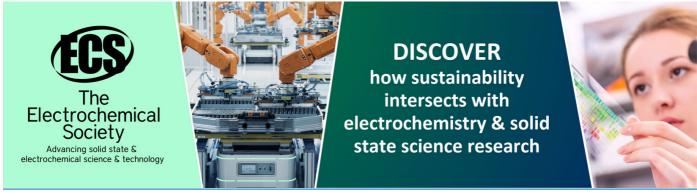**PAPER • OPEN ACCESS**

Profile and preferences users of doctors consultation application in Indonesia

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Profile and preferences users of doctors consultation application in Indonesia

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Abstract. Researchers in healthcare predict the need for healthcare applications will grow rapidly. In Indonesia, doctor consultation applications began to emerge, but research on doctor consultation application still a few. The purpose of this study was to identify the user profile and preferences for doctor consultation application in Indonesia. The data were collected using an online questionnaire via Google Form that consisting of 3 parts: user profiles, user preferences, and doctor consultation application. There was 129 response and only 111 can be used. SPSS version 24 was used to test validity and reliability, descriptive data, cross tabulation, multi-response calculation, independent t-test. Consensus calculation used to find the preference of doctor consultation application in Indonesia. The results show that there are 6 most important factors that developers of doctor consultation application should consider. The most popular applications are Alodokter and Halodoc where Halodoc is a leader in doctors consulting application, so developers can make these two applications as a reference. The developer can target the market using user profile from this research. In addition, the features that should be in the application are the features of consultation (chat), disease information, purchase and delivery of medicine, and consultation (call).

Keywords – Doctor Consultation Application, User Preferences, Consensus

1. Introduction

The modern world is rapidly changing human behavior every day. An ever-expanding technology can transform the conventional way of human life in a more modern direction. The development of increasingly sophisticated technology can affect daily human activities thus create new challenges and opportunities in every aspect of human life including health care.

The growing number of smartphones every year supports an increasing number of applications every year, especially mobile applications. It is predicted in 2019 will be 2.5 billion smartphone users worldwide [1]. This is certainly a business opportunity for mobile application developers because the market size is large and predicted become larger. Information technology in the healthcare industry has taken advantage of electronic devices for service and also health monitoring of its users. Wallace et al believe that mobile access to information made possible by mobile computing devices has the potential to change how medicine is learned and practiced now and in the future [2]. Ventola's predicted an uptrend regarding the use of mobile devices and apps in health care and will be widely incorporated into nearly every aspect of clinical practice in the future [3]. Pai wrote that about 46 percent of healthcare professionals want to introduce smartphone apps into their practice within the next five years, according to a survey conducted by market research company **Research Now** of 500

healthcare professionals and 1,000 health app users in the US [4] At the end of 2010, more than 200 million m-Health applications were downloaded and about 70% of worldwide citizens were interested to access to, at least, one m-Health application [5].

Recently, there is an emerging health mobile application worldwide, which give information, communication and health suggestion to the users where this health application can give benefit in tracking or managing patient/user health. Besides the health mobile application, a doctor's consultation application also emerge. A doctor's consultation application is a healthcare application and channel for users to consult a doctor online. Not only that, some medical consultation applications also provide non-prescription drug purchasing and delivery features, information on various types of diseases, as well as information of existing hospitals or emergency units that can be accessed easily through the user's mobile device. This phenomena also emerge in Indonesia and there are 9 application in 2018, namely in descending order from most download to least (based on Play Store downloads data): Alodokter, Halodoc, Go-Dok, KlikDokter, ApaSakitku, Dokter Diabetes, DokterChat, OnCom, and YesDok.

Because newly emerged, then research in about doctor consultation application is not much. This is the first research study in Indonesia about doctor consultation application. This research will be beneficial for business practitioners of doctor consultation application to identify profile and preference of users. Therefore, this study aims to identify the profile and preference of Doctor Consultation Application in Indonesia.

2. Methodology

The research in this area still new and from literature study, the study of Thinnukool about mobile healthcare in Thailand is suitable with this research because of their research in the Asia Pacific and corresponding with the purpose of this research. The main tools in this research are questionnaire which is based on Thinnukool et al research, with adaptation to fit the Indonesian users.

There are four dimensions to evaluate doctor consultation applications: user opinions on doctor consultation application as a tool in the initial medication, user opinions on Graphical User Interface (GUI), user opinions when using doctor consultation applications, and user opinion of the reliance on the use of application functionality [6]. The questionnaire for this research consists of three parts: user profile, user preferences, and a general question about doctor consultation application. Before the questionnaire distributed, the first step is face validity of the whole item of the question by asking several people if there are any ambiguous questions. After refining the questionnaire based on the face validity, the questionnaire distributed via Google Form. The usable questionnaire only for people who have downloaded, use doctor consultation application and passes the filter question. The next step is the validity test, followed by a reliability test. Data processing consists of descriptive data, crosstabulation, and multiresponse calculation of questionnaire part 1 and 3. The next step is processing the part 2 with independent t-test and consensus to calculate user preferences of the apps. After data processing, the next step is to analyze the data. The final step is the conclusion and direction for further research.

3. Data collection

The questionnaire has three parts where parts 1 is demographic of the respondent to capture user profile, parts 2 is user preferences in doctor consultation application, and part 3 asking a general question about doctor consultation application. The first part of this questionnaire contains a demographic profile of respondents that asking gender, age, educational background, employment status, income, family status, residence, types of mobile device used (IOS or Android) and questions about doctor consultation application that respondent use. Part 2 in the questionnaire use Thinnukooll et al research with adaptation. This sections are measured using Likert scale 1 - 5, which is 1 = Very Unimportant, 2 = Unimportant, 3 = Neutral, 4 = Important, 5 = Very Important. The filler question is used in this part to segregate between a response that can be used and remove in the next step. The

dimension and question in part two shown in table 1. The third part containing questions about all of the doctor's consultation application that was ever used by the user.

TABLE 1. Dimension and Item in Questionnaire part two

No	Item in questionnaire
	Use of doctor consultation application as a tool for initial medication
A1	The apps providing information on the initial medication and resulting in an effective treatment
A2	The apps can provide accurate information on the healthcare as same as professional advice from pharmacists and doctors
A3	Using the apps can make personal healthcare better
A4	Using the apps can change behaviors and encourage users to care more about their personal health.
A5	The apps information is safe to user health
A6	Using the apps can reduce the bill for medication when the users get sick
A7	Using the apps can facilitate the users in the initial medication
	Graphical User Interface (GUI)
B1	Buttons on the screen are easy to find
B2	The screen is clearly distinguishing between foreground and background
B3	Screen colors are appropriate
B4	Each of the menu images represents understandable functionality
B5	The number of menu is appropriate to use
B6	Menu list is easy to use
B7	Text sizes are appropriate
B8	Contrast of the display is beautifully balanced
B9	Overall user interface design on the screen
	Application Usage
C1	The apps is easy to use
C2	Every feature available on the app works well
C3	The apps stable runs on the mobile device platform
	Reliance on the apps functionality
D1	User confidence in the apps regarding instruction in care or treatment
D2	User belief that the apps can provide accurate information about medicines
D3	User confidence that the information provided by the apps can help the user to understand their healthcare
D4	User confidence that the information provided by the apps will not harm the user
D5	User confidence that the apps useful as health support

It is intended to get users of doctor consultation application as respondents, so the voluntary response sample was conducted with the distribution of questionnaire using Google Form link in social media such as Line, Whatsapp, and Telegram and got 129 responses. After checking the responses through the filter question, there are 111 questionnaires that can be used. The next step is to validate the questionnaire using Pearson correlation and all item is valid because the total r score calculation is bigger than r from the table. Reliability test using Cronbach's alpha shows that the questionnaire is excellent reliability with 0.9 of Cronbach's alpha value.

4. Results
The first part of the questionnaire that capture user profile is presented in Table 2 and the third part of the questionnaire presented in Table 3. In the first part of the questionnaire, the cross-tabulation

analysis is divided into 9 sections by linking gender, frequently used applications with several other variables including age, education, occupation, income, status, residence, mobile devices, applications used and duration of application. Cross-tabulation results by linking gender, frequently used applications with some other variables including age, education, occupation, income, status, residence, type of mobile devices, applications used and duration of application, it can be deduced that most users of the consultation application doctors have the following relation:

1. Male and female under 35 years and most doctor consultation application they use are Alodokter and Halodoc.
2. Male have educational backgrounds under master degree and most doctor consultation application they use are Alodokter and Halodoc, while the female has an educational background under bachelor degree and most doctor consultation application they use is Alodokter and Halodoc.
3. Male and female students and employee and their choice of doctor consultation applications are Alodokter and Halodoc.
4. Male and female have income in the range $\leq$ 9 million rupiah per month and most of the applications they choose are Alodokter and Halodoc.
5. Male and female with single status and their choice of doctor's consultation application are Alodokter and Halodoc.
6. Male and female reside in urban areas such as Tangerang, Jakarta, and Bandung and consultation application of doctor of choice is Alodokter and Halodoc.
7. Male and female have android mobile software and physician consultation applications of choice namely Alodokter and Halodoc.
8. New users (male and female) use the doctor's consultation application for <12 months and their preferred applications are Alodokter and Halodoc.
9. Male and female hear first about doctor consultation apps through friends and google (recommended apps in Play Store).

The third part of the questionnaire has three question that can choose more than one answer, so the multi-response used to process this. The three question is what doctor consultation application that you have ever used, for who do you use the apps, and what are the important features in the apps, coded as M1, M2, and M3 respectively and presented in Table 4 to 6. Results from multi-response are:

1. Halodoc is the highest percentage of applications that user use.
2. Most of the user use the apps for themselves.
3. Features of consultation (chat), disease information, purchase and delivery of drugs, consultation (call) are the most interesting feature for doctor consultation applications.

The second part of the questionnaire was processing separately using an independent t-test. This test used to test whether there is the difference between male and female in response the question because this research wants to know the preference for both male and female, so if there is any difference, then the question will be drop in the next steps. The null hypothesis for an independent t-test is that the two population have equal means [7]. The results of the independent t-test shown in Table 7.

H_0: $\mu 1 = \mu 2$ (two population have equal means)
H_1: $\mu 1 \neq \mu 2$ (two population have different means)

TABLE 2. Demographic Respondents

No	Question	Respondents	
		Frequency	Percentage
1	Gender		
	Male	45	40,50%
	Female	66	59,50%
2	Age		
	< 26 years old	45	40,50%
	26 - 35 years old	50	45,00%
	36 - 45 years old	12	10,80%
	> 45 years old	4	3,60%
3	Education		
	Elementary/Junior/High School	35	31,50%
	Diploma	2	1,80%
	Bachelor Degree	66	59,50%
	Master Degree	7	6,30%
	Doctoral Degree	1	0,90%
4	Occupation		
	Doctor	1	0,90%
	Nurse	3	2,70%
	Business owner	7	6,30%
	Government employee	7	6,30%
	Employee	51	45,90%
	Students/College Students	35	31,50%
	House wife	6	5,40%
	Unemployed/other	1	0,90%
5	Income earnings		
	< Rp 1.500.000	19	17,10%
	Rp 1.500.000 - Rp 3.499.999	16	14,40%
	Rp 3.500.000 - Rp 4.999.999	21	18,90%
	Rp 5.000.000 - Rp 6.999.999	28	25,20%
	Rp 7.000.000 - Rp 8.999.999	17	15,30%
	Rp 9.000.000 - Rp 11.999.999	6	5,40%
	> Rp 11.999.999	4	3,60%
6	Marriage status		
	Married	89	80,20%
	Single	22	19,80%
7	Residence		
	Jakarta	24	21,60%
	Bogor	5	4,50%
	Depok	5	4,50%
	Tangerang	41	36,90%
	Bekasi	6	5,40%
	Bandung	12	10,80%
	Surabaya	4	3,60%
	Medan	6	5,40%
	Semarang	5	4,50%
	Others	3	2,70%

TABLE 3. General Question Results

No	Question	Respondents	
		Frequency	Percentage
1	Type of mobile devices		
	IOS	47	42,30%
	Android	64	57,70%
2	Doctor consultation apps that users use		
	Alodokter	52	46,80%
	Go - Dok	3	2,70%
	Halodoc	48	43,20%
	Klik Dokter	7	6,30%
	Yesdok	1	0,90%
3	How long use the doctor consultation apps		
	< 1 month	23	20,70%
	1- 6 month	62	55,90%
	7 - 12 month	18	16,20%
	> 12 month	8	7,20%

TABLE 4. Doctor Consultation Application that ever used (M1)

		$M1 Frequencies		
		Responses		Percent of Cases
		N	Percent	
$M1[a]	Alodokter	74	33,30%	66,70%
	Apasakitku	19	8,60%	17,10%
	DokterDiabetes	1	0,50%	0,90%
	DokterChat	1	0,50%	0,90%
	GoDok	14	6,30%	12,60%
	Halodoc	76	34,20%	68,50%
	KlikDokter	31	14,00%	27,90%
	YesDoc	6	2,70%	5,40%
Total		222	100,00%	200,00%

a. Dichotomy group tabulated at value 1.

TABLE 5. For whom a user using the application (M2)

		Responses		Percent of Cases
		N	Percent	
$M2^a$	My self	107	47,60%	96,40%
	childre	18	8,00%	16,20%
	grandparents	11	4,90%	9,90%
	parents	48	21,30%	43,20%
	spouse	21	9,30%	18,90%
	relatives	18	8,00%	16,20%
	boss	1	0,40%	0,90%
	friend	1	0,40%	0,90%
Total		225	100,00%	202,70%

a. Dichotomy group tabulated at value 1.

TABLE 6. Important Feature in Doctor Consultation Application (M3)

$M3 Frequencies

		Responses		Percent of Cases
		N	Percent	
$M3^a$	Phone consultation	69	10,40%	62,20%
	Chat consultation	92	13,80%	82,90%
	Medicine purchase	71	10,70%	64,00%
	LabService	13	2,00%	11,70%
	Medical Check Up	7	1,10%	6,30%
	Insurance	20	3,00%	18,00%
	Find Doctor	12	1,80%	10,80%
	Health article	33	5,00%	29,70%
	Health video	8	1,20%	7,20%
	Hospital	48	7,20%	43,20%
	Emergency Unit	59	8,90%	53,20%
	Disease Info	81	12,20%	73,00%
	Medicine use info	62	9,30%	55,90%
	Reminder	50	7,50%	45,00%
	Discount	40	6,00%	36,00%
Total		665	100,00%	599,10%

a. Dichotomy group tabulated at value 1.

TABLE 7. Independent t-test results (a)

No	Item	Sig.	No	Item	Sig.	No	Item	Sig.
1	A1	0.027*	9	B2	0.868	17	C1	0.068
2	A2	0.634	10	B3	0.808	18	C2	0.322
3	A3	0.512	11	B4	0.397	19	C3	0.107
4	A4	0.027*	12	B5	0.842	20	D1	0.380
5	A5	0.079	13	B6	0.900	21	D2	0.967
6	A6	0.383	14	B7	0.620	22	D3	0.890
7	A7	0.294	15	B8	0.402	23	D4	0.895
8	B1	0.915	16	B9	0.525	24	D5	0.871

Table 7 shows that there are two items that have significance smaller than 0.05, meaning that A1 and A4 reject H_0. It shows that population male and female have a different opinion on item A1 and A4. The 22 other items have significance more than 0.05, meaning that the two population have the same opinion on the items.

The next data processing is a consensus which is used to get the preference of the users of the doctor consultation application. Consensus has two common meanings, one is a general agreement among the members of a given group or community; the other is as a theory and practice of getting such agreements [8]. Likert scale is the most widely used and controversial because it is ordinal scale but converted to numbers and treated as interval data. Research from Gail and Norman shows that a parametric test can be used to analyze Likert scale responses [9,10]. Tastle and Wierman introduce a mathematical measure that permits a logical determination of dispersion around a category value to determine a group consensus from Likert Scale data, which called consensus [8]. This is the rules that must be satisfied before any measure can be considered a viable solution to the Likert scale consensus problem [8]:

1. For a given (even) number of individuals participating in a discussion on some question of interest, if an equal number of individuals, n/2, separate themselves into two disjoint groups, each centered on the strongly disagree and strongly agree on categories, the group is considered to have no consensus.
2. If all the participants classify themselves in the same category of the Likert scale, regardless of the category, then the consensus of the group is considered to be complete at 100%.
3. If the mix of participants is such that n/2 + 1 participants assign themselves to any one category, the degree of consensus must be greater than 0, for the balance in the group is no longer equal at the extreme categories.

Hence, a complete lack of consensus generate a value of 0, and a complete consensus of opinion yields a value of 1 and every other combination of Likert scale categories must result in a value within the unit interval [8]. The equation to calculate consensus shows in equation 1 where μ_x is mean of X, d_x is the width of X ($d_x = X_{max} - X_{min}$), pi is the probability (relative frequency) of outcome X_i (which ranges from 1 to 5), i is an index, and n is the number of categories.

$$\text{Cns}(X) = 1 + \sum_{i=1}^{n} p_i \log_2\left(1 - \frac{|X_i - \mu_x|}{d_x}\right) \qquad (1)$$

This is an example of the item in question A5 and the consensus summary depict in Table 8 with descending order from larger to smaller.

Mean:

$$\mu_x = \sum_{i=1}^{n} p_i X_i = \frac{0}{111} \times 1 + \frac{2}{111} \times 2 + \frac{18}{111} \times 3 + \frac{42}{111} \times 4 + \frac{49}{111} \times 5$$
$$= 4.24$$

Example Consensus Calculation:

$$Cns(X) = 1 + \frac{0}{111} \log_2\left(1 - \frac{|1 - 4.24|}{4}\right) + \frac{2}{111} \log_2\left(1 - \frac{|2 - 4.24|}{4}\right)$$
$$+ \frac{18}{111} \log_2\left(1 - \frac{|3 - 4.24|}{4}\right) + \frac{42}{111} \log_2\left(1 - \frac{|4 - 4.24|}{4}\right)$$
$$+ \frac{49}{111} \log_2\left(1 - \frac{|5 - 4.24|}{4}\right)$$
$$= 0.7237$$

TABLE 8. Consensus Summary

No		Item	Consensus
1	D3	User confidence that the information provided by the apps can help the user to understand their healthcare	0.8170
2	B6	The menu list is easy to use	0.8126
3	B8	Contrast of the display is beautifully balanced	0.8099
4	D4	User confidence that the information provided by the apps will not harm the user	0.8096
5	D5	User confidence that the apps useful as health support	0.8096
6	B4	Each of the menu images represents understandable functionality	0.7990
7	D2	User belief that the apps can provide accurate information about medicines	0.7981
8	C2	Every feature available on the app works well	0.7941
9	B9	Overall user interface design on the screen	0.7939
10	A7	Using the apps can facilitate the users in the initial medication	0.7893
11	B5	The number of the menu is appropriate to use	0.7867
12	A3	Using the apps can make personal healthcare better	0.7766
13	D1	User confidence in the apps regarding instruction in care or treatment	0.7754
14	C3	The apps stable runs on the mobile device platform	0.7735
15	C1	The apps is easy to use	0.7676
16	A6	Using the apps can reduce the bill for medication when the users get sick	0.7654
17	B7	Text sizes are appropriate	0.7631
18	A2	The apps can provide accurate information on the healthcare as same as professional advice from pharmacists and doctors	0.7605
19	B3	Screen colors are appropriate	0.7591
20	B2	The screen is clearly distinguishing between foreground and background	0.7479
21	A5	The apps information is safe to user health	0.7237
22	B1	Buttons on the screen are easy to find	0.7098

5. Conclusion and direction for further research

Doctor consultation application developer should target the market based on the user profile to a female with age under 35 years old, with education background under bachelor degree, having a job as employee or students, income under 9 million rupiah monthly, single status, who uses apps for themselves and domiciled in urban areas. They also can use Halodoc as a benchmark because of the highest percentage of users and focus on features that interesting for users such as chat and telephone call consultation, disease information, purchase and delivery of medicine.

Consensus gives information on the preference of factor that most important for users and developer of doctor consultation apps can focus on several first factors. For example, from the first quartile or 6 factor, the most important factors for users are user confidence that the information provided by the apps can help user to understand their health care, menu list is easy to use, contrast of the display is beautifully balanced, user confidence that the information provided by the apps will not harm the user, user confidence that the apps useful as health support, each of the menu images represents understandable.

Further research should replicate this research and took a larger sample since this is the first research conducted, to make the research more generalized.

6. Acknowledgment

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