Implementing Dynamic Systems Development Method for a Web-Based System to Evaluate Child Health and Growth

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ABSTRACT

The Simpang Gambir UPTD Community Health Center has developed an innovative digital system to monitor the growth of toddlers. Previously, the recording of toddler growth data was done manually, often leading to data loss or damage. This new system is designed to address these issues and provide a more efficient and accurate solution. The system not only facilitates health center staff and Posyandu cadres in monitoring toddler development but also assists them in creating digital growth reports. With this system, toddler growth data can be accessed quickly and easily, facilitating decision-making regarding child health management. One of the key features of this system is its ability to track toddler growth based on weight-for-age charts. This feature allows health workers to easily identify toddlers with nutritional problems and promptly provide necessary interventions. Additionally, the system is equipped with a fast data search feature, enabling staff to easily find specific toddler growth data. The development of this system utilizes the Dynamic System Development Method (DSDM), allowing for a structured and efficient development process. With this method, the system can be developed rapidly and in accordance with user needs.

Keywords: Dynamic System Development Method, evaluation, health, Toddler, Growth and Development

INTRODUCTION

Technological advancements, particularly in information systems, have been accelerating at a rapid pace. Information systems are a manifestation of technological progress that is widely applied in various domains, including healthcare. Health is a fundamental aspect of human life, as it significantly influences an individual's quality of life. (Maryam et al., 2022). Healthcare challenges in Indonesia, particularly infant health, continue to pose significant problems. High rates of infant morbidity and mortality remain a concern. Immunization programs offer a promising strategy to substantially reduce infant deaths caused by infections (Rad et al., 2021).

Toddlers, aged 0-5 years, are in a critical phase of rapid growth and development. To assess the growth and developmental milestones of toddlers, community participation in Posyandu programs is essential. This allows for monitoring of the overall health status of the community (Aprilia & Rodianto, 2023).

The Simpang Gambir Public Health Center, situated at Jl. Pendidikan, Simpang Gambir Village, Linggabayu District, Mandailing Natal Regency, provides essential healthcare services. According to data from the health center, a significant number of infants in the area are suffering from malnutrition and stunting (Alhari et al., 2021). The nutritional status of toddlers is evaluated using age and anthropometric measurements. Anthropometry, the scientific study of human body measurements, is employed to assess nutritional status through various parameters, including weight and height (Balita et al., 2021). Growth and development in children are inextricably linked, occurring concurrently (Wahono, 2022). The evaluation of infant growth and development is conducted by measuring the child's weight and documenting it in a maternal and child health handbook (Nurhayati & Ifalahma, 2024).

The research identified a problem with the manual processes of data collection, recording, and dissemination, leading to inefficiencies and data loss. To address this, a system is proposed to facilitate the health center's management of child data and monitoring of developmental milestones. This system will enable data storage and retrieval, streamlining the monitoring process. The Dynamic Systems Development Method (DSDM) is a suitable methodology for developing such a system, as it emphasizes iterative development, user involvement, and collaboration (Dewi Ayu Nur Wulandari et al., 2021). This study is an extension of the previous research titled "Geographic Information System in Monitoring Priority Areas for Child Stunting Handling in Medan City". The current study delves into the issue of stunting and develops a monitoring system for priority areas in Medan City, leveraging Leaflet JavaScript to integrate mapping functionalities into a web-based platform. The system is designed to streamline the monitoring process for health departments and community health centers. (Siregar et al., 2023).

The preceding study, entitled "Design of an Android-Based Infant Development Application", sought to develop a

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mobile application for infant development. The objective was to provide a tool that could support parents, particularly mothers, in their infant care routines. Furthermore, the application was designed to enhance users' understanding of infant care practices (Halawa et al., 2023).

Based on the problems experienced by Simpang Gambir Health Center regarding child development, a health information system and child development system was built to facilitate the Posyandu cadres and health center staff in monitoring child development. The evaluation used is formative evaluation, which is the implementation stage of the child development program with the aim of improving the ongoing program based on daily, weekly, monthly, yearly, or short-term activities. The benefits of this evaluation are to provide feedback to program managers about the progress of the results achieved and the obstacles faced.

LITERATURE REVIEW

In a previous study conducted by (Maki et al., 2023) he Dynamic System Development Method (DSDM) was used. The system was modeled using the Unified Modeling Language (UML). The result of this study was a school website integrated with Moodle-based e-learning, and the system was tested using black-box testing and media expert validation. In contrast, the research conducted by the author has a broader scope, encompassing aspects of child development and monitoring child growth. The method used in this research is a method that can be used to build or develop software iteratively and incrementally, involving collaboration between users and developers. The main difference between this research and the previous research lies in its scope and complexity.

The preceding study primarily focused on providing school-related information, including profiles, news, announcements, and events, while integrating with a web-based e-learning platform. This research expands upon this by developing a web-based system utilizing DSDM to facilitate the management of Posyandu cadre and child data. The system enables administrators to perform various tasks such as data processing, monitoring child growth, and generating reports.

METHOD

The research method used by the author is a qualitative method. Qualitative refers to that which is descriptive and tends to use analysis. Qualitative methods are used to explain existing research without providing manipulation.(Hanyfah et al., 2022) Qualitative methods are research techniques that provide results that cannot be calculated using numbers. Some of the techniques used to obtain data are as follows:

1. Observation
   The author made direct observations of activities related to the problem taken. At this stage the researcher made observations at the Lingga Bayu Community Health Center by looking at the data directly.
2. Interview
   An interview is a direct question and answer session between two or more people to obtain information. The aim is to find out user needs. At this stage the researcher conducted a question and answer session with one of the midwives at the Lingga Bayu Community Health Center.
3. Literature Study
   Literature study, namely looking for data related to research as a reference and as additional or supporting information related to the problems in this research (Suendri et al., 2022). Literature studies consisting of references from books, journal articles and information available on the internet related to the topic of discussion.

Dynamic Systems Development Method (DSDM)

The system development technique employed in this research is the FAST method. FAST is a system enhancement methodology that integrates multiple well-known methods into a flexible framework that can be augmented with other techniques. FAST is a system development method that enables the creation of high-quality systems in a relatively short timeframe. This method is more flexible as it can be further developed using various approaches that are continually evolving. DSDM was first introduced in 1995 as the only publication demonstrating the use of the RAD method worldwide. DSDM is a method that can be used to build or develop software iteratively and incrementally with the involvement of collaboration between users and developers. Dynamic System Development Method facilitates a framework for developing functions in a more adaptable way to changes in order to build software that meets the needs on time (Alexander & Prasetyaningrum, 2023).
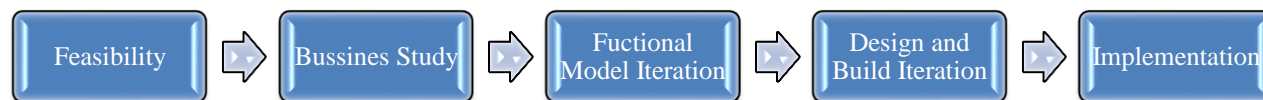
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Figure 2 Method DSDM

1. Feasibility
    The purpose of a feasibility study is to evaluate and select the most appropriate solution and to determine whether the proposed development solution is aligned with the organization's business requirements.
2. Bussines Study
    After conducting a feasibility analysis in step 1, the next step is to analyze the business and technology characteristics. The Business Study provides the foundation for all subsequent work.
3. Fuctional Model Iteration
    The design of the main function of the information system along with the prototype is built in this stage.
4. Design and Build Iteration
    At this stage, the information system application being developed is ready for use by users. In this phase, what is done is to design a system with high enough standards so that it can be used according to user needs. The output of this phase is a system that has been tested
5. Implementation
    In this phase, the application that has been created by the developer is then used by the user, with training provided to users about the new system and also determining future needs. The implementation phase is carried out after the designed program has been completed. The design of the user interface of the developed system will be displayed in the implementation section (Ikhwan & Aslami, 2020).

RESULT

The following will explain the implementation of each stage of the Dynamic System Development Method (DSDM) that will be used in the creation of the Web-based Child Monitoring System.

Feasibility

In this phase, a meeting is held between users and system developers to discuss the plan for creating a child health and development system at the health center. The result of the feasibility study is to determine the needs of the system to be created as well as the continuation of the planned system with the aim of assisting community health workers and health centers.

Bussines Study

To determine the scope of business processes and the information system needs required in each process, a Usecase Diagram is used. In the system to be created, there are 2 types of user levels that will interact with the system: health centers and community health workers. Each user level has an interaction that is appropriate to the user's needs. The following is a usecase diagram for each user level:
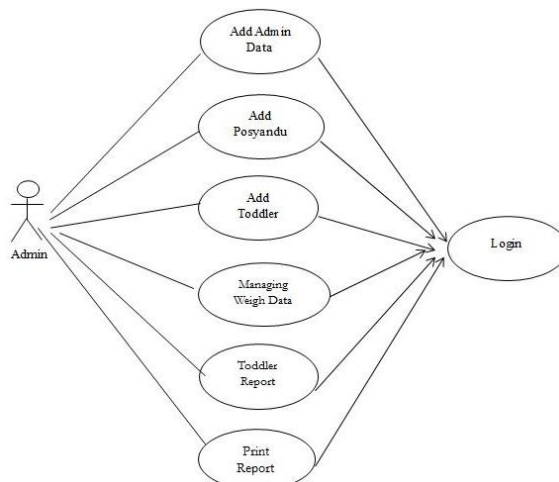

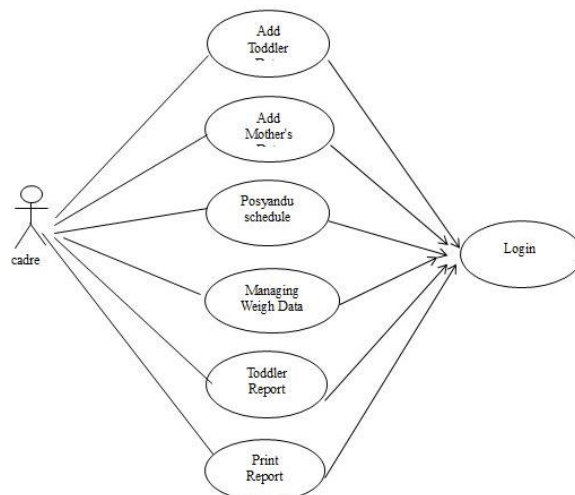Figure 3 Use Case Owner Page of Community Health Centers Admin

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Figure 4 Use Case of Posyandu Cadre Owner Page

Fuctional Model Iteration

Modeling Iteration At this stage, we begin to design the main functions of the information system that will be built. Designing a prototype of the program display interface system that will be created. The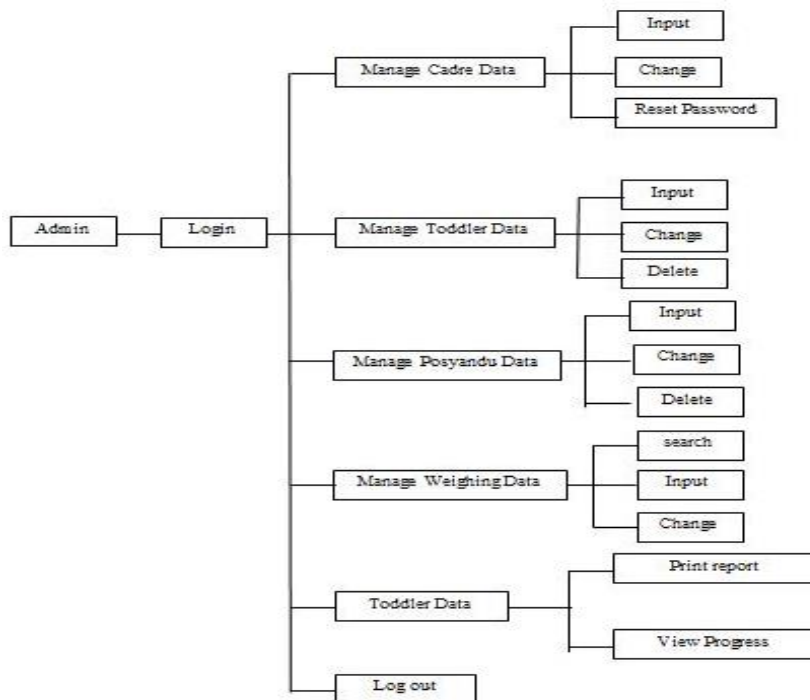 following are the menus that will be designed. Modeling iteration. At this stage, we begin to design the main functions of the information system that will be built. Designing a prototype of the program display interface system that will be created. The following are the menus that will be designed

Design admin menu

Figure 5. Design Admin Menu
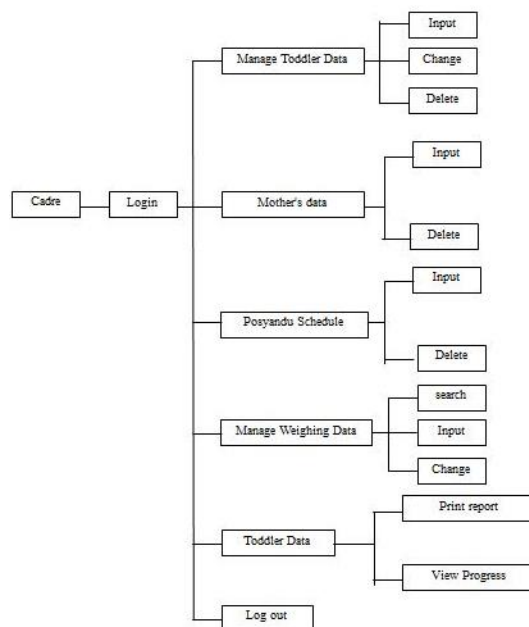
Design Cadre Menu

Figure 6. Design Cadre Menu

Design and Build Iteration

At this stage, design an overview of the system menu that will be developed. Depiction of the input form menus that will be displayed on the admin menu and Posyandu cadre menu.:

Design of Login input form The login

Input form is used for admin and Posyandu cadres to enter the toddler nutritional status monitoring application so they can enter the next stage

Figure 7. Login form Display Design

Admin Input Menu Design

The main admin menu is used as the main admin page to access this website. This page displays a menu that can access all pages such as the menu for managing cadre data, managing toddler data, and managing weighing data.

* Corresponding author

Figure 8. Admin Input Menu Design

1) Admin Output Menu Design

Figure 9. Admin Output Menu Design

2) Posyandu cadre Input Menu Design

Figure 10. Posyandu Cadre Input Menu Design

3) Posyandu cadre output menu design

* Corresponding author

Figure 11. Posyandu Cadre Output Menu Design

1. Implementation

   At this implementation stage, the database design that will be used in the health center monitoring system is explained by arranging the data and creating the required table structure to store the required data. The system created can monitor the nutritional status of toddlers who have taken part in toddler weight weighing activities once a month. Implementation using codeigniter obtained several web pages as follows

   1) Login Form

Figure 12. Login View

On this page there is a login menu, you are instructed to fill in the username and password above so you can log in

   2) Admin Menu

   If the email entered in the login form is an email with admin status, the system will display the Admin menu. In this menu the Admin can input Posyandu cadre data.
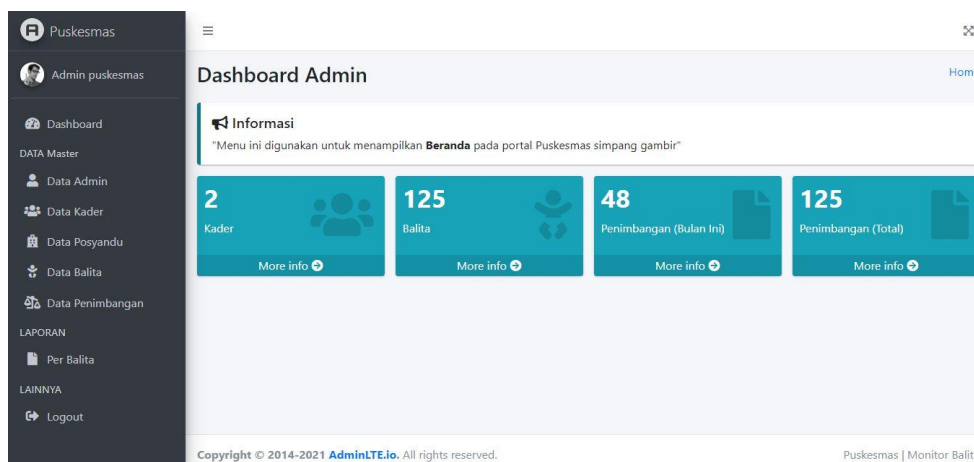
Figure 13. Admin Menu Display

3) Manage Weighing Data Menu Display

This menu is used by Simpang Gambir Community Health Center officers or admins to input data on weighing results, then input data on toddlers and their weight so that the nutritional condition of toddlers can easily be determined. The results of this report are in the form of a toddler weighing report and can be used to print reports
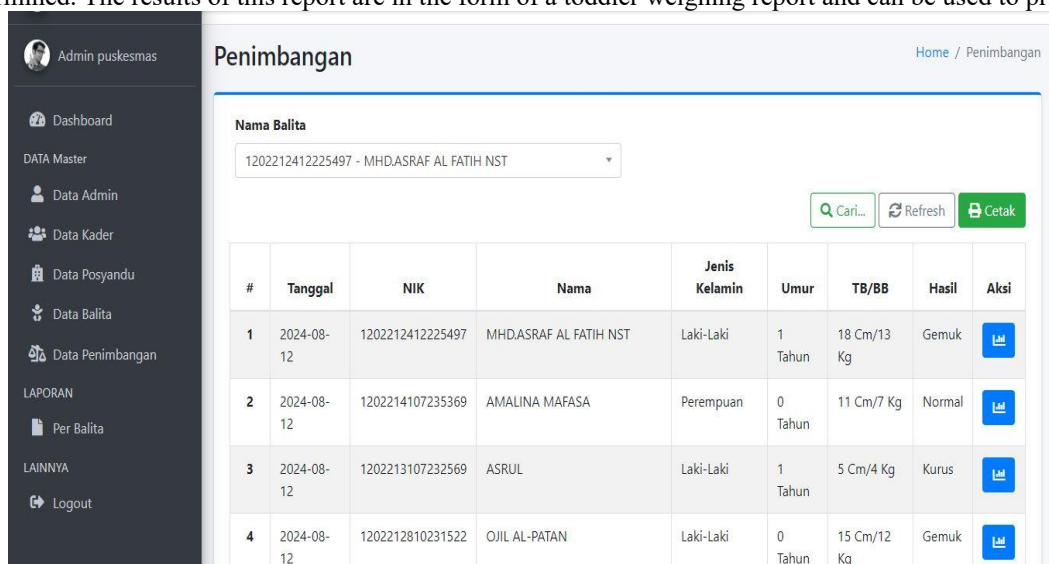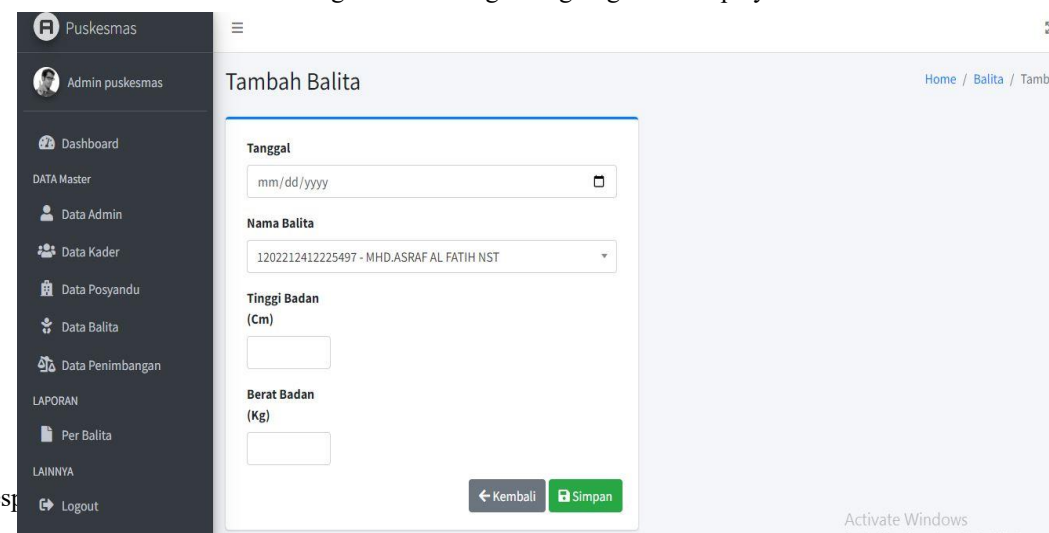

Figure 14. Manage Weighing Data Display

* Corresp

1882

Figure 15. Display Add Weighing Data

Figure 16. toddler weighing report display

4) Posyandu cadre menu

If the email entered in the login form is an email with Posyandu cadre status, the system will display the Posyandu cadre menu. In this menu, Posyandu cadres can see the nutritional status of toddlers and the development of toddlers' weight.
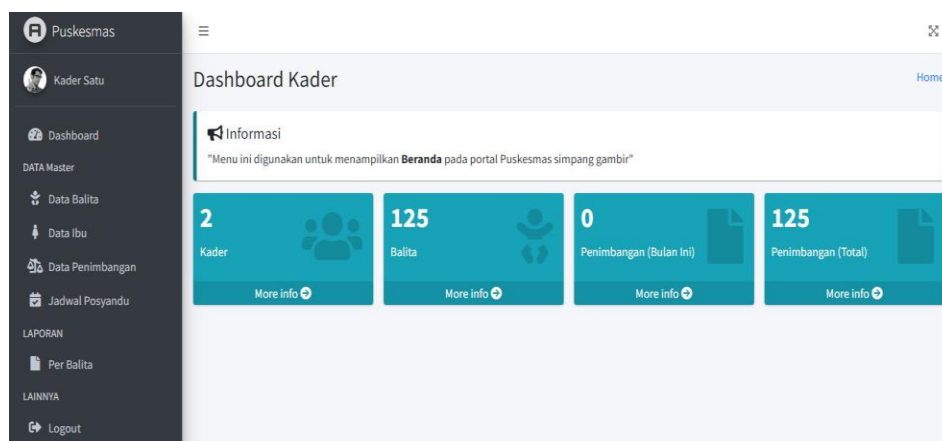

Figure 17. Posyandu cadre menu

Figure 18. display of toddler weighing results

* Corresponding author

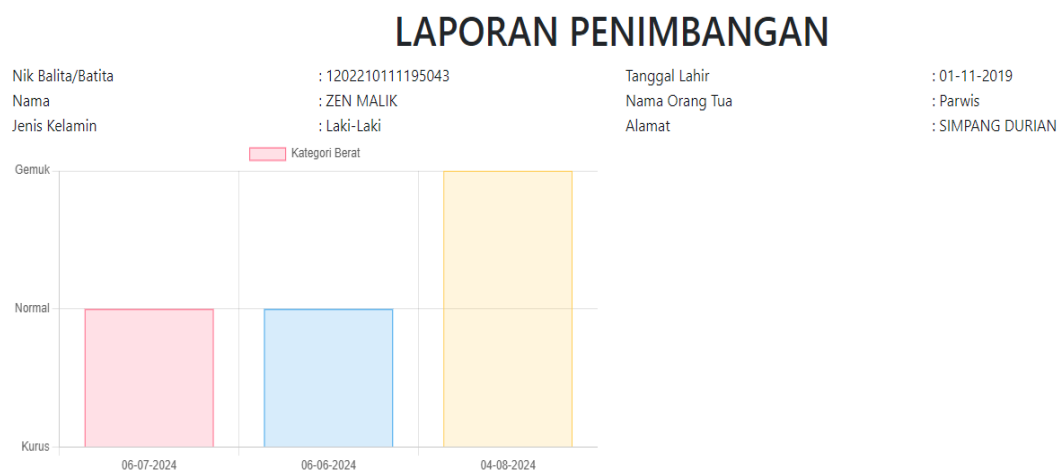This weighing chart shows the results of weighing toddlers each month.

Figure 19 graphic display of toddler development

Verifikasi

The results of the black box testing, as shown in the table below, indicate that all pages and commands function as designed.

Table 3 Blackbox Testing

Input	Process	Output	Results
Login	Enter username and password	Access dashboard page	Successful
Dashboard	Click on child data and mother data information	Enter master data page (child and mother data)	Successful
Master Data	Add, edit, and delete child data, Posyandu data, and Posyandu cadre data	Data can be processed and added	Successful
Weighing Data	Add, edit, and delete child weighing data	Data can be processed and added	Successful
Print Report	Display and print child weighing report	Can be displayed and printed	Successful

DISCUSSIONS

This research successfully developed a web-based information system for monitoring child growth at Simpang Gambir Community Health Center. The system features child data recording, child weighing, and weighing report printing. With this system, the previously manual data recording process becomes more efficient and minimizes the risk of data loss. The system built facilitates health workers and the health center in monitoring child growth, especially in terms of nutrition. Child data such as weight, nutritional status, and development reports can be accessed more quickly and accurately compared to the manual method which is prone to data loss and damage. One of the main features produced from this research is the display of child development graphs based on weight categories (normal, thin, obese). This feature makes it easier for the health center to visually monitor the nutritional status of children and can directly print reports for administrative needs. With a database-based system, child data storage is more secure and organized compared to conventional paper-based methods. This system reduces the risk of data loss or damage and allows for faster access to child data whenever needed. The use of the DSDM method in system development has proven effective because this method allows for iterative development and directly involves users in each development stage. This ensures that the system built meets the real needs of health workers and the health center. The results of the implementation of this system show an increase in efficiency in the process of monitoring child growth. The health center now has a more effective tool for tracking child data, monitoring their health status, and compiling reports

* Corresponding author

1884

quickly. In addition, the system minimizes errors that often occur in manual recording and facilitates the evaluation of child health development.

CONCLUSION

The conclusion is that we have successfully developed an online electronic system that can be used by administrators to process Posyandu cadre data, manage child data, view child weighing information, and print child weighing data reports. This system can be a solution to minimize the loss of child data with a database storage system. The system can also make it easier for Posyandu cadres and health centers to determine the nutritional status of children by looking at weight for age. Additionally, the system can speed up the process of searching for child data. The Dynamic System Development Method (DSDM) was used in this system because the stages in DSDM are comprehensive, clear, and easy to understand, making the system development process more organized and easier to carry out.

REFERENCES

Alexander, T., & Prasetyaningrum, E. (2023). Pengembangan Sistem Informasi Inventory Obat dan CRM Pada Apotek Sentosa Dan Klinik Pratama. *Jurnal Tekno Kompak*, *17*(1), 123–135.

Alhari, M. I., Febriyani, W., Jonson, W. T., & Fajrillah, A. A. N. (2021). Perancangan Smart Village Platform Aplikasi Edukatif untuk Pengentasan Stunting serta Monitoring Kesehatan Ibu Hamil. *Jurnal Ilmiah Teknologi Informasi Asia*, *15*(1), 51. https://doi.org/10.32815/jitika.v15i1.562

Aprilia, D. K., & Rodianto, R. (2023). Perancangan Sistem Informasi Manajemen Posyandu (SIMPADU) Untuk Meningkatkan Kualitas Layanan Posyandu. *Digital Transformation Technology*, *3*(2), 346–361. https://doi.org/10.47709/digitech.v3i2.2529

Balita, K., Hamil, I. B. U., & Lansia, D. A. N. (2021). *SISTEM INFORMASI POSYANDU PENDATAAN DESA KEPONGPONGAN*. *11*(1), 39–50.

Dewi Ayu Nur Wulandari, Muhammad Dika Atthariq, Wahyu Dwi Nanda, & Lestari Yusuf. (2021). Implementasi Dynamic System Development Method (Dsdm) Pada Sistem Informasi Manajemen Bengkel Mobil Berbasis Web. *JSiI (Jurnal Sistem Informasi)*, *8*(1), 10–17. https://doi.org/10.30656/jsii.v8i1.2979

Halawa, P. S., Cholifah, W. N., & Kuncoro, A. (2023). Perancangan Aplikasi Perkembangan Balita Berbasis Android. *Jurnal Riset Dan Aplikasi Mahasiswa Informatika (JRAMI)*, *4*(01), 120–126. https://doi.org/10.30998/jrami.v4i01.5073

Hanyfah, S., Fernandes, G. R., & Budiarso, I. (2022). Penerapan Metode Kualitatif Deskriptif Untuk Aplikasi Pengolahan Data Pelanggan Pada Car Wash. *Semnas Ristek (Seminar Nasional Riset Dan Inovasi Teknologi)*, *6*(1), 339–344. https://doi.org/10.30998/semnasristek.v6i1.5697

Ikhwan, A., & Aslami, N. (2020). Implementasi Data Mining untuk Manajemen Bantuan Sosial Menggunakan Algoritma K-Means. *Jurnal Teknologi Informasi*, *4*(2), 208–217. https://doi.org/10.36294/jurti.v4i2.2103

Maki, K., Sangkop, F. I., & Krisnanda, M. (2023). Pengembangan E-Learning Berbasis Web Di Sma Yadika Langowan. *JOINTER : Journal of Informatics Engineering*, *4*(02), 16–23. https://doi.org/10.53682/jointer.v4i02.87

Maryam, N., Setiawan, D., & Noratama Putri, R. (2022). Aplikasi Deteksi Dini Penyakit Tidak Menular Pada Lansia Dengan menggunakan metode Dynamic System Development Method (DSDM). *JEKIN - Jurnal Teknik Informatika*, *3*(1), 1–8. https://doi.org/10.58794/jekin.v3i1.219

Nurhayati, N., & Ifalahma, D. (2024). Sistem Informasi Tumbuh Kembang Balita Di Posyandu Menggunakan Model Prototype. *Journal of Information System Management (JOISM)*, *5*(2), 183–187. https://doi.org/10.24076/joism.2024v5i2.1390

Rad, M., Android, B., Triana, L., & Andryani, R. (2021). *Aplikasi Monitoring Data Imunisasi Berkala Untuk Meningkatkan Pelayanan Posyandu Menggunakan*. *10*, 106–112.

Siregar, M. R. S., Samsudin, & Putri, R. A. (2023). Sistem Informasi Geografis Dalam Monitoring Daerah Prioritas Penanganan Stunting Pada Anak Di Kota Medan. *Journal of Science and Social Research*, *6*(3), 643–648.

Suendri, S., Harahap, A. M., Nasution, A. B., & Kartika, S. (2022). Analisis Sistem Pendukung Keputusan Penentuan Lulusan Terbaik Menggunakan Lima Algoritma Pada Program Studi Sistem Informasi UIN Sumatera Utara Medan. *Al-Ulum: Jurnal Sains Dan Teknologi*, *7*(1), 38–43. https://doi.org/10.31602/ajst.v7i1.5839

Wahono, B. B. (2022). Model Aplikasi Stimulasi Deteksi dan Intervensi Dini Tumbuh Kembang Anak Berbasis Web. *Jutisi : Jurnal Ilmiah Teknik Informatika Dan Sistem Informasi*, *11*(3), 783–794. http://ojs.stmik-banjarbaru.ac.id/index.php/jutisi/article/view/991

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