Paper Jurnal/Prosiding

by Bety Etikasari

RESEARCH ARTICLE

OPEN ACCESS

Android-Based Application for Children's Growth Monitoring as a Complement for Child Development Card

Puspitasari Pramuditha Shinta Dewi[1], Bety Etikasari[1], Trismayanti Dwi Puspitasari[1], Ria Chandra Kartika[1], Lukie Perdanasari[2], Arvita Agus Kurniasari[1]

[1] Department of Information Technology, Politeknik Negeri Jember, Jember, Indonesia
[2] Department of Health, Politeknik Negeri Jember, Jember, Indonesia

Corresponding author Puspitasari Pramuditha Shinta Dewi1 (e-mail:pramuditha@polije.ac.id)

ABSTRACT Posyandu is a community activity center to provide health services and family planning. Routine monthly weighing for toddlers is one of the activities carried out by the Posyandu. This activity aims to detect early childhood growth disorders to address these problems quickly and precisely. However, since the Covid-19 pandemic, the toddler Posyandu, held regularly every month, has been temporarily suspended until the pandemic ends. This situation causes monitoring of toddlers' growth, and development cannot be done. Therefore we need a mechanism for monitoring child growth and development that can be done online via a smartphone. In previous research has implemented several desktop, web, and mobile-based information systems, but they do not yet have complex features such as maternal and child health information management. The purpose of this research is to create an android-based application in the form of an information system for Child Development Posyandu, which will contain several features such as immunization schedules, monitoring of child growth and development, health news. This application development uses the design sprint method. The test results with the User Acceptance Test method of this android application to user respondents show that 80% of the applications are in a Good category and can be used at Posyandu.

INDEX TERMS Android Application, Posyandu, Child's growth

I. INTRODUCTION

Community-Based Health Efforts (Upaya Kesehatan Bersumberdaya Maysarakat, UKBM) is a health service facility managed by the community. The Indonesian government has developed various programs in health service to empower communities, one of which is the Integrated Health Center (Pos Integrated Services, Posyandu).

The village community formed Posyandu to improve primary health services, especially Maternal and Child Health (KIA), Family Planning (KB), research, nutrition, and addressing local health problems. The purpose of posyandu is to empower the community and provide convenience for the community in primary health services to accelerate the reduction of maternal and infant mortality. Posyandu implementation is held once a month and located in every village. Posyandu routine activities are organized and driven by Posyandu Cadres with technical guidance from the Puskesmas and related sectors [1].

The Ministry of Health of the Republic of Indonesia has created a posyandu program, namely a monthly weighing program at the posyandu using the Kartu Menuju Sehat (KMS). KMS contains the normal growth curve of children based on the anthropometric index of weight for age. In 2013 there was an increase in the number of cases of malnutrition in East Java, namely from 2012 by 8,410 cases, increasing to 11,056 cases, while from 2013 to 2016, it continued to decrease by 5,663 cases. There are several possibilities for the decrease in the number of cases, including the increasing intensity of nutrition workers in the community to find early cases of malnutrition in the field. Nutrition monitoring training activities for Puskesmas through posyandu, increased surveillance and simultaneous weighing month activities are an effort to find cases of malnutrition early which is quite effective [2].

Based on Riskesdas 2018 data, in Jember Regency, children under five with poor nutritional status and poor nutritional status is still more than 20% of the number of toddlers in Jember Regency [2]. Meanwhile, in Kemuning Lor village, of the total 421 children under five in 2010, there were still one under five with poor nutrition, 21 under five with poor nutrition, and others with moderate and good nutrition. That shows that it is crucial to carry out Posyandu activities for toddlers to continue to monitor the health conditions of toddlers in Jember Regency, especially in Kemuning Lor Village.

One of the activities of the Posyandu for toddlers is weighing toddlers. Routine monthly weighing carried out by the posyandu is expected to detect early growth disturbances under five so that these problems can be handled quickly and accurately. Growth monitoring needs to increase its role in precautions to prevent the deterioration of the nutritional condition of children under five. Changes in body weight are a very sensitive indicator to monitor a child's growth. If the child's weight gain is lower than it should be, its development is impaired, and it is at risk for malnutrition. On the other hand, if the weight gain is more significant than it should be, it indicates the risk of being overweight [3].

Posyandu activities for toddlers are an important effort to prevent growth disorders in toddlers. Since the Covid-19 pandemic, the Posyandu for toddlers in Kemuning Lor Village, which the Posyandu routinely carries out, has been temporarily suspended until the pandemic ends. So that by not carrying out activities for toddlers, monitoring the growth and development of toddlers can also not be carried out. So we need a remote information system that can be used to monitor the growth and development of toddlers every month. So that although the activities of the toddler posyandu are not carried out directly, they can still be carried out remotely using an information system that can monitor the growth and development of toddlers in Kemuning Lor Village.

Information system on health during the Covid-19 pandemic is an alternative that can be used to minimize face-to-face activities with medical officers. A similar information system related to checking health conditions, namely the early detection of Covid-19 exposure, has also been developed [4][5]. During the pandemic, online methods became one of the most widely used alternatives in various fields [6].

Another problem in the Posyandu in Kemuning Lor Village is that data processing and administration do not meet standard procedures under the Ministry of Health of the Republic of Indonesia. Posyandu activities begin with the registration of toddlers, then weighing is carried out, and the results will be recorded in the Posyandu administration book and Kartu Menuju Sehat (KMS). Manual recording can make it difficult for Posyandu cadres to monitor the implementation of Posyandu, especially to find out the number of toddlers who come to the Posyandu every month, the development of toddlers' weight, giving vitamins, and

immunizations. Based on the results of interviews with midwives assigned by the Arjasa puskesmas at the Kemuning Lor posyandu, Mrs Umi Zahroh said that "Every three months the Health Service requires Posyandu to compile reports on the progress of Posyandu implementation. Difficulties in the search process for data collection for toddlers so that data collection for toddlers is carried out every time it will make a report on the implementation of the posyandu which results in a lot of data duplication".

In previous studies, several desktop, web and mobile-based information systems have been implemented in health services (Posyandu and Puskesmas) but have not implemented complex features [13][15][17][18][19][20]. These features include the absence of management for maternal-child health information and stunting and exercise problems. During a pandemic, this information system will be needed to improve the effectiveness and efficiency of health services. So that the mother feature is also essential, the communication that occurs at the posyandu digitally becomes two-way.

Another related research is Design of Information System Immunized Care Services Based on Mobile (Case Study : Puskesmas Maos Cilacap) [16]. In that study, researchers produced a web-based health service information system. However, the system built-in that study is only based on a website, not a mobile application. Meanwhile, Android-based smartphone users have the most significant percentage, with 91.84% of users in Indonesia, according to the results of a Statcounter survey in September 2020 [21].

This background is necessary to develop an application that can unite children's growth and development. Therefore, this study aims to develop an android-based application for child development using the design sprint method and the User Acceptance Testing method. Applications developed using the android platform, where most people already use smartphones in their daily lives, including the health sector, make it easier to implement posyandu activities [8].

II. MATERIALS AND METHODS

Android application development for child development has several features, including immunization scheduling, monitoring child growth and development, and health news. Application development is carried out using the design sprint method to complete the application quickly. This method generates an app prototype that programmers can use as a guide when developing apps.

The Sprint Design method can be used to help design the user interface (UI) of the application being developed to become a UI design solution [11][12]. The design sprint method is very suitable for use on projects that require fast time to find solutions, such as the current Covid-19 momentum, where users need this system immediately for publication [4]. There are five stages in the design sprint, as shown in FIGURE 1 [8].

A. UNDERSTAND

The understand stage explores problems from the main resource person or client, namely the Midwife. Some of the problem data found are:

1. Recording of toddler's height and weight at the time of posyandu is still manual;
2. Vaccination activities that are not running smoothly due to the Covid-19 pandemic;
3. The need for additional information or socialization related to toddler nutrition, but the delivery of this information has been hampered during the Covid-19 pandemic.
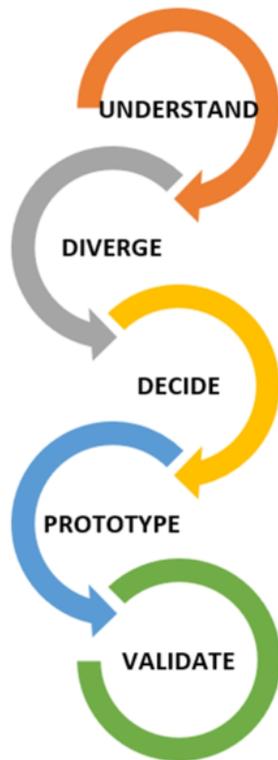

FIGURE 1. Stages of Design Sprint

B. DIVERGE

The diverge phase is carried out by each individual in an application development team. Based on the difficulties identified during the Understand phase, each person creates a solution flow.

C. DECIDE

The Decide step involves voting on the application design flow that has been completed using the presentation method of each individual in the team, and then deciding which one will be continuing to be implemented. After a vote by all members of the presenting team, the best concept is chosen

to be implemented. After that, we develop a storyboard or mockup based on the final thoughts we chose. FIGURE 2 depicts the storyboard or mockup for this application.
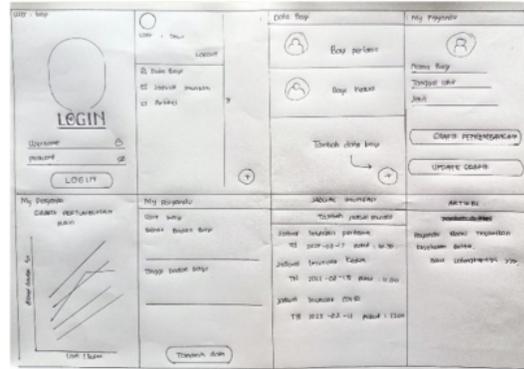

FIGURE 2. Application Mockup

D. Prototype

This phase is to make the application design according to the application design flow agreed upon at the previous Decide phase. The prototype in this application is shown in FIGURE 3.



FIGURE 3. Application Prototype

E. VALIDATE

This phase validates the prototype that has been developed for users, namely midwives and mothers of toddlers. In the application development process, we use hardware and software. The required hardware includes Asus 9S2U63M Desktop Computer, Intel Core i5-5200U, 6GB RAM, 1TB Hard Drive, Toshiba Mouse and Dell Keyboard. The required software is Windows 10 Operating System, Google Chrome Browser, Support Software (Microsoft Office 2013), Database Manager (PHPMyAdmin), Database Server (MySQL) and mobile developer (Android Studio).

III.   RESULTS AND DISCUSSION

The MyPosyandu application has three access rights: Admin, Midwife, and Mother. Admin permissions can edit all menus. Midwives have access rights to add/edit/view mother and baby data, add/edit/delete immunization schedules to be implemented, and add/edit/delete articles. Mother's access rights have features to add/edit baby data, view immunization schedules, and view articles.

There are two main features that were developed to solve the problem of the Posyandu in Kemuning Lor Village during the Covid-19 pandemic. Later, this Android-based application will also be helpful for further supporting activities at the Posyandu.

The first problem is not being able to monitor the growth and development of toddlers during the Covid-19 pandemic because physical distancing rules can still be carried out online monitoring through the child development feature so that the health level of toddlers is maintained and can improve. Features of child growth and development are shown in FIGURE 4, FIGURE 5, and FIGURE 6.
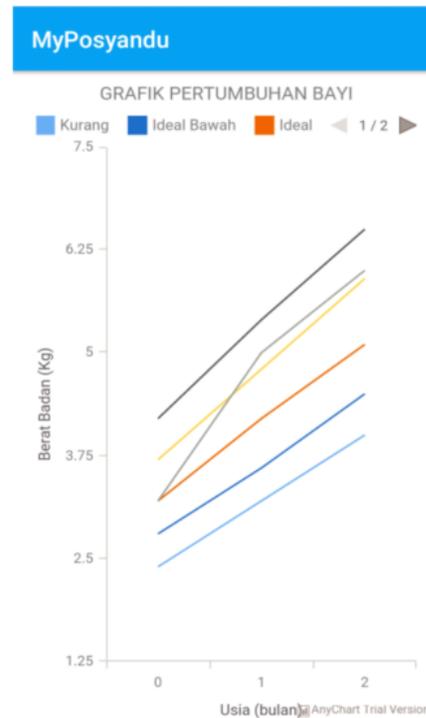
FIGURE 5. Features of Child Development- Baby Growth Chart

FIGURE 4 . Baby Data
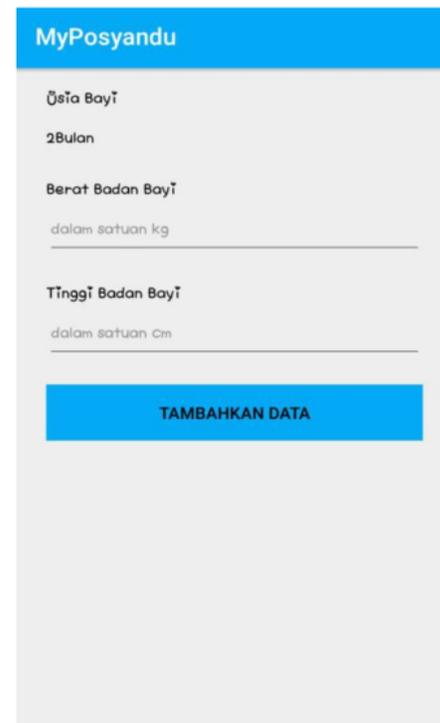
FIGURE 6. Features of Child Developmen Baby Update Data

The second problem is that there is no Posyandu information system, so the Posyandu recording and reporting process is still done manually, making it difficult for Posyandu cadres to manage Posyandu data. Regarding this problem, this android-based application has developed an immunization scheduling feature at the Posyandu in Kemuning Lor Village so that Posyandu service management can still run well during the Covid-19 pandemic. This feature will send an SMS containing the immunization schedule to each parent so that the mandatory immunizations given to children are not missed. The immunization scheduling feature is shown in FIGURE 7 .
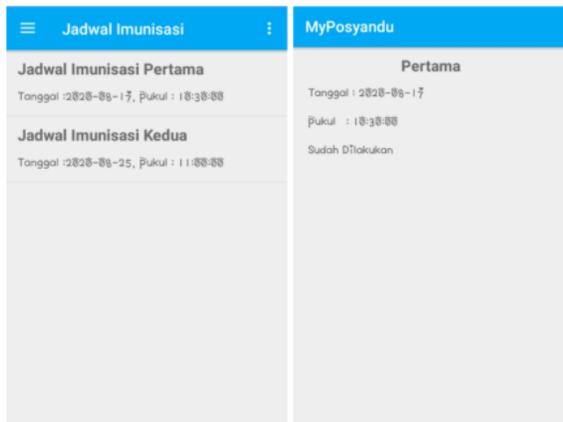
FIGURE 7. Immunization Scheduling Features
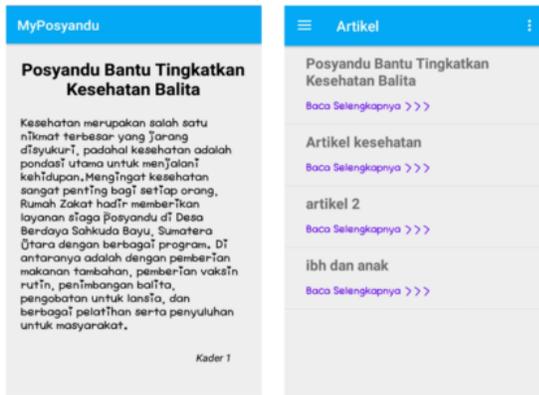
FIGURE 8. Additional Information on the Application

In addition to the two main features, the application also provides additional information in Toddler health articles. That will make it easier for midwives to conduct socialization related to toddler health in the community. Additional information in the form of articles is shown in FIGURE 8.

The application trial uses the User Acceptance Test (UAT) method, with the main indicator used being usability. UAT aims to make good and quality application performance [14]. This method can test applications with the Android platform [10]. In addition, this test method is most often used, including for applications in the health sector, because the indicators directly lead to users' acceptance of the application [11].

There are two aspects that are tested: appearance and programming flow. In TABEL 1 test instrument refers to the UAT indicator with ten main questions. The category of test results is made in 5 categories of value intervals.

TABLE 1
UAT Questionnaire

No	Assesment Statement	Test Result				
		SA	A	H	NA	SNA
Application Display Aspect						
1	Layout of text and images accordingly		6			
2	Selection of appropriate background		6			
3	Choose the right color		5	1		
4	Selection of appropriate font size and type	1	5			
5	Display buttons (buttons) used are attractive	1	5			
Programming Aspect						
6	Applications are easy to run	1	5			
7	Easy program menu selection is not confusing		5	1		
8	Entering and exiting the program is easy		6			
9	Reaction button (button) right		4	2		
10	The language used is easy to understand		6			
Amount		3	53	4		

Notes : SA = Strongly Agree; A = Agree; H= Hesitate; NA= Not Agree; SNA= Strongly Not Agree

The results of the trial application on UAT conducted to 6 respondents consisting of 1 Midwife, 1 nutritionist, 2 informatics technicians, and 2 posyandu cadres showed that this application was included in the Good category with a percentage of 80% for use in routine Posyandu activities.

From the aspect of the application display, 97.6% of respondents stated that the application display was included in the very attractive category. The user-friendly aspect of the programming flow shows that 94.4% of respondents stated that the application was very easy to use.

The test findings reveal that there is a mismatch between color selection and the ease with which program menus can be selected. It identifies the application's shortcomings, indicating that more research is needed to address these issues.

IV. CONCLUSION

This Android-based application for monitoring child growth and development has been successfully created with the user acceptance test results showing that 80% of the applications are in a suitable category to be used in Posyandu activities. It is beneficial for Posyandu in carrying out routine activities during the Covid-19 pandemic, so it has answered the aim of this study. Sustainability for further researchers can develop research using machine learning to predict stunting development in children. In addition, the test results show that there is a mismatch in colour selection the ease of choosing program menus, so research needs to be developed to solve these problems.

REFERENCES

[1] Depkes, *Depkes RI. Pedoman Umum Pengelolaan Posyandu*. Jakarta: Depkes RI, 2006.

[2] Kementerian Kesehatan RI, *Riskesdas Provinsi Jawa Timur*. Jakarta: Kementerian Kesehatan RI, 2019.

[3] Dinas Kesehatan Provinsi Jawa Timur, *Profil Kesehatan Provinsi Jawa Timur Tahun 2016*. Surabaya: Dinas Kesehatan Provinsi Jatim, 2016.

[4] B. Etikasari, T. D. Puspitasari, A. A. Kurniasari, and L. Perdanasari, "Sistem Informasi Deteksi Dini Covid-19," *J. Tek. Elektro dan Komputer*, vol. 9, no. 2, pp. 101–108, Aug. 2020, Accessed: Nov. 10, 2020. [Online]. Available: https://ejournal.unsrat.ac.id/index.php/elekdankom/article/view/28278.

[5] E. Dong, H. Du, and L. Gardner, "An interactive web-based dashboard to track COVID-19 in real time.," *Lancet. Infect. Dis.*, vol. 3099, no. 20, pp. 19–20, 2020, doi: 10.1016/S1473-3099(20)30120-1.

[6] S. Samudi, S. Widodo, and H. Brawijaya, "The K-Medoids Clustering Method for Learning Applications during the COVID-19 Pandemic," *SinkrOn*, vol. 5, no. 1, p. 116, 2020, doi: 10.33395/sinkron.v5i1.10649.

[7] Listya Febri Fathoni, Mushlihudin, K. Firdausy, and A. Yudhana, "Application Information System Based Health Services Android," *J. Ilmu Tek. Elektro Komputer. dan Inform.*, vol. 2, no. 1, pp. 37–46, 2016.

[8] H. Sumual, J. R. Batmetan, and M. Kambey, "Design Sprint Methods for Developing Mobile Learning Application," *KnE Soc. Sci.*, vol. 3, no. 12, pp. 394–407, 2019, doi: 10.18502/kss.v3i12.4106.

[9] Y. Nurhadryani, S. K. Sianturi, and I. Hermadi, "Pengujian Usability untuk Meningkatkan Antarmuka Aplikasi Mobile Usability Testing to Enhance Mobile Application User Interface," *J. Ilmu Komput. Agri-Informatika*, vol. 2, no. 2010, pp. 83–93, 2013.

[10] M. Afdal and D. G. Humani, "Aplikasi Sistem Pakar Diagnosa Awal Penyakit Menular Pada Balita Berbasis Android," *J. Ilm. Rekayasa dan Manaj. Sist. Inf.*, vol. 6, no. 1, p. 55, 2020, doi: 10.24014/rmsi.v6i1.8979.

[11] B. M. S. Nirmala, "Metode Sprint Design Pada Perancangan Aplikasi Mobile Booking Online Fastboat Di Bali," *SENSITIf Semin. Nas. Sist. Inf. dan Teknol. Inf.*, pp. 1273–1281, 2019, [Online]. Available: https://ejurnal.dipanegara.ac.id/index.php/sensitif/article/view/513.

[12] H. Wendri, J. Dedy Irawan, and A. Faisol, "Penerapan Location Based Service Untuk Pencarian Lokasi Rapat Menggunakan Metode Design Sprint," *JATI (Jurnal Mhs. Tek. Inform.*, vol. 4, no. 2, pp. 144–149, 2020, doi: 10.36040/jati.v4i2.2694.

[13] E. Sudarmilah, U. Fadlilah, W. D. Pratisti, and G. G. Giwangkoro, "Prototyping on Web-Based Information System of Toddler's Growth and Development," *International Conference on Information Systems for Business Competitiveness (ICISBC)*, 2013.

[14] Y. Nurhadryani, S. K. Sianturi, and I. Hermadi, "Pengujian Usability untuk Meningkatkan Antarmuka Aplikasi Mobile Usability Testing to Enhance Mobile Application User Interface," *J. Ilmu Komput. Agri-Informatika*, vol. 2, no. 2010, pp. 83–93, 2013.

[15] S. Kusumadewi, R. Kurniawan, and H. Wahyuningsih, "Implementasi Sistem Informasi Posyandu Berbasis Web dan Android di Desa Bimomartani," *JPPM (Jurnal Pengabdi. dan Pemberdaya. Masyarakat)*, vol. 3, no. 2, p. 351, 2019, doi: 10.30595/jppm.v3i2.4903.

[16] R. Purwanto, A. Prihantara, and L. Syafirullah, "Design of Information System Immunized Care Services Based on Mobile (Case Study: Puskesmas Maos Cilacap)," *Proceedings - 2018 International Conference on Applied Science and Technology, iCAST 2018*, pp. 470–476, 2018, doi: 10.1109/iCAST1.2018.8751549.

[17] A. Setiyawati et al., "Utilization of Electronic Medical Records for Monitoring The Health of Toddlers and," International Proceedings the 2nd International Scientific Meeting on Health Information Management (ISMoHIM) vol. 5, pp. 87–92, 2020.

[18] S. Pratama, "Penerepan Sistem Informasi Posyandu Mawar Kelurahan Simpang Empat," *Technologia*, vol. 7, no. 4, pp. 237–244, 2016.

[19] S C Wibawa et al "Online test application development using framework CodeIgniter" *IOP Conference Series: Materials Science and Engineering, Volume 296, The Consortium of Asia-Pacific Education Universities (CAPEU)*, 2017.

[20] I. P. Windasari and R. R. Yana, "Aplikasi Mobile Kartu Menuju Sehat (M-KMS)," *J. Sist. Komput.*, vol. 6, no. 2, pp. 80–83, 2016.

[21] A. W. Prayugha and F. Zuli, "Implementasi Augmented Reality Sebagai Media Promosi Universitas Satya Negara Indonesia Berbasis Android Menggunakan Metode Marker Based Tracking," *Research Lembaran Publikasi Ilmiah Vol.4 No.1 Maret TH*. 2021

PRAMUDITHA SHINTA DEWI PUSPITASARI The author was born in Jember in 1988. She has Bachelor's degree in Informatics System (2007) and Master's degree in Informatics Engineering with a concentration in Information System (2012) from Institut Teknologi Sepuluh Nopember (ITS) Surabaya. In 2016 the author participated in the Professional Engineers Development Program (PPPI) to explore the profession in the vocational field of Electrical Engineering, until he received the title/Professional Title "Engineer". The author currently works as a lecturer at the Department of Information Technology of Politeknik Negeri Jember. The author is also a member of the Research Group for the field of Artificial Intelligence in the Information Technology Department.

BETY ETIKASARI The author was born in Trenggalek, May 28, 1992. She has Bachelor's degree in Informatics Engineering Education (2014) and Master's degree in Vocational Education with a concentration in Informatics Engineering Education (2016) from Malang University. The author currently works as a lecturer at the Department of Information Technology of Politeknik Negeri Jember. The author is active in teaching, research and community service activities. The vocational lecturer training experience (Retooling) was attended on 29 July – 23 August 2019 at Alibaba Business School, Hangzhou, China for E-Commerce competence. In addition, the author is also a member of the Expertise and Research Group for the field of Artificial Intelligence in the Information Technology Department.

TRISMAYANTI DWI PUSPITASARI The author was born in Jember, February 27, 1990. She has Bachelor's degree in Information System (2012) and Master's degree in Computer Science (2015) from Gadjah Mada University. The author currently works as a lecturer at the Department of Information Technology of Politeknik Negeri Jember. The author is active in teaching, research and community service activities. The vocational lecturer training experience (Retooling) was attended on 29 July – 23 August 2019 at Alibaba Business School, Hangzhou, China for E-Commerce competence. In addition, the author is also a member of the Expertise and Research Group for the field of Artificial Intelligence in the Information Technology Department.

RIA CHANDRA KARTIKA. The author was born in Banyuwangi, August 3, 1991. She has Bachelor's degree in public health science from Jember University (2013) and Master's degree in Public Health Science form Airlangga University (2016). She currently works as lecturer in the health department of Politeknik Negeri Jember. Her research interests involved nutrition and public health.

LUKIE PERDANASARI The author was born in Jember, May 10, 1993. She has Bachelor's degree in Informatics Engineering (2015) from the University of Muhammadiyah Jember and Master's degree in Informatics and Computer Engineering (2016) from Electronic Engineering Polytechnic Institute of Surabaya. The author currently works as a lecturer at the Department of Information Technology of Politeknik Negeri Jember. The author is active in teaching, research and community service activities. In addition, the author is also a member of the Expertise and Research Group for the field of Artificial Intelligence in the Information Technology Department.

ARVITA AGUS KURNIASARI The author was born in Jember, August 31, 1993. She has Bachelor's degree in Informatics Engineering (2016) and Master's degree in Informatics and Computer Engineering (2019) from Electronic Engineering Polytechnic Institute of Surabaya. The author currently works as a lecturer at the Department of Information Technology of Politeknik Negeri Jember. The author is active in teaching, research and community service activities. In addition, the author is also a member of the Expertise and Research Group for the field of Artificial Intelligence in the Information Technology Department.

Paper Jurnal/Prosiding

5% SIMILARITY INDEX
0% INTERNET SOURCES
5% PUBLICATIONS
0% STUDENT PAPERS

PRIMARY SOURCES

1 Triwiyanto Triwiyanto, Torib Hamzah, Sari Luthfiyah, Bedjo Utomo. "Hand Prosthetic Design for Transradial Amputee by Using 3D Printing Technology to Enhance Life Quality", Jurnal Teknokes, 2021
Publication
3%

2 Indria Nuraini, Isabella Hasiana, Nabila Sayangbati Gamas. "Analysis of Needs For Using Android-Based KPSP Applications In Monitoring The Growth of Together", Journal Of Nursing Practice, 2021
Publication
2%

Exclude quotes	On	Exclude matches	< 2%
Exclude bibliography	On		