DEVELOPMENT OF AN IOS-BASED BABY MEAL PLANNER APPLICATION

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Abstract. The Baby Meal Planner (BMP) application has been developed by the authors since 2020, and in 2022 BMP version 2.0 has been redeveloped. The BMP Version 2.0 application has been equipped with a cut-off point for the baby's nutritional status with the latest references, calculation of energy and nutrient needs for babies up to 24 months of age, calculation of food needs for MP-ASI up to 24 months of age, and is equipped with MP-ASI recipes for up to 24 months of age. Currently, the Android version of the BMP application has been used by more than 5,000 people, received a rating of 4.9, has 3 copyright certificates, has been published in SINTA-indexed journals, has been processed in international journal reviews, and has been reached to the public in community service activities. Along with the increase in smartphone users with the iPhone Operating System (IOS) operating system, the purpose of this research is to develop an IOS-based Baby Meal Planner Application. The research will be carried out for 8 months from April to December 2023, in collaboration with the Kebon Kalapa Village, Central Bogor District, Bogor City through the PKK and Posyandu as partners in the research. Research activities consist of a preparatory process in the form of discussion activities with partners, licensing, and preparation of proposals. Application development activities include developing application features, processing complementary food menus, and outreach to the community. The method used in application development is the Forward Chaining Method. The output of this study is the IOS-based Baby Meal Planner application, which can be downloaded from the App Store, with a level of technology readiness at level 7 (TKT 7).

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1 Introduction

Complementary Foods (MP ASI) are given after the baby reaches the age of 6 months to 24 months of age. Good practice of giving complementary Food will support optimal growth and development of the baby so as to produce quality human resources in the future [1]. Good nutrition knowledge must be possessed by mothers or caregivers in making complementary food. There is a relationship between knowledge and attitudes with the behavior of giving complementary foods [2]. According to [3], less than a quarter of children aged 6-23 months have received proper complementary feeding practices according to recommendations. Therefore we need a tool that is easy to use to help mothers or caregivers make MP ASI, one of which is in the form of a mobile application. The mobile application was chosen because now smartphones have become an easy and practical part of everyday life wherever you are [4].

Baby Meal Planner (BMP) is an IOS-based application that is used to assist mothers or caregivers in making complementary food menus. The BMP application is the result of a competitive grant research work by IPB Vocational School lecturers which was made in 2020 and redeveloped into BMP Version 2.0 in 2022. Currently, the BMP application can be downloaded by the public via Google Play store. This application has been used by more than 5,000 people, has a rating of 4.9, and has 3 copyright certificates, is published in SINTA indexed journals, is in review process in international journals, and has been socialized to the public in community service [5].

Along with the increase in smartphone users with the iPhone Operating System (IOS) operating system, it is also marked by an increase in downloads of various applications in the app store since 2020 and it is predicted that this will continue to increase until 2030. So that in this research an IOS-based Baby Meal Planner Application will be developed. This application is expected to be in line with SDGs 2, namely ending hunger and improving people's nutrition, as well as assisting the government in tackling the problem of stunting in Indonesia [6] [7] [8]. The application development will collaborate with the PKK and Posyandu Kebon Kalapa Village, Central Bogor District, Bogor City to be able to make applications that suit the needs of the community, especially mothers or baby caregivers in planning complementary food menus. The general objective of this research is to develop an IOS-based Baby Meal Planner application.

2 Materials and Methods

This study was conducted in April-December 2023 at The College of Vocational Studies Campus of IPB University, Bogor. Calculation of nutritional status in the application using the Z-Score Weight for Age, Height for Aged, and Weight for Height. The three nutritional status index values above are compare with the WHO Growth standard [9]. The baby’s Energy Requirements are calculated by the formula = [(89 x body weight (kg)) -100] + 22. The energy requirement that must be available from complemental foods is 40% of daily energy needs. Protein requirements are calculated at 12% of daily energy needs, fat requirements are calculated at 25% of daily energy needs, and carbohydrate requirements are calculated at 63% of daily
energy needs [10] [11]. Menu planning made by translating the amount of energy that must be available from complementary foods into food and menu items [12]. Energy and nutrient content is calculated by using Tabel Komposisi Pangan Indonesia (TKPI). The application development stage consists of requirement analysis, quick design, and build a prototype [13].

3 Result and Discussion

3.1 Requirement Analysis

Requirement analysis is the process of studying and analyzing the needs and goals of users. The purpose of needs analysis is to identify and define new boundaries. Functional requirements are functional behaviors that must be implemented by a system or system components [14]. Table 1 shows the functional requirement of developed system.

<table>
<thead>
<tr>
<th>No</th>
<th>Modules</th>
<th>Functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Splash Screen</td>
<td>The system must allow the user to see how the logo or application name will appear each time the application is started</td>
</tr>
<tr>
<td>2</td>
<td>Introductory page</td>
<td>the system should allow the user to view information on the benefits of the application</td>
</tr>
<tr>
<td>3</td>
<td>Baby Data</td>
<td>the system must allow the user to enter data on weight, height, gender, age and display the results in the form of nutritional status and energy and nutrient requirements</td>
</tr>
<tr>
<td>4</td>
<td>Complementary Food Recipe</td>
<td>the system must allow the user to see an example of the Complementary food menu for the age group 6-12 months and 13-24 months</td>
</tr>
<tr>
<td>5</td>
<td>Information</td>
<td>the system must enable the user to view information on the energy and nutritional requirements of the infant, the principles of feeding the infant, and the texture of the infant's food.</td>
</tr>
</tbody>
</table>

3.2 Use Case Diagram

Use case diagram are created in Unified Modeling Language language (UML). The UML is a common modeling tool for object-oriented approaches to visually describe the structure and behavior of the system [15]. Total use case in the figure are six use cases. Figure 1 shows the use case diagram for IOS Based Baby Meal Planner Application.
3.3 Activity Diagram

The system design of IOS Based Baby Meal Planner Application was illustrated by using an activity diagram. Activity diagram will explain and identify the flow operation of the system. Figure 2 show the activity diagram of IOS Based Baby Meal Planner Application.

3.4 Build a Prototype

The prototype was designed based on information from quick design. Microsoft Excel, Ipad, and Iphone are the tools used to build the prototype and Flutter is the software used to build the prototype. When this application is run, the first page that will appear is the splash layout as shown in Figure 3, this page will appear for approximately 2 seconds.

Fig. 1 the use case diagram for IOS Based Baby Meal Planner Application
After that, it will automatically go to the introductory page as in Figure 4. The introductory page contains a brief explanation of the Baby Meal Planner application, how to use it, and an overview of the contents of the application. This page can be read one by one by the user or you can press the skip button to go directly to the home page. The home page display consists of the BMP logo image as well as the main button consisting of the Baby Data button, the MP ASI Recipe button, and the Information Button as in Figure 5. When pressing the baby data button, the user can enter the baby's weight (kg), height (cm), age (month), and sex as shown in Figure 5. This is a way of determining the nutritional status of baby anthropometrically with a z score. After filling in the baby data and pressing the send button, the baby's nutritional status will appear based on the z-score and energy and nutritional needs. Nutritional status was assessed from 3 z-score indices, namely weight for Age, Height for Age, and Weight for Heigh [15]. Weight for age describes body mass relative to chronological age. Weight for age is used to assess current nutritional status. Height for Age is used to measure linear growth which can be used to assess past nutritional status. Weight for Height is used to measure body weight relative to height. Weight for Height is used to measure linear growth which can be used to assess
current nutritional [16]. Energy that must be available from complementary food is 40% with a contribution of carbohydrates of 63%, protein 12%, and fat 25% [17]. If the user returns to the main page and presses the information button, information related to MP-ASI will appear in this application as shown in Figure 6. If the user returns to the main page and then presses the complementari food Recipe button, the Main Food Recipe and Side Food Recipes for babies aged 6-12 months and 13-24 months will appear as shown in Figure 7. Figure 3 - Figure 7 shows the interface of the system.
Figure 5. Baby Data Entry
3.5 User Evaluation

Evaluation of the application by the user is carried out to find out whether this application meets the user's needs. It is used to validate the output of a software application by giving adequate input and comparing it to the functional requirement. Table 2 shows the user evaluation.

### Table 2. The user evaluation

<table>
<thead>
<tr>
<th>Module</th>
<th>Functionality</th>
<th>Expected Outcome</th>
<th>Actual Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Splash Screen</td>
<td>The system must allow the user to see how the logo or application name will appear each time the application is started</td>
<td>user successfully see how the logo or application name will appear each time the application is started</td>
<td>As expected</td>
</tr>
<tr>
<td>Introductory page</td>
<td>the system should allow the user to view information on the benefits of the application</td>
<td>user successfully view information on the benefits of the application</td>
<td>As expected</td>
</tr>
<tr>
<td>Baby Data</td>
<td>the system must allow the user to enter data on weight, height, gender, age and see the results in the</td>
<td>user successfully enter data on weight, height, gender, age and see the results in the</td>
<td>As expected</td>
</tr>
</tbody>
</table>
display the results in the form of nutritional status and energy and nutrient requirements | form of nutritional status and energy and nutrient requirements

| Complementary Food Recipe | the system must allow the user to see an example of the Complementary food menu for the age group 6-12 months and 13-24 months | user successfully see an example of the Complementary food menu for the age group 6-12 months and 13-24 months | As expected

| Information | the system must enable the user to view information on the energy and nutritional requirements of the infant, the principles of feeding the infant, and the texture of the infant's food. | user successfully view information on the energy and nutritional requirements of the infant, the principles of feeding the infant, and the texture of the infant's food. | As expected

4 Conclusion

The Baby Meal Planner which is an IOS-based application to help mothers in fulfilling nutrition for babies aged 6-24 months as an effort to overcome stunting problems in Indonesia. This application can be used for early detection of the nutritional status of infants aged 6-12 months, determining the energy needs of macro nutrients, determining the energy needs that must be available from complementary food, Determining the amount of food ingredients a day used to make complementary food, examples of menu recipes, as well as information related to complementary food.

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References

1–13 (2019)
5. A. Rizkiriani, R. Dianah, and A. Kartinawati, 5, pp. 1–6 (2023)
7. Z. A. Bhutta *et al.*, 112, pp. 894–904 (2020)
11. A. N. Afifah, S. Marawanti, and Agustono, pp. 0–6