Article

Digital Marketing Prototype of Electronic Growth Chart (e-KMS)

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Abstract: Currently, Indonesia is facing serious Multiple Nutritional Problems (MGG) with 30.8% stunting and 35.4% obesity rates. The Healthy Growth Card (KMS) serves as an instrument for growth monitoring, particularly related to nutritional status. Growth disturbances, such as malnutrition due to both nutritional deficiencies and excesses, can be detected early by plotting weight on the KMS. Websites are a form of internet marketing and an effective part of digital marketing for disseminating information and promoting products. This research aims to create a prototype for digital marketing electronic Growth Chart (e-KMS). The research employs the software system development method using the Prototype model. The prototype is designed using UML (Unified Modeling Language) and case tools. The digital marketing prototype is a website-based platform with capabilities for promoting and registering online at the Politeknik Negeri Jember (Polije) Daycare, as well as serving as a Communication Information and Education (CIE) medium for assessing and monitoring the nutritional status of children in the form of e-KMS. Program coding is needed to make the prototype usable as a digital marketing tool for e-KMS, enabling the monitoring of children's growth to be implemented in childcare institutions.

Keywords: digital marketing, e-KMS, electronic growth chart, malnutrition, screening

1. Introduction

Malnutrition is a manifestation of incorrect nutrition, namely in the form of undernutrition and overnutrition [1]. According to the World Health Organization (WHO), malnutrition encompasses various nutritional conditions, including undernutrition (underweight, wasting, stunting), imbalanced nutrition (deficiency and excess of micronutrients, vitamins, and minerals), and obesity [2]. Based on the Levels and Trend in Child Malnutrition report in 2020, it is known that 5.7% or 38.9 million toddlers experience overweight, 22% or 149.2 million toddlers experience stunting, and 6.7% or 45.4 million toddlers experience wasting[2]. These conditions depict the presence of a double burden of malnutrition. Almost all provinces in Indonesia face issues of both stunting and obesity, with stunting prevalence ranging from 17.6% to 42.7% and obesity prevalence from 19.1% to 46.5%. According to the criteria for the dual nutrition problem (stunting in toddlers 30% and obesity 30%), Indonesia is currently in a serious state of Multiple Nutritional Problems (MGG) with 30.8% stunting and 35.4% obesity [3].

The Healthy Growth Card (KMS) serves as an instrument for growth monitoring, especially related to nutritional status. Growth disturbances in the form of malnutrition, whether due to nutritional deficiencies or excesses, can be detected early by plotting

weight on the KMS. This allows for preventive measures before more severe nutritional problems occur [4]. Daycare Polije has been equipped with information to prevent malnutrition, including assessments of toddlers' nutritional status, malnutrition screening applications, anthropometric instruments, and the processing of nutritious food. However, the growth monitoring instrument used is still manual, in the form of printed KMS [5]. Additionally, according to information from the Daycare Polije management, there is no Information, Education, and Communication (IEC) media to promote to the wider community that Polije has a technology-based Daycare that supports efforts to reduce stunting through e-KMS. Promotion is an activity carried out by an individual to increase the visibility of a service, product, brand, or company to the general public (Gramedia, n.d.). In the health sector, there is health promotion aimed at providing information to the public for the improvement of health quality, both individual and community health [6], [7].

The rapid development of technology and information media encourages the use of digital media as the most modern promotional tool to introduce products or services. The improvement to the proposed research is the design of a system that can automatically visualize the growth chart records of children based on age, weight, and gender. The chart will appear automatically with data points corresponding to the input and processed based on nutritional anthropometry. Thus, it can aid in digital marketing in the health sector by providing education on the development of nutritional status in infants/toddlers. Additionally, it can be utilized for prominent visibility in promoting DWP Polije daycare, ensuring it becomes well-known in the community. Digital promotions can be carried out through various means such as websites, social media, search engines, applications, emails, etc [7], [8]. A website is a form of internet marketing, part of digital marketing that is effective for disseminating information and promoting products [9]. Given this background, a website is needed as digital marketing for Daycare Polije and is also beneficial for IEC related to e-KMS as a malnutrition screening tool. Research by Romzah et al. (2021) shows that electronically created KMS can facilitate cadres in determining the nutritional status of toddlers based on Indonesian child anthropometric standards [10]. This study aims to create a website prototype that can be used as digital marketing for Daycare Polije and has the ability to screen malnutrition through e-KMS. The prototype method is an approach that develops applications by providing an example of a design to potential users and obtaining prototype evaluations before syntax writing is performed [11].

2. Materials and Methods

Researcher implemented the prototype model as a software development method in the design of e-KMS (Figure 1). The prototype method is an approach that develops applications by providing an example of a design to potential users and obtaining prototype evaluations before being translated into a programming language. The advantages of the method used align with previous research; in its application, prospective users actively participate in the application creation process [11]. As a result, the processes can quickly adapt to user preferences and be revised according to the principles of technical expertise to obtain economical, reliable, and efficient software [12]

In the prototype model, there are three stages typically undertaken by designers [11]First, Listening to User Needs: Understanding the necessary requirements for the system to be created by engaging in processes such as interviews, observations, and direct documentation with users. The author conducted these processes to align with the issues identified in the research location. The outcome of this stage produces detailed functional and non-functional requirements. Second, Building Design or Mock-Up: After analyzing the requirements for the e-KMS to be developed, the identified needs are translated into models used in this design, including activity diagrams, use case diagrams, class diagrams, and database relationships. Third, Testing Mock-Up: This stage is the final step

in the prototype model, aiming to gather feedback and suggestions related to the created design. If there are corrections or updates needed, the process is carried out in sequence, and revisions and checks are performed starting from the first process, the second, and so on.

The research was conducted from July to October 2023 at Daycare Polije for Listening to User Needs, Building Designs or Mock-Up, and Testing Mock-Up. The research subjects were the managers of Daycare Polije, while the research object was the creation of the e-KMS digital marketing prototype. The Listening to User needs stage was carried out through interviews with the managers of Daycare Polije to determine the functional and non-functional needs of the e-KMS digital marketing prototype.
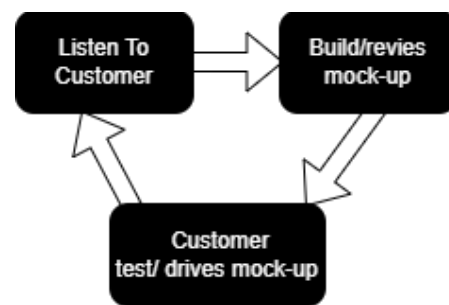

Figure 1. Prototype Implementation Method

3. Results and Discussion

This research utilizes the Prototype method, consisting of stages such as listening to user needs, building designs or mock-ups, and Testing Mock-ups.

3.1 Listening to User Needs Stage

Observations during the implementation of community service in 2022 revealed that the Daycare Polije lacked tools for monitoring the nutritional status of children. The nutritional status monitoring tools commonly used in Indonesia, implemented in Posyandu, include the Healthy Growth Card (KMS). Interviews with the management indicated that Daycare Polije needed digital promotional media and online registration. Based on the analysis of these needs, functional and non-functional requirements for the Daycare Polije website were identified as follows. The use case diagrams can be seen in figures 2 and 3 (Functional Requirements).:

3.1.1   Functional Requirements, among others
3.1.1.1 Users can view information on the homepage, profile of Daycare Polije, health information, gallery, audio and video health promotions, and health guidelines.
3.1.1.2 Users can enter and submit student registration data.
3.1.1.3 Users can play and download audio-video health promotions.
3.1.1.4 Users can view and download health guidelines and manuals.
3.1.1.5 Users can input and submit data such as gender, date of birth, weight, and height of the child.
3.1.1.6 Users can view the nutritional status of children based on indicators such as weight-for-age, height-for-age, and weight-for-height.
3.1.1.7 Users can view and save e-KMS graphs to monitor the nutritional status of children.

3.1.2   Non-functional Requirements

    3.1.2.1 Operational: Use PHP Server system; Database management using MySQL; Access the Daycare Polije website through a browser; Accessible via various devices such as laptops and smartphones; Requires an internet connection.

    3.1.2.2 Security: Administrator security system uses MD5-encrypted passwords to access the admin page.

    3.1.2.3 Information: Alerts for incorrect username and password input when logging into the administrator page; Pop-ups appear upon success or failure in adding, editing, and deleting module data.

    3.1.2.4 Performance: Quick loading time for the website; No errors in the process of adding, editing, and deleting data on the Daycare Polije website; No errors in the user general registration data input process on the website; No errors in displaying data on the landing page, consistent with the admin page input.

3.2   Building Designs or Mock-up Stage

Users of e-KMS can perform activities without having to go through the login process by accessing the system online. Users can directly check the nutritional status of their infants or toddlers from the age of 0-60 months (Figure 2). Users can enter profile data, including name, date of birth, gender, and first check the height and weight data of their baby or toddler. The results will appear as information related to the nutritional status and e-KMS graphs according to their nutritional status. The use case diagram has been adjusted to user needs, reinforced by previous research that explained in creating a use case diagram, researchers had to adjust to existing needs. Use cases help explain users accessing the system that will be used [14]. Before creating a system prototype, a business process flow design is needed for each user to be able to use the e-KMS system [12] [15]. The results of the e-KMS can provide education to users on how to interpret growth chart records measured based on age, weight, and gender. This enables users to monitor and evaluate the nutritional status development of children (Figure 2).
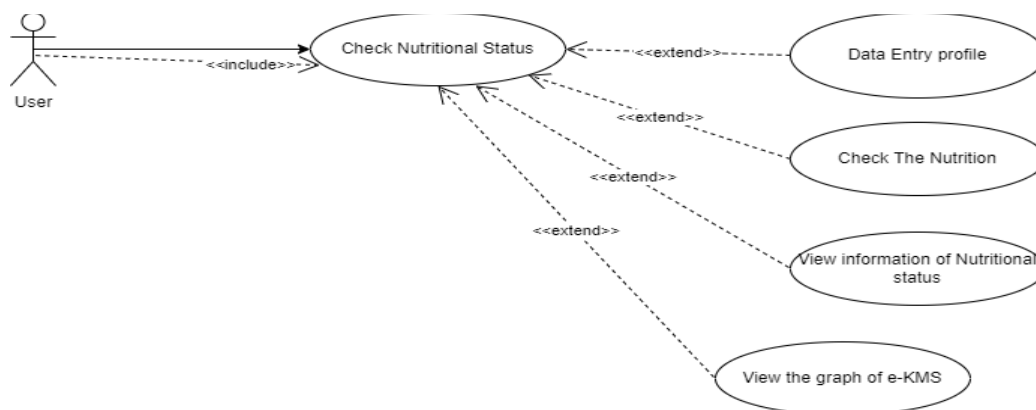

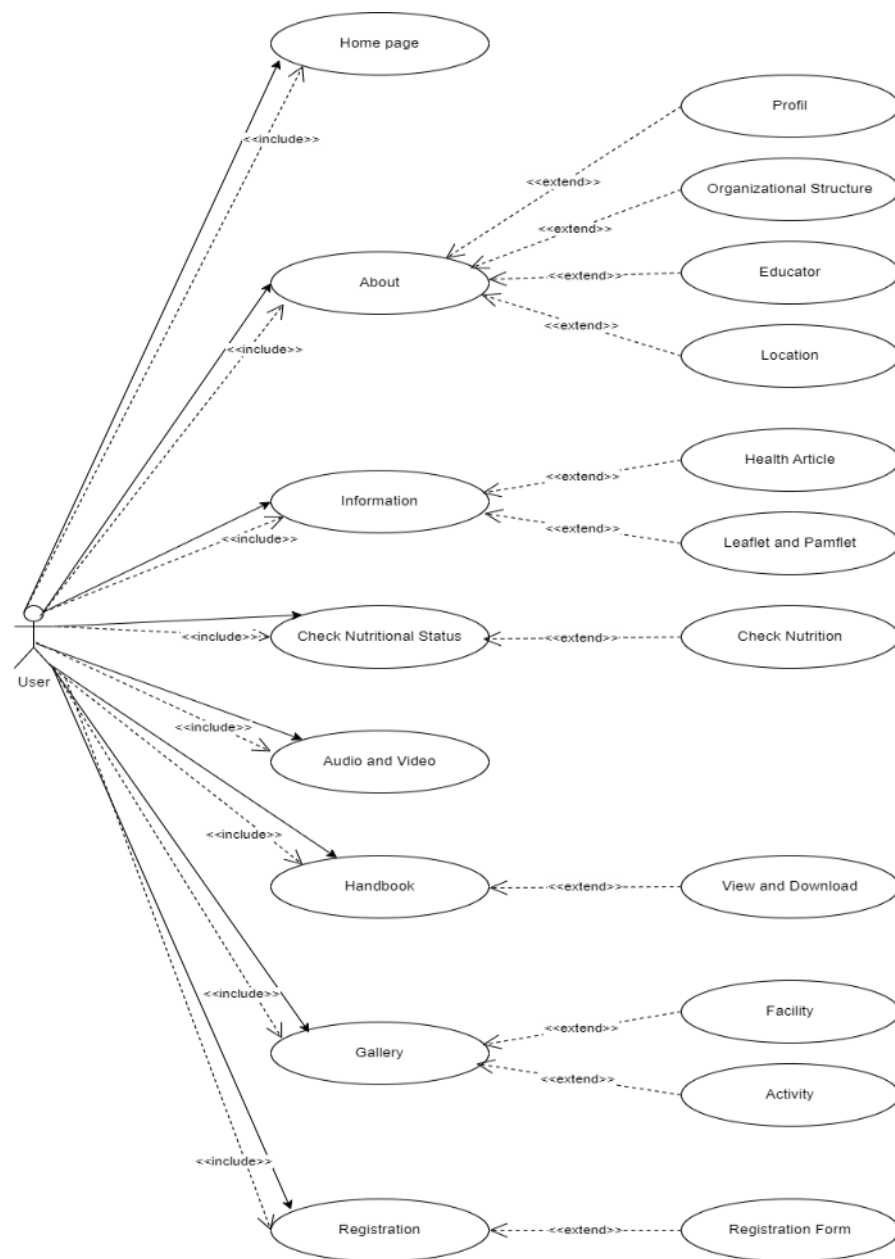**Figure 2.** Use Case Diagram User of e-KMS

Figure 3. Use case diagram of User

Following the analysis of user needs, the researcher created a prototype website for Daycare Polije as digital marketing and with the capability of malnutrition screening using e-KMS. The prototype development utilized the Unified Modeling Language (UML) and case tools. The use case diagram for the prototype website can be seen in Figure 3.

A user use case diagram was created to facilitate the interaction process between interfaces and identify users who can access it [13]. Data users engage in activities without the need for a login process by accessing the system online. The creation of the use case diagram has been adjusted based on user needs analysis. There are 8 main pages that can be directly accessed by website visitors (Figure 3). Visitors need to access these 8 main pages before accessing the additional 11 menus from each main page. Additional pages can stand alone as they do not require data entry processes such as usernames and passwords.
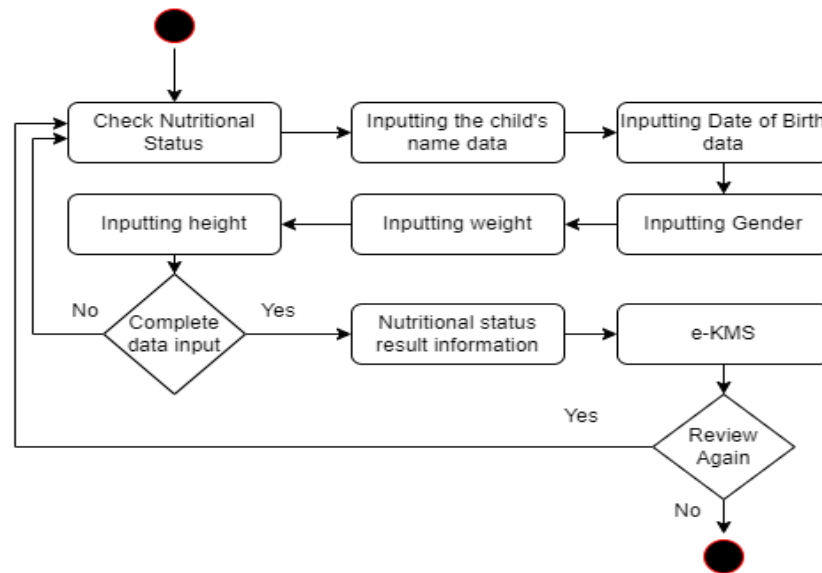
Figure 4. Activity Diagram of e-KMS

The activity diagram was created according to user needs, modeling the processes that occur in a system. The sequence of processes in a system is depicted vertically. Each process from each user will be sequentially written, detailing each stage of the activities performed [12]. The e-KMS activity diagram (Figure 4) begins with the user clicking on the "Check Nutritional Status" menu, then entering personal data such as the child's name, date of birth, gender, weight, and height. Ensure that the data is input correctly; if not, the system will return to the data input page to recheck and complete the inaccurate data. If the data is complete, the nutritional status calculation results will appear, displaying the input data and the nutritional status based on age, gender, weight, and height. The e-KMS graph will also be displayed according to the calculation results, categorized based on weight for age, height for age, and weight for height. If the user wants to check again, they can return to the nutritional status check page.

3.3   Testing Mock-Up Stage

The mock-up that the researcher has constructed is then transformed into a prototype so that users can visualize the design of the website to be developed. The homepage view of the website is presented in Figure 5. The designed prototype website includes a homepage, profile of Daycare Polije, Health Information, nutrition status check, audio and video health promotions, health guidelines, gallery, and online registration. The designed website pages align with user needs, as they can be utilized for digital marketing and online registration for Daycare Polije.

Figure 5. Website Homepage TPA Daycare Polije

The prototype website of Daycare Polije has an advantage for checking the nutritional status of children (Figure 6). The page for checking the nutritional status of children is open access, allowing users (daycare caregivers, parents, and the general public) to access it without the need to log in first. Users only need to input child data such as gender, date of birth, weight, and height. Based on this data, the system will categorize the nutritional status of the child according to indicators such as weight-for-age (BB/U), height-for-age (TB/U), and weight-for-height (BB/TB) (Figure 7).

Figure 6. Web page for check nutritional status

According Figure 7 represents the nutritional status results of the child according to their age and gender. On the page displaying the nutritional status results, information about the ideal weight and height according to the child's age and gender will be provided (Figure 7). The classification of the child's nutritional status in this built prototype is based on the anthropometric standards of Indonesian children [6]

Figure 7. Web page for result of nutritional status

The nutritional status results for Figure 7 are then presented in the form of a growth chart based on BB/U, TB/U, and BB/TB, as shown in Figure 8. This electronic growth chart is designed to facilitate users in monitoring the nutritional status of children. The determination of points on the graph is based on the anthropometric standards for assessing the nutritional status of children [6]Nutritional status categorized as normal is represented by dark green and light green colors, while malnutrition is indicated by yellow and below the red line.

Figure 8. Web page for electronic Growth chart (e-KMS)

Testing of the nutritional status assessment and e-KMS prototype was conducted at Daycare Polije. The test results were then used to improve the mock-up prototype. Based on the test results, the areas that needed improvement included adding information to the nutritional status check about "Info: Data entry must be in accordance with the age. Ensure that the child's data is measured correctly and accurately! All columns must be filled in," as seen in Figure 6. Additionally, there were improvements to the graph, which initially was represented by lines. It was later improved by adding distinguishing colors such as dark green, light green, yellow, and a red line (Figure 8).

4. Conclusion

The digital marketing prototype is designed to assist in promoting and facilitating online registration for Daycare Polije. The prototype has been created with health information features that can be utilized for medical communication, information, and education (KIE) related to child health. The advantage of the prototype lies in the e-KMS, which can be used to assess and monitor the nutritional status of children. For future research, the prototype can be implemented using website-based programming languages.

5. Patents

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