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Design of the Android-based Kartu Menuju Sehat (KMS) Application as a Toddler Growth and Development Monitoring

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Abstract

The growth and development of infants and toddlers can be regularly monitored using KMS (Card Towards Health). Monitoring growth and development has been carried out but is still manually in the KMS book. The research aims to develop an information system that supports monitoring toddlers' growth and development status. System development uses the system development life cycle (SDLC), and system trials are used to determine user acceptance of the developed application. The system development method is carried out in three stages: design, development, and implementation. The results of the trial show that the system developed provides results that meet user needs. The system test results show that the application can give output information on monitoring toddlers' growth and development status, which can be displayed in graphic form, Excel, or PDF format. Nomor Induk Kependudukan (NIK) data was added to compare it with other health applications in the developed system.

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Introduction

The anthropometric standards used as a reference in measuring and assessing the nutritional status of children have been regulated in the regulation of the Minister of Health number 2 of 2020 concerning the anthropometric standards of children, which consists of the weight index according to age (BB/A), Length or height (PB/A or TB/A), and Weight according to Body Length or Height (BB/PB). Then, the calculated figures will be adjusted to the nutritional status category that WHO has determined for children aged 0-5 years (Kemenkes RI, 2022). One of the diseases caused by dietary factors is (malnutrition) namely stunting, which is a condition of impaired growth and development in children due to chronic nutritional disorders and repeated infections, which is characterized by a length or height below standard, less than -2 standard deviations set by WHO(D. F. Susanti, 2022) Based on the 2022 Indonesian Nutritional Status Study (SSGI), the prevalence of underweight and very underweight was around 17.1%. This data is reported electronically in the e-PPGBM application(Dinkes Kota Semarang, 2022)(Dinas Kesehatan Kota Semarang, 2024). Poor nutritional intake can result in health impacts/problems (Barker et al., 2011). Several other research results also state that malnutrition is influenced by several factors, both internal and external, such as food consumption, education level, knowledge about nutrition, environmental cleanliness, and social

background (Aisyah et al., 2023)(Schwab & Traven, 1979). In addition, parenting patterns and a history of infectious diseases also affect the nutritional status of toddlers. (Handayani, 2017) One of the strategic monitoring of toddler nutritional status is by having toddler posyandu and cadres as companions and supporters of parents in motivating the importance of monitoring BB (body weight) and PB/TB (Length/Height) of their toddlers. Recording and reporting weighing results is one of the efforts in supervision or monitoring and control that can be carried out by posyandu cadres and can also be known by the health center. One of the tools that can be used as a data recording media is KMS (Kartu Menuju Sehat). Based on the Regulation of the Minister of Health of the Republic of Indonesia Number 155/Menkes/Per/I/2010, it states that KMS (Healthy Menu Card) is a media for recording development through a child's normal growth curve based on the anthropometric index of body weight according to age which is differentiated by gender. Child growth and development monitoring is recorded manually using KMS (paper-based), so the data is not directly integrated in real time. KMS can be used as a tool to monitor toddler growth.

The KMS contains a normal child growth chart, which can be used to determine whether a child is growing normally or experiencing a growth disorder. If the child's weight chart follows the growth chart on the KMS, it means that the child is growing normally and at low risk of experiencing a growth disorder. Conversely, if the weight chart does not match the growth chart, the child is likely at risk of experiencing a growth disorder. As a record of child health services, The KMS records pregnancy health history, delivery history, postpartum examination, basic child health services, especially child weight, neonatal examination, provision of vitamin A capsules, provision of breast milk to infants aged 0-6 months and immunization, and the last KMS can be used As an educational tool. The KMS contains basic care messages.(Maulidia & Sukamto, 2015) Good cooperation between the community, posyandu cadres, and the health center can support acquiring accurate, complete, and correct data. This data can be used as a decision support and planning for nutritional development activities in its area. (W. I. Susanti et al., 2019) One of the obstacles in monitoring health status is that in integrated health posts, recording still needs to be done manually and the issuance of the latest law on the implementation of electronic medical records in health service facilities. (Kemenkes RI, 2022). It does not yet cover the integrated health service post. Therefore, it is necessary to develop information that can be used as a tool to facilitate recording so that monitoring of health status can be done promptly as it should be. Integrated health service posts have an important role in monitoring the nutritional status of children, including infants and toddlers. Compliance with visits to integrated health service posts is related to the status of children, such as in the results of a study conducted in an area in Yogyakarta, which showed a relationship between the level of compliance with visits to integrated health service posts and the nutritional status of children. (E. Sari, 2017).

Previous research was conducted by developing KMS applications with various methods, such as web-based or desktop-based applications. Still, the development of information technology and devices, as well as the need for fast data mobility, so in this research, we conducted a trial of developing an Android-based system because of the ease of user access when the system is designed based on Android. Ease of user access is one reason for creating this application.

Methods

This research is a system development research, and the application or trial of the system type of research is Research and Development research; according to Sugiyono, the Research and Development method can be interpreted as a scientific way to design, produce, and test the validity of the products that have been produced. (Hendryani & Susana, 2020) The initial stage is the development of an information system, namely using the SDLC method and the FAST method (framework for the application of system thinking) for the analysis framework. Object-oriented analysis and design (OOAD) are used in designing the information system, while the model description uses UML *(Unified model language).*(whitten, L Jeffery; bentely, D lonnie; Dittman, 2013),(A. O. Sari & Nuari, 2017) This Android-based KMS application was developed to make monitoring the development of toddlers, especially those experiencing stunting, easier. System development was carried out using the FAST method. The steps are as follows:(whitten, L Jeffery; bentely, D lonnie; Dittman, 2013)

a. Preliminary Study

   This is the initial stage of system development. In this section, the activities identify the problems and opportunities for developing the system. What is done is to look for sources of information regarding stunting incidents and several journals regarding application development that have been carried out in previous studies as a reference in compiling information that will be displayed in the system.

b. Problem analysis
This activity is carried out by analyzing the problems experienced in monitoring and preventing stunting. By recording any problems found in the growth and development status recording and monitoring model. The growth and development recording is still done manually in KMS (healthy card); growth and development information cannot be presented directly because it takes time to analyze the data manually.

c. Needs Analysis
Other supporting data is needed in system development, this information can be obtained using literature studies and interviews with prospective system users regarding what information needs to be presented in the system being developed. Based on the results of interviews and literature studies, it was concluded that a mobile system/application is needed that can be installed on Android to record the results of toddler growth and development monitoring activities so that officers can easily access the application and obtain information about the status of the toddler's growth and development.

d. Decision Analysis
Several alternative system developments are identified at this stage, and decisions regarding the system application design are made.

e. System Design Stages
System design includes application design, database design, and user interface design. The following describes the application's main menu to be developed.

f. Development system result
The application developed in this research was tested by installing it on Android. The following is a display of the home page.

Results

The following image shows the result of the interface design development for the KMS, which has been installed on Android.

Figure 3. Home

Figure 4. Login Application

Figure 5. Page Admin

Figure 3 to Figure 5 illustrate the sequence of application usage in Android, and Figure 5 shows the menu to log into the application by clicking the login button; after that, the admin can do several activities, such as monitoring the growth and development status of toddlers, checking the ideal weight and height of toddlers, adding/inputting cadres, and adding Posyandu data. The admin can pull reports in Excel or PDF format according to the desired reporting needs. The following is a display of the toddler data input page.

Figure 6. Login Input Data

Figure 7. Appearance Input

In Figures 6 and 7, officers can input toddler data. On this page, officers can also directly get information about the toddler whether the toddler's health status is good (normal) or poor, it can also be checked via the KMS on this page as shown in the following figure 8:

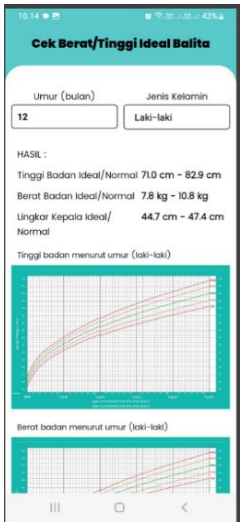

Figure 8. Menu KMS

Figure 9. Search by Name

Meanwhile, in Figure 8, officers can find one of the toddler's data according to the data input that has been done and can download the toddler's status report in Excel or PDF format. The development team conducted the system testing independently after ensuring that all system features were functioning properly. Following this, prospective users tested the system to gather their feedback on the developed system.

Discussion

The android-based electronic KMS application was successfully developed according to the design that had been prepared. System development begins with assessing users' information needs. At this stage, user requirements are gathered from the existing paper-based Knowledge Management System (KMS), which currently serves as the reference. The collected data is then categorized into key components—input, process, and output—based on the information system's needs. This classification forms the foundation for designing the application, ensuring it aligns with the identified requirements.

To facilitate users in using the developed application, folders are created in the interface that makes it easier for users to get to their information needs, for example, login menu, admin menu, posyandu data input menu, toddler data input menu, then as a form of output from the developed system, a KMS menu is also provided which can be printed as PDF, or Image as a report if needed, in addition, a recap of the growth

and development of toddlers who undergo overall examinations can also be presented in full in excel or PDF. According to previous research, an attractive, easy, and simple dashboard/interface display is a powerful tool for expanding useful information(Arrachman et al., 2024). In addition to user interface design, creating an attractive user interface design that follows user needs greatly affects the acceptance of the technology being developed, as the results of previous research based on the results of the regression test that the interface design variable has an influence on the real conditions of information users (Irawati et al., 2019)which means that almost all respondents can accept it if the application developed is used in toddler growth and development monitoring activities. Previous research conducted by Andika Pramita (2023) on the development of queue applications also stated that, on average, respondents agreed with the development of the application (Widyassari & Sirojunnafis, 2023).

Based on the results of the system testing, the following conclusions were obtained: 98% of respondents stated that the developed application was easy to use, 95% of respondents stated that the developed application provided more benefits when applied to service activities, and 82%, which means that almost all respondents can accept it if the developed application is used in service activities, research by SH gea at all, (2022) about the application of TAM methode at actualization of SIMRS (Hospital Information System), the result showing if perceived usefulness and perceived of use affect the actual use of the system (Hartini Gea et al., 2022), and another research by widya ratna wulan (2024) the result show The attitude regarding the development of telemedicine in Prolanis was positive (79.0%), and positively perceived the development of telemedicine by 58.3%. Age (p = .035; OR = 0.502) and gender (p = .010; OR = 2.605) were significantly related to respondents' knowledge. The educational background is significantly related to respondents' attitudes (p = .025; OR = 3.080)(Ratna Wulan et al., 2024)

Conclusion

Based on the results and discussion above, it can be concluded that the system design can be significantly developed into an effective information system for recording toddler growth and development activities, and its functionality has been well-received, as evidenced by the successful system trials conducted. Some data that can support decision-making, such as child and parent NIK data and an application pocketbook (manual book), are needed to facilitate use.

Author Contributions

"Conceptualization artikel dan tema penelitian , by fitria wulandari.; methodology, Arif Kurniadi and fitria wulandari.; software, Oki setiono. formal analysis, Fitria wulandari and Widya Ratna Wulan; writing—original draft preparation, Fitria wulandari and widya ratna wulan.; writing—review and editing, fitria wulandari and widya ratna wulan.; All authors have read and agreed to the published version of the manuscript." Authorship must be limited to those who have contributed substantially to the work reported

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