



IMPLEMENTATION MODEL PROTOTYPING IN APPLICATION DESIGN OF HALAL FOOD PRODUCT DETECTION FOR OVERSEAS MUSLIM STUDENTS

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ABSTRACT

In the age of globalization, the production and trading of food have become more widespread, and consumers, particularly those who follow the Islamic faith, require access to information about the halal status of the products they consume. It is crucial to provide accurate and relevant information to them regarding the halal nature of the products they buy. To cater to this need, many people are using barcode scanners via mobile platforms to obtain product information. These barcode scanners use optical scanners called code readers, and they are popular as they provide a quick and efficient way of obtaining information. Creating a barcode application using the prototyping method is an effective solution that involves several steps, such as gathering and analyzing requirements, rapid design, building a prototype, user evaluation, and refining the prototype. The programming language Kotlin is used to create these applications, which support building Android applications on the Java Virtual Machine Platform (JVM). The use of Kotlin, which is statically expressed and executed, makes the process of developing these applications efficient and straightforward. In summary, developing a barcode application using the prototyping method and Kotlin is an excellent solution to provide consumers with accurate and accessible information about the halal status of food products they consume.

Keywords: Halal, Barcode, Kotlin, Prototyping, Android.

1. INTRODUCTION

In the era of globalization and all human activities, information is always needed quickly so that it can be used or consumed, one of which is food information. Especially Muslims need information quickly to find out whether the product to be consumed is halal or not. There are several ways to find out whether the product to be consumed can be consumed or not by searching for information on the internet; it's just that not all products are clearly explained, so an application is needed as a tool to find out the product quickly.

Many systems are used to make it easier for humans; it's just that they need a system that suits their needs, one of which is a system for checking halal or non-halal goods to make it easier for Muslims to know whether the products they are consuming are halal or haram according to their beliefs. Making a system requires an algorithm or method as well as work steps and solutions according to its function. Therefore, the researcher provides a prototype method solution for making a halal product barcode system using an Android mobile.

Making a system requires an algorithm or method as well as work steps and solutions according to its function. Therefore, the researcher provides a prototype method solution for making a halal product barcode system using an Android mobile. Several previous studies have used prototyping methods as a solution to get maximum results. Reactor for modeling and rapid prototyping of OPF formulations for integrated transmission and distribution and high-efficiency UV LED reactor design and optimization using power models ITD, as demonstrated by researchers (Montazeri & Taghipour, 2023), was performed outside. Prototyping through 3D printing technology can accelerate the process of developing innovative food products. 3DFP can be used as a key prototyping tool to enhance and accelerate the production of food products with economic, nutritional, toxicological, social, and environmental benefits. (Derossi et al., 2023).

2. THEORY

2.1 Prototyping Model

A prototyping model is a software development methodology that allows developers to create software prototypes that can be tested and evaluated by users and stakeholders before the final product is created. Below are the stages or steps of the prototyping model (He et al., 2023). Through phases consisting of design, material preparation, prototyping, testing, evaluation, and improvement (Kasani et al., 2023). Prototyping models are designed to accelerate product development, allowing developers to make changes and improvements to the product before the final product is manufactured. In this article, the prototyping model is described, which allows developers to refine the design and test the functionality of an origami-based rigid folding parabolic reflector before the final product is manufactured (T. Wang & Santer, 2023).

2.2 Kotlin

Kotlin is the programming language used when creating applications in the prototyping model of the previous article. Kotlin is a modern programming language that runs on the Java Virtual Machine (JVM) and is used specifically for building Android applications. This programming language enables developers to write shorter, clearer, and easier-to-understand program code, speeding up the application development process (Martín de la Iglesia, 2023). Function in prototype refers to the purpose of creating a physical prototype, which is to test the characteristics, functionality, and reliability of the product being developed. These prototypes can be used to test how well the product is designed, perform component testing, and assess product reliability in a variety of situations. Prototyping models allow developers to gather feedback and improve the product before producing the final product, reducing the risk of errors and improving the quality of the product produced.

Java is the core programming language for Android development. Kotlin can now be used to develop applications on various platforms such as iOS (Bin Uzayr, 2022). Kotlin works to develop applications for Android smoothly and effectively. Additionally, Kotlin is also a cross-platform programming language that can be used to develop applications on various operating systems, both iOS and web-based (Thai, 2022). Using Kotlin when testing black box methods has several advantages: ease of learning, zero security features, support for writing short code,



ability to integrate with the Java programming language, and support from a large community. has the advantage (Pratama et al., 2023).

2.3 Firebase

Firebase is Google's cloud-based application development platform. The platform provides various services and infrastructure that enable developers to efficiently build, manage, and deploy applications. (Späth, 2022). Firebase has many features, including: authentication, real-time database, real-time database, real-time database, cloud functions, hosting, analytics, cloud messaging (Peter et al., 2022).

2.4 Blackbox

The Halal barcode black box method is a system testing method that regards the system as a black box and tests the functionality of the system from the user's point of view without worrying about the details and internal structure of the system. This method is used to verify that the system can perform its intended function correctly (Pradana, 2020). In the field of halal barcodes, black boxes are systems that check the halalness of food products by reading the barcodes on product packages. This system is also known as a "halal scanner" or "halal verifier".

Blackbox works in the Halal barcode area as follows:

1. Affixing the halal label:

Food manufacturers or distributors must put a halal label on their product packaging. A halal label contains a code or number that identifies the food as halal.

2. Read the halal label:

A halal scanner reads halal labels on food packages by scanning the barcode on the label, halal code.

3. Matching:

After the halal scanner reads the barcode of the halal label, the system compares the code or number contained in the barcode with the previously stored halal code database. If the code or number matches a halal code in our database, the product is considered halal.

4. Indicate halal status:

After matching the halal code, the system will provide the halal status of the product. If the product is considered halal, the halal scanner will show the 'Halal' status on the screen. However, if the product is not considered halal, the halal scanner will show a non-halal or questionable status. Halal barcode field black box allows the system to automatically and accurately verify the halal nature of food, thus reducing errors in manual verification of halal food.

3. METHOD

3.1. Step by Step Model Prototype

The research using the prototyping method with used data kuliitatif. Where prototyping delivers facilities for developers and users to interact with each other during the process manufacture, so development can easily model software to be created. Figure 1 shows the prototyping method process.

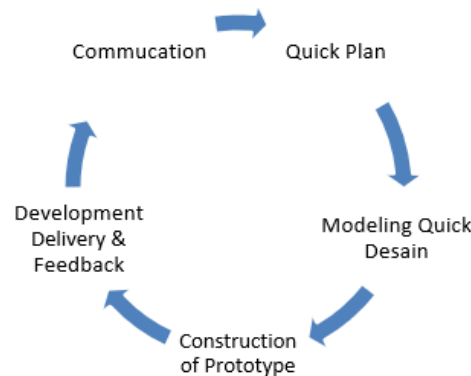


Figure 1. Model Prototyping.

Based on the prototype model above, we can describe each stage of the model as follows:

1. Communication. At this stage, the developer and the customer communicate about the purpose of creating the software and make sure that their needs are understood (B. Wang et al., 2023).
2. Plan fast. During this phase, there are iterations to create a fast-running prototype. Next, we carry out modeling in the form of "Rapid Design" (He et al., 2023).
3. Modeling In rapid design, design modeling is performed using previously structured modeling in the form of data flow diagrams, entity relationship diagrams, and flowcharts to describe the system analysis and design (Noferi et al., 2023).
4. Prototype. During this phase, a simple design is created based on a representation of the aspects of the software that will be presented to the end user. A quick sketch is the basis for starting building a prototype (He et al., 2023).
5. Implementation and Feedback: Feedback on prototype development is provided during this phase. Feedback is shared with stakeholders to evaluate previous prototypes and provide feedback that is used to improve the requirements specification. Iterations occur as developers make improvements to the prototype. This research only went as far as prototyping in Rapid Design based presentation of aspects of the software to the end user (Aman et al., 2023).

3.2 Research Stage

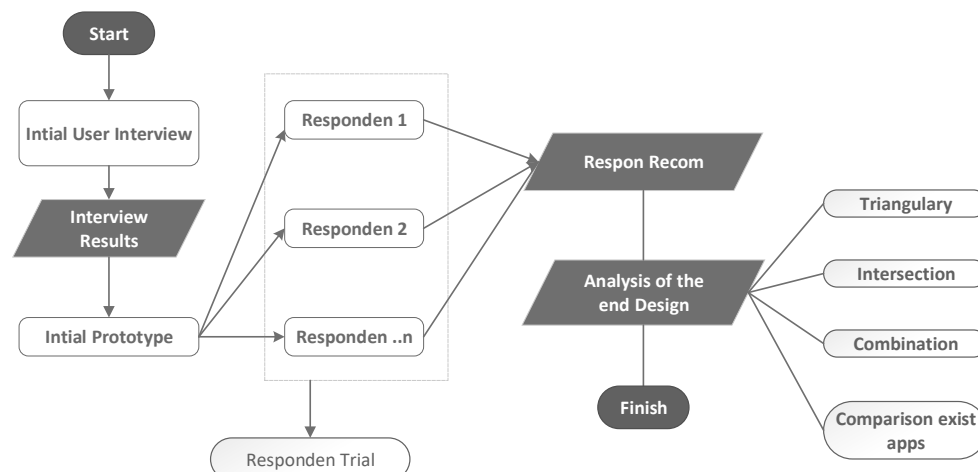


Figure 2. Research Stage.

3.3. Research Design



Figure 3. Buyer Side Design.



Figure 4. Volunter Side Design.

This table 1 provides an overview of the application status in a system.

Table 1. Status on Apps

Status	Logo	Description
Recommended	Halal volunteer recommended 2022	Data recommended by volunteers but not checked admin
Verified by admin	Halal verified 2022	Data input by volunteers has been checked by admins as a truth reinforcement of information
Data Expired	Halal expired 2019	Data has expired and there has been no updated data from volunteers or admins.
Not registered	not registered	Data has never been entered into the system. It is not known if it is halal.

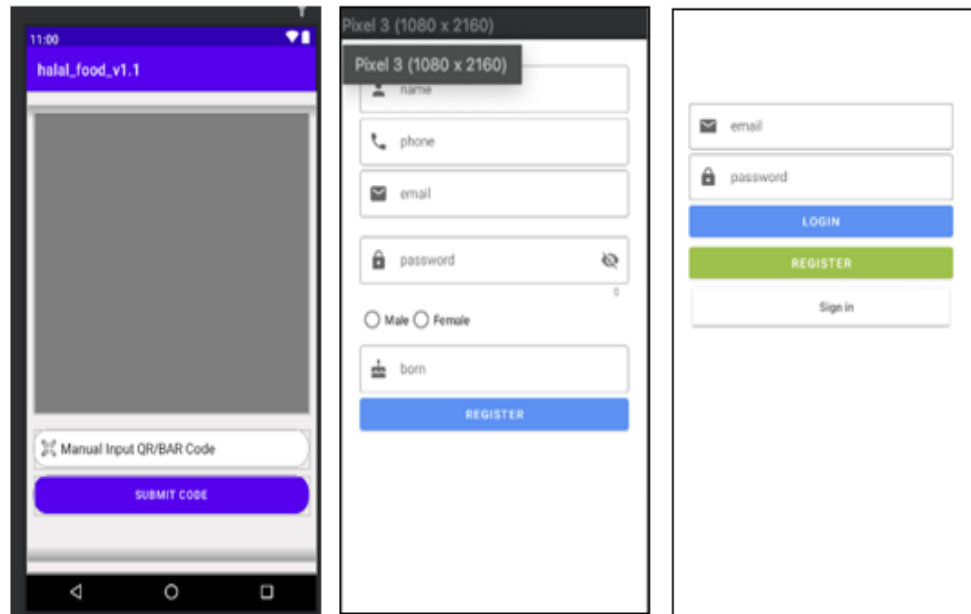


Figure. 5. Shopper Implementation Section.

4. RESULTS AND DISCUSSION

This research proposes a prototype model using the Kotlin programming language to develop a barcode application for halal food product detection. The focus is on providing accurate and accessible information to overseas Muslim students about the halal status of food products. The research design involves stages such as communication, planning, modeling, prototyping, implementation, and feedback, allowing for iterative development and continuous user input. The buyer side design enables users to scan barcodes and quickly check product halal status, while the volunteer side design allows users to contribute and verify information. The successful implementation of the prototype application demonstrates its effectiveness in addressing the need for reliable and easily accessible halal food product information. Future research could explore enhancements like ingredient analysis integration and collaboration with other techniques to further improve the application.

5. CONCLUSIONS AND SUGGESTIONS

In the future, barcodes will be developed to identify product ingredients that are prohibited for consumption because they cause or may cause chronic disease, and collaboration and other hybrid techniques will be used to maximize We plan to achieve results.

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