# EXAMINING THE INTENTION TO USE MOBILE HEALTH APPLICATIONS AMONGST INDONESIANS

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## ABSTRACT

The use of m-health applications in Indonesia is currently increasing drastically during the COVID-19 pandemic. This has led to intense competition between companies providing health application services to continue to retain users, one of which is by understanding the important factors that influence the intention to use applications either directly or indirectly, apart from the COVID-19 pandemic. This study aims to examine the effect of quality application, perceived information quality, trust, perceived usefulness and intention to use. The data employed for this study were collected from 150 users of mobile health applications in Indonesia. Hypothesis testing in this study used the Structural Equation Modelling (SEM) for the statistical analysis method. The results of this study indicate that application quality has a positive effect on perceived information quality, perceived information quality has a positive effect on trust, trust has a positive effect on perceived usefulness, and perceived usefulness has a positive effect on intention to use. Finally, the managerial implications in this study are expected to be a source of thought, especially for companies in the health technology industry to continue to improve and evaluate the quality of application that indirectly affect intention to use.

**Keywords**: mobile health applications; application quality; perceived information quality; trust; perceived usefulness; intention to use

## INTRODUCTION

The rapid development of technology has changed various aspects of life including the health industry. As long as people have internet access, they can find health information anywhere and anytime easily to find solutions for their health. The number of internet users in Indonesia is quite large and continues to increase each year (Indonesia Survey Center, 2020). More than 70% of internet users in Indonesia use the internet to find health information, but sometimes they cannot distinguish between biased and reliable information. Prof. dr. Ari Fahrial Syam in Juditha (2019) has conducted a survey and revealed that health information from unclear and irresponsible sources reached more than 90%. Then, e-health is present as a development of information technology using the internet. The World Health Organization (WHO) defines e-health as information and communication technology that supports health aspects such as health services, references, and cost-effective and safe health surveillance (Ryu, 2012). The term telemedicine was introduced by the Ministry of Health of the Republic of Indonesia as the application of e-health technology that can be accessed through an application on a smartphone (m-health). The application allows users to consult with doctors online, look for articles about health information, and even purchase medicines without having to go to a pharmacy.

In 2020, Indonesia ranks third for health application users after China and India with 57% users (Pusparisa, 2020). Currently, the use of health applications in Indonesia is increasing significantly during the COVID-19 pandemic. However, compared to other countries, the use of health applications in Indonesia is still relatively low. Before the

COVID-19 pandemic, a survey by Deloitte Indonesia conducted in June 2019 found that the use of health applications was still around 10% of the Indonesian population. It is because there are some considerations such as practicality and convenience, data privacy and security, diagnosis accuracy (trust), and legal protection for users (Hoeng, 2020).

Currently, Indonesia has shown developments in the health technology industry. It is evidenced by the emergence of digital health business actors who continue to innovate in this field (Lubis, 2021) such as Halodoc, Alodokter, Klikdokter, Good Doctor, SehatQ, and others. The COVID-19 pandemic has encouraged hospitals in Indonesia to develop telemedicine services and even the Ministry of Health has recently launched health applications such as Sehat Pedia and Peduli Protect. This study was conducted as the COVID-19 pandemic has changed people's behavior in which many people with health problems are worried about visiting and seeking treatment at the hospital due to fear of being affected by the COVID-19 virus. Therefore, people start using health applications that provide telemedicine services. The high number of available health applications has led to competition between the service providers. Companies need to adapt and maintain users by understanding the important factors affecting the intention to use, either directly or indirectly, so that they can continue to grow in meeting the health needs of users.

## LITERATURE REVIEW

### Technology Acceptance Model (TAM)

To measure user preferences, some research models have been used to describe consumer behavior and technology acceptance. The Theory of Reasoned Action (TRA) proposed by Ajzen and Feishbein in 1975 assumes that human behavior is preceded by intention. TRA claims that the behavior performed is determined by the behavioral intention. Behavioral intentions, on the other hand, are determined by individual attitudes and subjective norms about the behavior. An adaptation of TRA, the Technology Acceptance Model (TAM) was specifically designed by Fred David in 1986 to model user acceptance of information systems or technology (Galib et al., 2018).

The technology acceptance model (TAM) is the most widely used and most influential model to explain consumer behavior towards technology. Many researchers have developed new models by adding variables to the TAM to increase the explanatory power. Davis (1986) in Galib et al (2018) argues that research should explore other variables that may affect perceived usefulness, perceived ease of use, and actual use. TAM proposes that the intention to use technology is determined by attitudes toward use. User attitude is a factor affecting the desire to do something. Attitude towards technology use is s the user's evaluation of his or her interest in using technology. Attitudes towards use are determined by perceived usefulness and perceived ease of use. Perceived usefulness has a direct effect on adoption intention, while perceived ease of use has a direct and an indirect effect on intention through perceived usefulness (Ammenwerth, 2019).

### Application Quality and Perceived Information Quality

Chun et al (2013) define a good application quality as an application that has the characteristics of focusing on the value of use, fulfilling needs, effective, attractive, easy to use, safe, and reliable. The use of the application is determined by the character and quality of the application related to user satisfaction in achieving the desired efficiency and effectiveness. Users want an easy-to-use application according to its use with a short time to adjust to using it.

The quality of the application is important as application failure can affect the reputation of the company and the sustainability of its users. Applications need to be updated regularly to remain relevant to their users. If an app is created and it is never seen again, then the app is considered a bad app. Developers have to be careful in creating apps. In particular, creating applications for an organization's brand, product or service requires additional attention. Apps on smartphones are one of the most important marketing tools for any product or service. This makes it possible to build or eliminate brand equity according to its performance (Inukollu et al., 2014). Through the application, users will get as much information as possible so that by involving the internal control system, the application as a container for presenting information should have a high quality (Tao et al., 2017). Koohikamali and Sidorova (2017) define perceived information quality as relevance, reliability, the convenience of the information received by users. The credibility of the information can influence consumers' behaviour and ultimate intentions to use.

Ben-Mussa and Paget (2018) state that the ability to critically evaluate health information is an important component of health literacy. To improve this ability, it is necessary to understand how users evaluate the quality of health information in digital applications. In this study, the quality of information is how good the information contained in the health application and how the information is provided to users so that it is easy to understand. The results of a study conducted in Thailand showed that the quality of health websites has a positive relationship with perceived information quality (Boon-Itt, 2019). Based on the explanation above and results of previous studies, the association between application quality and perceived information quality is assumed as follows:

**Hypothesis 1: Application quality has a positive effect on perceived information quality in health applications.**

**Perceived Information Quality and Trust**

Zhou (2011) defines trust as a person's willingness to be vulnerable based on positive expectations of the behavior or actions of other parties in the future. When a person is in a difficult situation, he/she will be optimistic that the other party will pay attention to his/her interests and needs. High trust in information will make people feel that they are getting good information and will proactively process the information received, increase control, and reduce uncertainty and existing risks (Jiang et al., 2021).

In this study, trust is focused on initial trust which refers to the formation of trust at the first interaction in which users do not have meaningful or credible information about digital service providers yet. In the context of health applications, initial trust covers two components of trust in doctors and trust in the application platform. Doctors are primary care providers, while health applications are the media through which online health services are implemented. Initial trust in doctors is associated with the quality of information and quality of doctor interactions, while initial trust in the application is associated with their services (Cao et al., 2020). The evaluation of trust can support users to reduce vulnerabilities and potential risks as well as address perception of uncertainty in making any decision (Baqa et al., 2018).

A study by Widodo et al. (2016) found that the more complete the information provided by the application, the more users will trust the information provided. In this case, the quality of information has a significant effect on trust where increasing users' trust in using the application can be done by improving the quality of the information provided. Therefore, it is logical to assume the following hypothesis:

**Hypothesis 2: Perceived information quality has a positive effect on trust in using health applications**

**Trust and Perceived Usefulness**

Among attitudes towards technology, trust is an important factor affecting the use of technology. Previous studies have examined the relationship between trust and perceived usefulness, and the relationship between perceived usefulness and trust. Perceived usefulness is the user's belief that using a certain technology will improve his/her job performance. Perceived usefulness is an important antecedent of consumer behavior. Perceived usefulness is also a strong determinant of acceptance of the use of information technology (Chawla & Joshi, 2019). In this study, perceived usefulness is a person's belief that the use of health application services can be useful to obtain health information effectively so that in the end it improves the overall quality of health services.

A study by Primanda et al. (2020) showed that perceived usefulness has a significant effect on trust and indirectly affects consumers' purchase intentions in e-commerce. The perceived usefulness of other consumer reviews is a determination to increase the effectiveness and efficiency of online shopping, increase the level of trust in the platform used including the seller. Thus, this study proposes the following hypothesis:

**Hypothesis 3: Trust has a positive effect on perceived usefulness in using health applications**

**Perceived Usefulness and Intention of Use**

Yadav and Pathak (2017) define intention to use as an indication of a person's willingness to plan to perform certain behaviors in the future. Based on the TAM theory, people will perform a certain goal behavior depending on their behavioral intention to perform the behavior. Perceived usefulness can significantly influence people's attitudes toward a particular service or technology. If people find the service useful then they will rate it very positively. Davis et al. (1989) in Wulandari (2019) describes indicators of an intention to use as the possibility to use, interest in using new technology in the future, and the desire to reuse the technology when there is an opportunity in the future. Besides, to see the level of use of technology can be predicted through the user's attitude to the technology, for example, the desire to motivate other users (Liébana-Cabanillas et al., 2017).

Leon (2018) revealed that perceived usefulness has a significant influence on the intention to use mobile apps services in the millennial generation. Moreover, Boon-Itt (2019) found that perceived usefulness affects intentions to use health websites to seek health information. Thus, it is suggested that the perceived usefulness will influence intention to use.

**Hypothesis 4: Perceived usefulness has a positive effect on the intention to use health applications to seek health information.**

Based on the above theoretical background, this study specifies a conceptual model as shown in Figure 1.
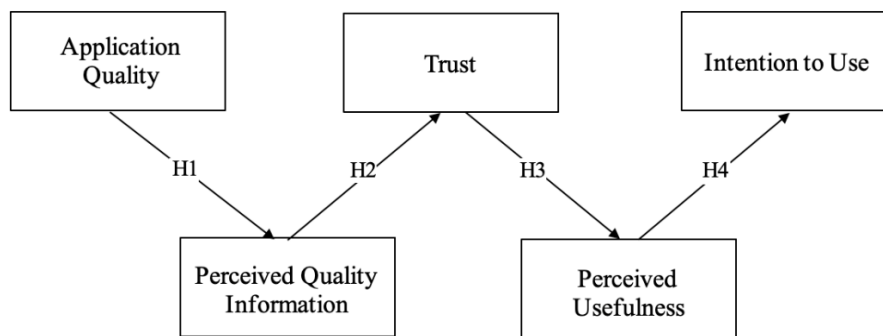
**Figure 1. Research framework**

## RESEARCH METHOD

### Measurement Scale

This study used quantitative methods to test the proposed hypotheses by examining results-oriented populations and samples. This descriptive study used a correlational approach to identify the relationship between variables and the close relationship between the variables if there is a relationship without changing the other variables. It involved 30 indicators of all variables. The measurement scale for the application quality variable was adopted from Llorens-Vernet & Miró (2020) and Riana et al. (2021) with 9 indicators. Perceived information quality was adopted from Boon-Itt (2019) and Riana et al. (2021) with 5 indicators. Trust and intention to use were measured by 5 indicators adopted from Boon-Itt (2019) and Octavius & Antonio (2021). Then, the perceived usefulness was measured by 6 indicators adopted from Hartono et al. (2019) and Riana et al. (2021). The intention to use variable used a 5-points Likert scale with 1 (strongly disagree) and 5 (strongly agree). Meanwhile, the 5 points on the indicators for the other four variables were 1 (very unimportant) and 5 (very important) as the indicators did not point to specific health applications but health applications used by each respondent.

### Sampling

Data were collected through an online questionnaire using a 5-point Likert Scale. It involved 150 respondents as samples as according to Roscoe (1975) in Sekaran & Bougie (2016), the sample size in the study should be more than 30 with a maximum of 500. In addition, Hair et al. (2019) mentioned that studies using SEM analysis techniques required some samples, namely 5 to 10 times the number of indicators for all variables. This present study had 30 indicators so the minimum sample size was 150. The sample was determined using a purposive sampling technique through filtering questions. The criteria were health application users who have used or are still using the application to present and lived in Indonesia. The respondents' demographic included in this study are shown in Table 1.

**Table 1. Respondents' Demographics**

| Demographics | | Number and percentage | |
|---|---|---|---|
| Gender | Male | 81 | 54% |
| | Female | 69 | 46% |
| Age | 20–29 years old | 111 | 74% |

| | | | |
|---|---|---|---|
| | 30–39 years old | 18 | 12% |
| | 40–49 years old | 16 | 10.7% |
| | 50 years old or above | 5 | 3.3% |
| Education level | High school | 77 | 51.3% |
| | Bachelor's degree | 60 | 40% |
| | Master's degree | 13 | 8.7 |
| Domicile | Java | 122 | 81.3% |
| | Sumatra | 12 | 8% |
| | Sulawesi | 8 | 5.3% |
| | Nusa Tenggara | 6 | 4% |
| | Maluku | 2 | 1.3% |
| Occupation | Student | 93 | 62% |
| | Entrepreneur | 26 | 17.3% |
| | Private employee | 25 | 16.7% |
| | Homemaker | 3 | 2% |
| | Teacher | 2 | 1.3% |
| | Agent | 1 | 0.7% |
| M-health applications used by users | Halodoc | 70 | 46.7% |
| | Peduli Lindungi | 70 | 46.7% |
| | Alodokter | 57 | 38% |
| | Klik Dokter | 27 | 18% |
| | YesDok | 22 | 14.7% |
| | Good Doctor | 37 | 24.7% |
| | SehatQ | 22 | 14.7% |
| | Practo | 1 | 0.7% |
| | Mobile JKN | 2 | 1.3% |
| Main reason for using the application | Online health consultation | 87 | 58% |
| | Looking for information or health articles | 126 | 84% |
| | Buy medicine | 111 | 74% |
| | Make an appointment with a doctor or hospital | 53 | 35.3% |
| | Order laboratory test services | 46 | 30.7% |
| | Insurance | 2 | 1.3% |
| | Government requirements | 21 | 14% |

| | | | |
|---|---|---|---|
| | Monitor personal health information | 65 | 43.3% |

Note: Respondents could select more than one m-health application and select at least three main reasons for using the application.

## Data Analysis

To examine the relationship among more complex variables simultaneously, this study used a multivariate analysis technique of Structural Equation Modeling (SEM). The measurement model was tested by testing the reliability and the validity covering convergent and discriminant validity. Furthermore, structural model testing was carried out to describe the relationships between the existing constructs by looking at the R-square value and Variance Inflation Factors (VIFs). Data were analysed using the Statistical Program for Social Sciences (SPSS) application.

## RESULTS AND DISCUSSION

### Results

In conducting reliability testing, this study looked at Cronbach's Alpha and corrected item-total correlation to test the internal consistency. It is considered reliable if it meets the criteria value of Cronbach's Alpha > 0.7 and Composite Reliability (CR) > 0.7 (Hair et al., 2019). This study referred to Loiacono et al. (2002) for the corrected item-total correlation of 0.4. Table x is the result of the reliability test based on the data of 150 respondents after the elimination of some indicators because they did not meet the criteria for the data goodness test in the pilot test conducted on 30 respondents. The remaining indicators were declared reliable. The convergent validity test used CFA with the minimum standardized loading estimates of > 0.6 referring to Hair et al. (2019) which is at least > 0.5 or higher and ideally > 0.7. Based on the data obtained, the indicators "m-health applications provide information that fits my needs" and "m-health applications allow me to retrieve health information faster" were eliminated because they had standardized loading estimates of <0.6.

**Table 2. Loading of the item measurement model, CR, and AVE**

| Construct/Indicator | Loading | Cronbach | CR | AVE |
|---|---|---|---|---|
| Application Quality | | 0.853 | 0.878 | 0.592 |
| m-health applications have instructions or some kind of assistance for use | 0.727 | | | |
| m-health applications provide information about the terms and conditions of use and privacy policy | 0.805 | | | |
| m-health applications provide a choice of more than one language | 0,810 | | | |
| m-health applications identify the authors of the content and their professional qualifications | 0.822 | | | |
| m-health applications use scientific evidence to guarantee the quality of the content | 0.673 | | | |
| Perceived Information Quality | | 0.792 | 0.807 | 0.511 |
| m-health applications provide information that fits my needs | 0.564 | | | |
| m-health applications provide accurate information | 0.669 | | | |

| | | | | |
|---|---|---|---|---|
| m-health applications provide up-to-date information | 0.669 | | | |
| m-health applications provide complete information | 0.745 | | | |
| m-health applications provide clear information in a good format | 0.758 | | | |
| Trust | | 0.825 | 0.848 | 0.582 |
| My privacy is protected during the use of the application | 0.800 | | | |
| The doctors in m-health application have medical qualifications | 0.774 | | | |
| The consultation or diagnosis provided by the doctors in the application is reliable | 0.742 | | | |
| The m-health applications are able to meet user health beliefs | 0.735 | | | |
| Perceived Usefulness | | 0.846 | 0.874 | 0.582 |
| m-health applications allow me to retrieve health information faster | 0.508 | | | |
| m-health applications increase effectiveness in obtaining health information | 0.755 | | | |
| m-health applications are able to facilitate users in initial medication | 0.803 | | | |
| m-health applications can encourage users to be more concerned with personal health | 0.741 | | | |
| m-health applications are able to provide accurate information | 0.757 | | | |
| m-health applications are able to provide accurate information about health care as same as health professionals | 0.730 | | | |
| Intention to Use | | 0.887 | 0.913 | 0.678 |
| I plan to use m-health application again in the future | 0.659 | | | |
| I will use m-health application more than any alternative ones | 0.741 | | | |
| I would recommend m-health application to others | 0.833 | | | |
| I am willing to tell others about the good aspects of m-health application | 0.891 | | | |
| I will tell others about my good experiences using m-health application | 0.834 | | | |

After convergent validity was achieved, then the discriminant validity test was carried out with the Pearson correlation test where there was no correlation value above 0.75 as recommended (Zikmund et al., 2013).

**Structural Model**

Sekaran & Bougie (2016) explained that the multicollinearity test was carried out by looking at the size of the Tolerance value of > 0.10 and Variance Inflation Factor (VIF) of < 10. The results of the multicollinearity test on each indicator met the criteria. Thus, it can be stated that all variables do not have a high correlation statistically or there is no multicollinearity. The results of the $R^2$ value showed that the application quality variable could explain the perceived quality of information variable by 19.2% while the remaining 80.8% could be explained by other variables. The perceived information quality variable could explain the trust variable of 39.2% and the remaining 60.8% could be explained by other variables. The trust variable could explain the perceived usefulness variable of 17.5% while the remaining 82.5% was explained by other variables. Finally, the perceived usefulness variable could explain the intention to use variable by 5.6% and the remaining 94.4% was explained by other factors. The measurement model test used the Confirmatory Factor Analysis (CFA) and provided good results (GFI = 0.847, AGFI = 0.813, RMSEA = 0.054, CFI = 0.935, NFI = 0.816, TLI = 0.927). The results of the hypothesis test revealed that the four hypotheses were accepted with a P-value of < 0.05 (one-tailed) and the limit of the Critical Ratio (CR) used was 1.65.

**Table 3. Structural model hypothesis test results**

| | Hypothesis | Standardized estimates | P-value | Results |
|---|---|---|---|---|
| H1 | Application Quality --> Perceived Information Quality | 0.439 | *** | Accepted |
| H2 | Perceived Information Quality --> Trust | 0.626 | *** | Accepted |
| H3 | Trust --> Perceived Usefulness | 0.418 | *** | Accepted |
| H4 | Perceived Usefulness --> Intention to Use | 0.236 | 0.012* | Accepted |

Notes: *p = 0.05, **p = 0.01, ***p = 0.001

**Discussions**

This study has tested the relationship through online surveys concerning health applications in Indonesia, and evidence has been obtained to support the hypothesis. The hypothesis testing shows that application quality and perceived quality of information have a positive and very significant relationship. Quality applications have instructions for using the application. When a user, especially a new user who has a low digital literacy level, tries to find out more about the application, he/she can look for the help menu. In the help menu, users should be able to get information about the features and usage of the application.

Similarly, information in the form of terms and conditions of use as well as the privacy policy contained in the application, the choice of languages, the professional qualifications of the content writer along with scientific evidence that can guarantee the quality of the content are important in the process of forming one's perception of the quality of information such as health applications which provide accurate, complete, up-to-date, and clear information. The majority of respondents have a high level of digital literacy in which they can validate the information with other sources on the internet and assess the accuracy of

information so that the quality of the information in the application is vital considering that the information has a major impact on health. It is supported by Tao et al. (2017), Wang & Qi (2021), Zhang et al. (2015), and Boon-Itt (2019) who explains that the quality of a health website emphasizes the quality of content affects the quality of the information received by its users. If the content quality is not guaranteed and a deliberate effort is made to make the platform appear credible, evaluating health information on a health platform based solely on design can be problematic as design may not be a consistent indicator of information quality.

The second hypothesis states that perceived information quality has a positive effect on trust. This study found that the perceived information quality has a positive and very significant effect on trust and is the largest relationship compared to other hypotheses, with an estimate of 0.626. Receiving credible information continuously can increase the customer's level of trust. Trust is important in risky situations, especially in using applications on smartphones (Purwanto & Budiman, 2020). In the online context, the quality of information is an important factor to build trust. Initial trust formation is associated with a higher evaluation of information quality. If users get information, some will verify it. Information that is explained with clear, complete, and accurate sources will affect the user's trust in both doctors and the services offered by the health application. It is in line with Harrison (2016), Pujani et al. (2020), Boon-Itt (2019), and Talwar et al. (2020).

The third hypothesis states that trust has a positive effect on perceived usefulness. The higher the level of trust, the higher the perceived usefulness value on the ability of health applications to provide services. In line with previous studies by Primanda et al. (2020), Boon-Itt (2019), Purwanto & Budiman (2020), users will assume the application can facilitate initial treatment, increase effectiveness in obtaining health information, provide accurate information related to health care and others. Trust can increase expectations and attitudes based on the benefits of a trustworthy relationship. In other words, a trust allows creating a positive atmosphere that leads users to positive sentiments and tendencies towards usage. The findings of this present study are supported by a previous study by Yudiarti & Puspaningrum (2018) where trust positively and significantly affects the perceived usefulness. Trust is important in online services like protecting the privacy and facilitating secure payments. Therefore, the form of trust leads to the user's belief that the service provider can keep its promises regarding security and other issues.

The fourth hypothesis states that perceived usefulness has a positive effect on the intention to use. Perceived usefulness has been recognized as an important factor in predicting user intention to use technology. Previous studies reveal that perceived usefulness was an indicator of the motivational readiness dimension. This finding supports the TAM theory which was originally proposed by Fred Davis in 1986 and is in line with Triani & Moeliono (2019), Naufaldi & Tjokrosaputro (2020), and Trihutama (2018) who confirmed that perceived usefulness have a positive and significant impact on the use of digital applications in Indonesia. Layman (2021) explains that certain user profiles are associated with perceived usefulness in a health application in Indonesia. One of them is the location of the majority of respondents on Java island, especially Jakarta. Perceived usefulness that arises is encouraging users to be more concerned with personal health. Besides, age often becomes a moderating factor for the impact of the two main TAM components of perceived usefulness and perceived ease of use on intention to intentions and adoption behavior. It is said that the young generation is more concerned with the extrinsic advantages of technology such as its usefulness, whereas the older people are more process-oriented by examining the effort required to adopt new emerging technologies and being more aware of the risks (Saare et al., 2019). It is in line with this present study where the majority of respondents are college students aged 20–29 years.

**CONCLUSION**

Based on the results of the study, the perceived quality of information and trust, and perceived usefulness indirectly have a positive relationship and affect the intention to use health applications. The service provider of digital health applications can continue to improve and evaluate the quality of applications and the information available. In terms of information quality, information providers can improve the usability of health applications according to user needs and expectations. The results of the study show that the greatest relationship is in the perceived quality of information and trust. Users will trust a health application if it focuses on providing quality information. Health practitioners should provide instructions and advice in the application. If they recommend the most reliable application to users, they play an important role in ensuring the quality of the application.

The terms and conditions, privacy policy, and the availability of language choices in the application are also important for the quality of the application. The health application provider should provide a very detailed explanation in the terms and conditions including the weaknesses to educate the public so that they do not merely tick the box in the terms and conditions without reading and understanding them. The high number of the health technology industries in Indonesia requires companies to compete with each other to gain trust and create good perceived usefulness by continuing to promote the benefits of health applications in which is one of the factors affecting the intention to use.

Based on the respondent profile, most of the respondents live on Java island. The difference in characteristics allows for differences in perception so that this research may not be generalized and would be better to have a wider sampling coverage. Respondents' answers with high averages for each variable can be influenced by the COVID-19 pandemic situation which allows bias in their responses, especially on the intention to use health applications which have recently become a necessity, enthusiasm, and to meet the requirements of the Ministry of Health to monitor the spread of positive cases of COVID-19. Therefore, future research can be conducted after the end of the COVID-19 pandemic to compare the results with different situations. Future research is also expected to consider and more add variables. Many factors can influence users in using health applications such as social influences, perceived ease of use (Purwanto & Budiman, 2020), digital literacy (Handayani et al., 2021), perceived service quality (Talwar et al., 2020), perceived price, and motivation to seek information (Octavius & Antonio, 2021), and health awareness (To et al., 2019).

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