

# **LAPORAN PENELITIAN**

## **Analysis of Medical Mobile Application Based on Human and Computer Interaction (HCI) Principles**

**Analisis Aplikasi Mobile Kesehatan Berdasarkan  
Prinsip-Prinsip Interaksi Manusia dan Komputer**



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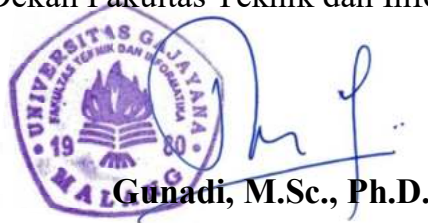
**Program Studi Sistem Informasi  
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# HALAMAN PENGESAHAN

Malang, 25 September 2019

Mengetahui,

Dekan Fakultas Teknik dan Informatika,

A handwritten signature in blue ink is written over a circular official stamp. The stamp contains the text "UNIVERSITAS GAJAYANA" at the top, "FAKULTAS TEKNIK DAN INFORMATIKA" around the inner edge, and "1980" at the bottom. The center of the stamp features a stylized flame or sun symbol. The signature is written in a cursive style, overlapping the stamp's border.

**Gunadi, M.Sc., Ph.D.**

## **ANALYSIS OF MEDICAL MOBILE APPLICATION BASED ON HUMAN AND COMPUTER INTERACTION (HCI) PRINCIPLES**

**Abstract:** The development of mobile applications are currently very rapid and used to support daily activities. The spread out of mobile applications such as education, business, entertainment, games, including mobile health applications makes this continuously compete to improve each other's performance. One thing that can be used as a consideration to measure the performance and evaluation of mobile applications are evaluated based on the principles of human and computer interaction (HCI), such as human, technology, usability, and ergonomics. The results of the evaluation indicate that medical mobile apps, in general, have fulfilled the principle aspects of human and computer interaction so it is not surprising why this application is a popular medical mobile application.

**Keywords:** Human-Computer Interaction, Human, Technology, Usability, Ergonomic.

## 1. INTRODUCTION

The development of mobile applications is currently very rapid and used to support daily activities. This development is adapted to the needs of diverse users and leads to more utilization of features on devices and applications that can be run more efficiently. The spread out of mobile applications such as education, business, entertainment, games, including mobile health applications makes this continuously compete to improve each other's performance. Technologies have been advanced to improve medical services, such as telemedicine and mobile health (Phillips, Galli, Watson, & et al, 2013). Previously, patients always went to the doctor at the clinic or hospital. They spend their energy and costs to the hospital even there they also have to queue.

But now, due to advances in cellular and wireless communication technology, people can receive medical services through their smartphones instead of having to go to the hospital. Even if you have to go to the hospital, the queue system can be through a smartphone application. The amount of information, encouragement, and support that can be conveyed to individuals during face-to-face consultations or through traditional media such as leaflets is limited, but mobile technologies such as mobile phones and portable computers have the potential to transform the delivery of health messages. (Phillips, Galli, Watson, & et al, 2013). This convenient and efficient way can reduce treatment costs.

A term in the medical world that is popular and describes the current situation is mobile health (m-Health). Actually, the term m-Health that a subarea of eHealth was introduced by Robert Istepanian in 2005 as use of “emerging mobile communications and network technologies for healthcare”. The applications (apps) of m-Health can change unhealthy lifestyles to be more healthy and form good habits (Guo, Yuan, & Chen, 2012)

In recent years various mobile health applications (m-Health) have emerged, such as popular m-Health applications are Halodoc, Alodokter, KlikDokter, MobileJKN, SehatQ and so on in Indonesia which are very easy to download and use. One of Indonesia's popular medical mobile applications and is the top trending download on the Playstore is Halodoc with a rating of 4.8 out of 5 stars (Playstore, 2019). In 2019, Halodoc has partnered with 1,000 pharmacy networks and is aiming for cooperation with 500 hospitals. This makes the health service application reach even greater. Halodoc contains features that can help users get medical services. Such as chat, voice calls, and video calls with doctors available 24 hours. In addition to easy access to contact doctors, Halodoc also offers a service to buy medical needs through the pharmacy delivery feature. Since its appearance in 2016 until now, Halodoc continues to improve its service quality and application performance.



**Fig.1.1 Interfaces of Halodoc App**

The interaction between Halodoc and users is the most important aspect of evaluating and monitoring application development. One thing that can be used as a consideration to measure the performance and evaluation of mobile applications are evaluated based on the principles of human and computer interaction (HCI). It is a computer-related discipline related to design for information, interactions, communication and technology (Bellotti, Shum, & MacLean, 1995) (Cullen & Folstad, 2014) (Sharp, Rogers, & Preece, 2007). HCI education and practice have been facing many challenges triggered by the rapid advancement of technology (Culen, 2015).

This study examines the popular medical mobile application, Halodoc in terms of the human-computer interaction (HCI) principle which consists of aspects of human, technology, usability, and ergonomics. From this study, it will also be seen how far the performance evaluation of the Halodoc is very popular and has become the top trending medical mobile application in Indonesia.



**Fig.1.2 Human Computer Interaction**

## 2. METHOD

The method used in this research is observation and evaluation of medical mobile applications based on the principle of human-computer interaction (HCI) consisting of 4 aspects namely human, technology, ergonomics and usability (Rahadian, Rahayu, & Oktavia, 2019). The human aspect of HCI is reviewed by humans who are application users. How the cognitive side of human psychology in feeling, processing and storing information through the application display. The technological aspects of HCI in terms of memory; sensory register of the filter channel iconic (excitatory vision), echoic (excitatory sound) and haptic (excitatory touch); storage; input and output. The usability aspect of HCI refers to the ease of use of the application. Usability here uses some parts of heuristic usability, namely visibility of system status, a match between system and the real world, user control and freedom, consistency and standards, aesthetic and minimalist design, flexibility and efficiency of use, help users recognize, diagnose and recover from errors (Nielsen & Mack, 1994). The ergonomic aspect can also be called work comfort to avoid mistakes and ineffectiveness.

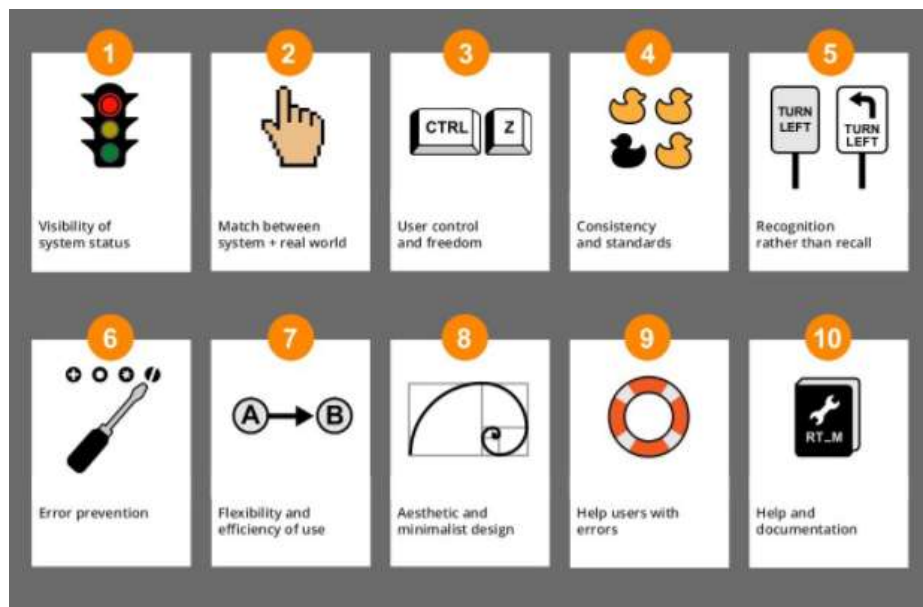


Fig.2.1 Ten Principles of Heuristic Evaluation (HE)

### 3. RESULT AND DISCUSSION

Based on observations on the Halodoc application, the following results are obtained:

#### 3.1 Human Aspect

This application connects users with third parties who provide services or sell goods such as (but not limited to) doctors, pharmacies, laboratories, delivery services. Users can use the application without the need to read the instructions or the manual book because every feature, menu, icon that is user-friendly has information that is easy to understand and adjusted to the user's convenience. The security and privacy of each user are guaranteed and protected. Chat features with doctors, and help by developers through chat, email and even telephone directly add to the comfort, trust, and security of users.

#### 3.2 Technology Aspect

The table 3.1 below is the result of evaluating technology aspects:

**Table 3.1. The result of evaluating technology aspects**

Element	Result
Memory & Storage	Size of the application installed, that is under 100MB is fairly small and does not burden the memory capacity of the supported devices
Sensory register	A response occurs to display the keyboard when the cursor is directed to the input, navigation, button, animation, to page movement
Input	Text input via the touchscreen keyboard either alphabet or number, input via the click of a button and navigation and pointing can be used according to needs and tasks
Output	Every input that has been processed raises output according to the given task in the form of text, sound, and images on the screen

#### 3.3 Usability Aspect

Usability here uses some parts of heuristic usability:

**Table 3.2 The result of evaluating usability aspects**

Element	Result
Visibility of System Status	The application is able to provide information that occurs to the user both what is being done, what is being done and what is happening. For example, when a user enters the application's home screen, a background screen will appear as the initial display. From this, the user can already identify that this display is part of a loading system

Match between system & the real world	The application is able to provide information that is easily understood like everyday language to give the impression of intimacy and trust for the user
User control & freedom	The application is able to provide convenience and freedom to the user in using the interface. Examples such as users who can do back, cancel, keyboard input. Responsive navigation makes it easy to move
Consistency & standard	This application has good consistency, each page has the same color, design, and theme. The arena is a standard mobile site that is simple, minimalist and does not use complicated graphics
Aesthetic & minimalist design	The layout design is good, comfortable to look at using good color contrast, suitable position and harmonious. With a minimalist design and combined with the appropriate whitespace (spacing between elements) will make the application look elegant
Flexibility & efficiency of use	Easy and flexible application. For new users do not have to bother learning the system through instructions or manual books because each menu and feature provides clear and concise information
Help users recognize, diagnose & recover from errors	When an error occurs, the application can provide an error message and also provide a solution in the form of steps or error handling instructions using language that is easily understood by the user.



Figure 3.1. Menus of Halodoc App

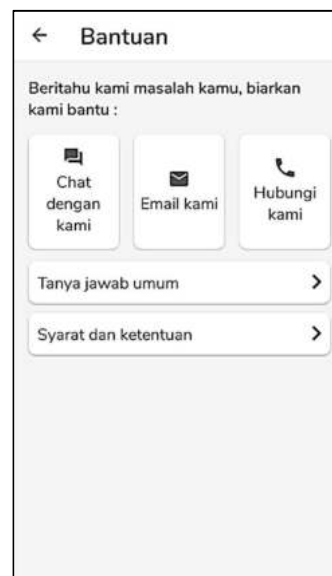


Figure 3.2. Help menu and FAQ



### 3.4 Ergonomic Aspect

The ergonomic aspect can also be called work comfort to avoid mistakes and ineffectiveness. The table 3.3 below is the result of evaluating ergonomic aspects:

**Table 3.3. The result of evaluating ergonomic aspects**

Element	Result
Consistency	Each page display uses icons, fonts, colors and consistent instructions
Simplicity	Display a simple design and use a familiar icon can simplify the operation of the application
Human memory limitation	The application provides a warning as to minimize memory load especially when an error occurs by the user
Cognitive directness	The use of icons, buttons and the physical requirements of the application are appropriate and can provide clear content information
Feedback	Each action given through buttons, links, and icons raises the system's response and feedback
System messages	Message or notification and confirmation will appear when there is an action from users. Its using language that is easy to understand.
Attention	The attention given by the application including explanations, important things, background, colors is in accordance with the intent and purpose.
Display issues	The responsive display adjusts the shape of the device. The placement of icon, button, scroll, and navigation functions are appropriate

#### 4. CONCLUSION

The spread out of mobile applications such as education, business, entertainment, games, including mobile health applications makes this continuously compete to improve each other's performance. This study examines the popular medical mobile application, Halodoc in terms of the human-computer interaction (HCI) principle which consists of aspects of human, technology, usability, and ergonomics. From this study, it will also be seen how far the performance evaluation of the results of the evaluation indicate that medical mobile apps, in general, has fulfilled the principle aspects of human and computer interaction so it is not surprising why this application is popular and become the top trending medical mobile application.

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