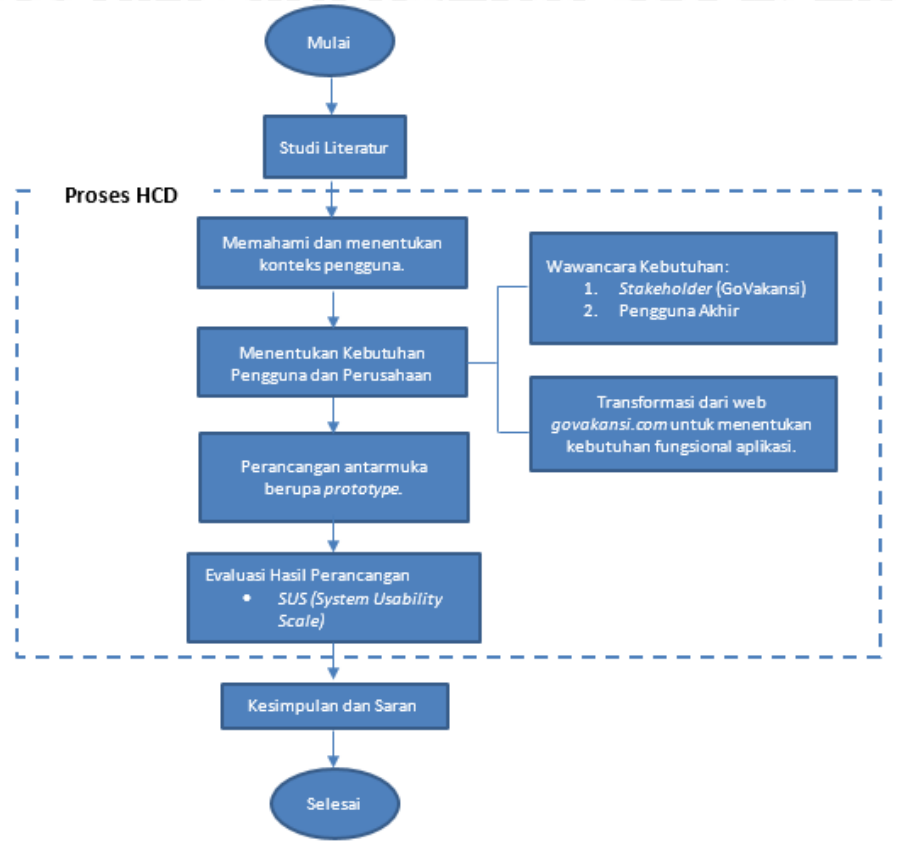


**Figure 3.1 Stages of Research**

## 4. ANALYSIS THE CONTEXT OF USE AND USER REQUIREMENTS

### 4.1 Specify the Context of Use

#### 4.1.1 User Groups, User Characteristics and Role in Application

Users of mobile-based Govakansi applications are divided into two groups i.e. the company or stakeholder and the end users of applications. Identification of users of Govakansi mobile based application which are the respondents of this research are the stakeholders and end users who often use the application.

Identification of the Govakansi mobile-based applications which the respondents in this study is the stakeholders and end users are set out below:

**Table 4.1 Group of System Users**

| Group of users | Characteristics | Role in the system |
|---|---|---|
| *Stakeholder* (PT. Govakansi Mandala Nusantara) | • Knowledgeable and has extensive experience of the travel world.<br>• Often associated with the consumer. | Providing the information related to travel packages as well as providing the application contents. |
| *End User* | • Frequent traveling.<br>• Ever operateing an android phone.<br>• Aged 20 to 30 years. | Getting the information related to travel packages, contents of applications, as well as reservations of tour packages. |

### 4.1.2 System Environment

Hardware, software and other tools that are used to run this applications is described in Table 4.2 below:

**Table 4.2 System Environment**

| | |
|---|---|
| ***Hardware*** | • Mobile Phone<br>• Chipset: Qualcomm MSM8974AC Snapdragon 801<br>• CPU: Quad-core 2.5 GHz Krait 400<br>• GPU: Adreno 330<br>• RAM: 2GB |
| ***Software*** | Operating System Android 6.0.1 (*Marshmallow*) |
| **Tools** | *Cordova framework* |

## 4.2 Implementation of Interviews

Interviews were conducted to the groups of users who have been described previously, namely:

1. Stakeholders that interacts directly to the consumers or users of application. This study took 2 respondents from the relevant stakeholders, namely Customer Service and Tour GuideDivisions.
2. The end users are the people who access the application. In this study there are three respondents from the end user group, that is, two travelers who understand the IT matters and have enough knowledge on design and one traveler who has little knowledge on technology.

The information to be extracted are related to features that need to be applied to the GoVakansi mobile based application as well as the outlines of interface design.

## 4.3 Analysis of Functional Needs of Applications

The functional requirements of application were obtained from the transformation of govakansi.com,which were customized in line with the confirmation results from the users in the previous interviews. The functional need transformation of Govakansi website resulted in fourteen needs, namelyRegister, Sign In,Check Travel Catalog, View Testimonials, Read Company Information, Book Travel Package, See Gallery, See Profile, Edit Profile, View Reservation, Cancel Reservation, Add Testimonials, Edit Testimonials, and Search Bar.

## 4.4 Use Case

Govakansi mobile based application consists of two actors namely: Guest,who is is a person using the application but not entering into the system yet, while Member is a person who uses the applications and has entered into the system. Apart from the users, the Govakansi mobile-based applications have seventeen use cases consisting of eleven use cases and six extended use cases. The eleven use cases include register, sign in, *lihat katalog perjalanan, lihat gallery, lihat testimonial, lihat informasi perusahaan, mencari katalog perjalanan, pemesanan perjalanan, mengelola profil, mengelola pesanan, mengelola testimonial*. The six extended use cases are *lihat profil dan edit profil*, which extend from the use case of *mengelola profil*, use case *lihat pesanan dan batalkan pesanan*, which extend from the use case *mengelola pesanan*, as well as the use case *tambah testimonial dan edit testimonial*, which extend from the use case of *mengelola testimonial*.

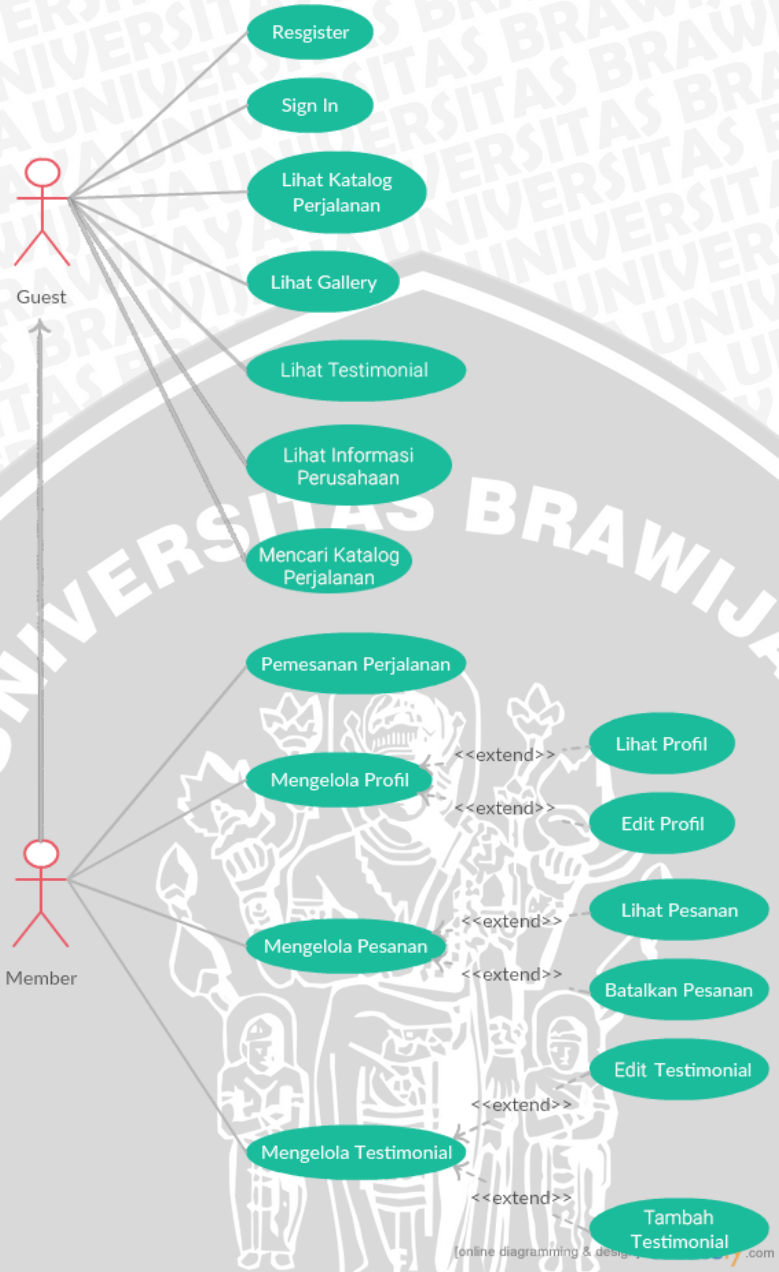


**Figure 4.1 Use Case of Govakansi Mobile-Based Application**

## 5. DESIGN OF USER INTERFACE

### 5.1 Guidelines of User Interface Design

The proposed design of the user interface to be applied to the Govakansi mobile based application is based on the interview and the transformation results of Govakansi website specified in the functional requirements of applications. In addition, the design also refers to Material Design Guidelines made by Google, which aims to reduce the element of subjectivity in the design.

### 5.2 Design of Proposal

The design of proposal was made based on the results of the functional need analysis in Section 4.3, which was adjusted with the results of interview in Section 4.2, as well as referring to the Google Material Design Guidelines in Section 5.1 to increase the design objectivity.

### 5.3 Prototype of Design

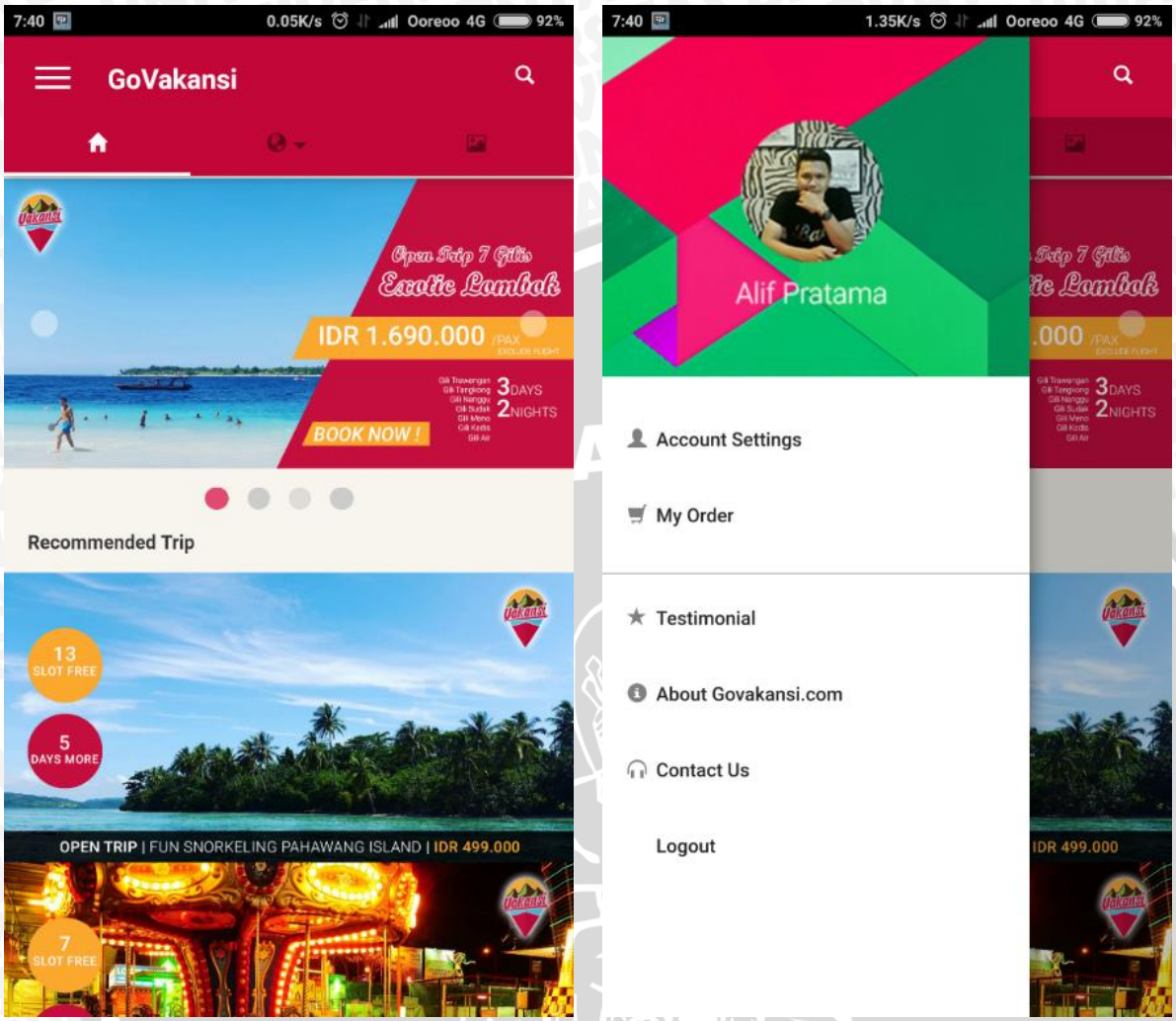


**Figure 5.1 Prototype of Design**

## 6. EVALUATION OF DESIGN

### 6.1 SUS Questionnaire Results

In the calculation of the SUS questionnaire, R symbolizes respondents,while Q represents statements. Here is how to calculate a score or a value to each SUS respondent, with respondent 1 (R1) as an example:

$$Score = (Q1-1)+(5-Q2)+(Q3-1)+(5-Q4)+(Q5-1)+(5-Q6)+(Q7-1)+(5-Q8)+(Q9-1)+(5-Q10)$$
$$=(5-1)+(5-2)+(5-1)+(5-4)+(5-1)+(5-4)+(4-1)+(5-1)+(4-1)+(5-3)$$
$$=72.5$$

The score tabulation of each SUS question can be seen in Table 6.1.

**Table 6.1 The results of score tabulation of each SUS question**

| Responden (R) | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | Skor SUS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| R1 | 4 | 3 | 4 | 1 | 4 | 1 | 3 | 4 | 3 | 2 | 72.5 |
| R2 | 3 | 3 | 3 | 4 | 4 | 3 | 4 | 4 | 4 | 4 | 90 |
| R3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 4 | 4 | 4 | 80 |
| R4 | 3 | 3 | 4 | 4 | 2 | 2 | 1 | 4 | 3 | 3 | 72.5 |
| R5 | 3 | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 3 | 3 | 85 |
| R6 | 2 | 2 | 4 | 4 | 3 | 1 | 3 | 4 | 3 | 4 | 75 |
| R7 | 3 | 4 | 3 | 4 | 2 | 3 | 4 | 4 | 3 | 4 | 85 |
| R8 | 3 | 2 | 3 | 3 | 3 | 3 | 2 | 4 | 3 | 3 | 72.5 |
| R9 | 4 | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 3 | 4 | 90 |
| R10 | 3 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 3 | 4 | 92.5 |
| R11 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 75 |
| R12 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 82.5 |
| R13 | 2 | 3 | 4 | 4 | 2 | 3 | 4 | 4 | 4 | 4 | 85 |
| R14 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 3 | 3 | 4 | 92.5 |
| R15 | 3 | 2 | 4 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 72.5 |
| R16 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 70 |
| R17 | 3 | 3 | 1 | 4 | 3 | 2 | 3 | 4 | 4 | 4 | 77.5 |
| R18 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 70 |
| R19 | 3 | 3 | 4 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 80 |
| R20 | 4 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 72.5 |
| R21 | 3 | 3 | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 87.5 |
| R22 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 67.5 |
| R23 | 3 | 2 | 4 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 77.5 |
| R24 | 3 | 2 | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 67.5 |
| R25 | 2 | 3 | 4 | 3 | 3 | 2 | 3 | 3 | 2 | 3 | 70 |
| R26 | 3 | 4 | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 90 |
| R27 | 2 | 3 | 4 | 4 | 3 | 3 | 4 | 4 | 2 | 4 | 82.5 |
| R28 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 67.5 |
| R29 | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 70 |
| R30 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 3 | 3 | 4 | 92.5 |
| | | | | | | | Rata-rata skor | | | | 78.83 |

The results of the SUS questionnaire from 30 respondents with five stakeholders, ten travelers with little knowledge on technology, and fifteen travellers with sufficient knowledge on technology or design show that mobile-based applications of Govakansi got an average score of 78.83.

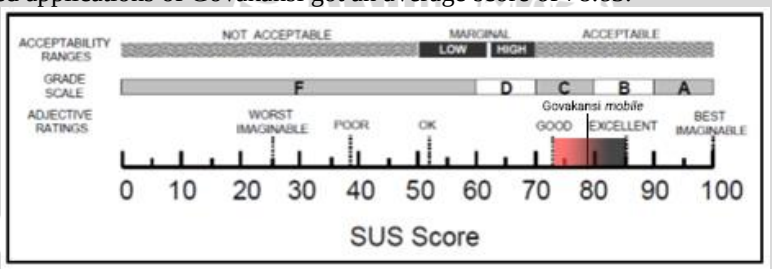


**Figure 6.1 Rating Scale of SUS Score**

Appearing in Figure 6.1, the scores of the user interface of the Govakansi mobile based application range from above the "GOOD" and below"EXCELLENT", which means that this application can be regarded worthy and acceptable.

### 6.2 Distribution of SUS Score Frequency

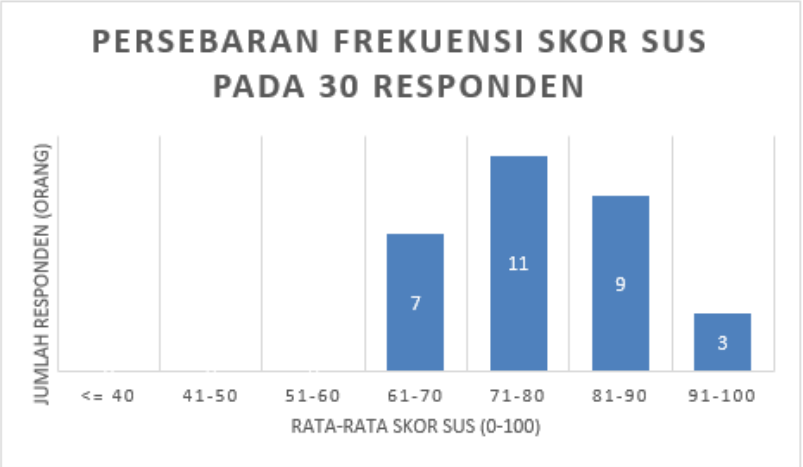


**Figure 6.2 Distribution of SUS Score**

Based on Figure 6.2, the following are the sequence of the 30 respondents' satisfaction with the Govakansi mobile based application ranging from the the smallest spread:

- Three respondents value this application within the range of 91-100, which is between “EXCELLENT" and "BEST Imaginable ". This range is the maximum range of user satisfaction in using the user interface of this application.
- There are seven people who judge these applications in the range of 61-70, which is above the "OK" and under the "GOOD"
- Nine people assess this application in the range of 81-90, which is above the "GOOD" and under "BEST imaginable"
- Eleven people value this application in the range of 71-80, which is above "OK" and under "EXCELLENT", and this range is the one showing the most satisfaction.

## 7. CONCLUSION

### 7.1 Conclusions

Based on the results of this study, the conclusions can be described as follow:

1. The analysis of user needs for designing the user interface design of Govakansi mobile based applications by adapting Human Centered Design (HCD) is:
   a. Specify the context of use
      The users of mobile based application of Govakansi are divided into two groups, that is the stakeholder (i.e. PT. Vakansi Mandala Nusantara) and end users.The group of end users is sub-divided into travelers with little knowledge on IT and travelers familiar with technology.
   b. Specify the functional requirements
      This was obtained from the transformation of govakansi.com website that is confirmed in the form of interview with users. There are 14 functional needs that were implemented in the design of the user interface.
2. User interface prototypes based on mobile applications designed as a solution for PT. Vakansi Mandala Nusantara to be able to compete with similar companies engaged in travel agency, especially with those that have had mobile based applications. The Protoype of Govakansi user interface is designed based on the results of the interview, the results of transformation of govakansi.com website and is referred to the Google Material Design Guidelines in order to reduce subjectivity in the design.
3. The evaluation of the design was done by using System Usability Scale (SUS) Questionnaire to 30 respondents and got a SUS score of 78.83, which means that the user interface of Govakansi mobile based application is in the category of Acceptable and is above the "GOOD" and under "EXCELLENT".

### 7.2 Suggestions

The following are suggestions for further research:

1. While the evaluation results of the user interface of Govakansi mobile based application is already in the category of ACCEPTABLE, the design of the application interface is still in the levels above "GOOD" and below"EXCELLENT". That is why this study needs improvement and further evaluation to able to produce designs of user interface at the level of "BEST IMAGINABLE".
2. The next step is to build Govakansi mobile based application with more comprehensive interface referring to this study in order to get the higher level of acceptability, so that PT. VakansiMandala Nusantara is able to compete with the similar companies that have implemented more modern mobile based application.

## 8. REFERENCES

Iqbal, M. 2015. Survei Ericsson: 70 Persen Penduduk Indonesia Akan Gunakan Smartphone Tahun 2018, [online] Tersedia di: <http://selular.id/news/2015/12/survei-ericsson-70-persen-penduduk-indonesia-akan-gunakan-smartphone-tahun-2018/> [Diakses pada 18 Januari 2017]

International Standards Office, 2010. ISO 9241-210 Ergonomics of Human-System Interaction Part 210: Human-Centered Design for Interactive Systems

Zaphiris, P., Dellaporta, A. & Mohamedally, D., 2003. User Needs Analysis and Evaluation of Portals. [e-book]. London. City University. Tersedia melalui: < www.academia.edu/2833330/User_needs_analysis_and_evaluation_of_p ortals> [Diakses 7 Maret 2016]

Bittner, K., Spence, I., 2002. Use Case Modeling. Canada: Addison-Wesley.

Nielsen, J. 2012. Usability 101: Introduction to Usability, [online] Tersedia di: <https://www.nngroup.com/articles/usability-101-introduction-to-usability/> [Diakses pada 19 Januari 2017]

International Standards Office, 1998. ISO 9241-11 Human-Computer Interaction Part 1: What have we learnt about usability since 1998?

Brooke, J. 1996. SUS - A ‘quick and dirty’ usability scale. [e-book] Usability Evaluation in Industry Chapter 21. Tersedia melalui <https://books.google.co.id/>