Progressive Web Application (PWA) Based E-commerce Design (Case Study: Dewo Home Industry in Jombang Regency)

Erlina Novita Putri[1*], *Siti Aminah*[2], *Arif Tirtana*[3]

[1] *Sekolah Tinggi Informatika & Komputer Indonesia, Jl. Raya Tidar No.100, Indonesia*
[2] *Sekolah Tinggi Informatika & Komputer Indonesia, Jl. Raya Tidar No.100, Indonesia*
[3] *Sekolah Tinggi Informatika & Komputer Indonesia, Jl. Raya Tidar No.100, Indonesia*

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Correspondence Email:
181116002@mhs.stiki.ac.id

Abstract

Current technological advances cannot be separated from the existence of e-commerce, where product buying and selling transactions are carried out online via electronic means. Dewo home industry is a home industry that sells snack products, instant herbs and traditional drinks. In the system that is currently running there are several problems including the first in terms of promotion, because the owner is required to promote his products to supermarkets and also souvenir centers. The second problem is the recapitulation of transaction data which is not carried out routinely, then there is no arrangement or notification of product stock information, and there is also no forum for giving feedback from buyers after making transactions. From these problems, a PWA-based website application was designed which will be of added value to the application, because users can get experience operating a mobile application simultaneously, even without an installation process and can be used even if the network is unstable even in offline mode.

1. Introduction

E-Commerce is a process of buying and selling transactions that are actually carried out online via electronic means. According to Laudon & Laudon, e-commerce is a business to business (B2B) transaction that occurs via the Internet(Hermawan et al. 2022). In Jombang Regency there is a Home Industry called Dewo, this industry sells food and beverage products such as instant herbal medicine, traditional drinks, snacks. So far, the sales, promotion and transaction data recapitulation processes have been carried out manually. So several problems arise from this condition, namely stock management that is not yet effective, product promotion is not optimal, data recapitulation is not carried out routinely, and so on. Therefore, to address these problems, an e-commerce was designed which is useful in increasing product sales and possibly speeding up existing business process operations (Tirtana et al. 2020).

Based on previous research, we have developed an application for implementing Progressive Web Application (PWA) in e-commerce. The system that will be created by researchers has advantages compared to previous research, namely that the application can be used on all pages in offline mode, namely without an internet network (Nurwanto 2019). Meanwhile, in previous research, offline mode could only be applied to one page.

Currently, there are many similar studies and raise the same topic, one of which is research conducted by Penny Hendriyati, but the application developed on the product details page does not include the remaining stock of the product itself, and there is no feedback from buyers to sellers at this time. after making a transaction (Hendriyati and Yusta 2021).

Therefore, the application developed for this research has additional features, namely feedback from the buyer to the seller after the goods are received and adding product remaining stock information on the product detail page so that buyers know the latest stock information for the related product. Researchers use Progressive Web Application (PWA) technology, this technology is useful for increasing conversions, and this technology offers the advantages of not requiring installation, can be used when the network is unstable or even offline, requires little storage space, and saves energy and costs (Al Hamid, Nuryasin, and Sari 2022).

1.1 Literature Review

In a scientific journal entitled "E-Commerce Application Design to Increase MSME Income". In the field of information systems, research results show that the current development of information technology leads to increasingly tight competition between industries. This competition has an impact on the development of the micro, small and medium enterprise (MSME) sector. MSME players often do not realize the importance of information technology, in this case the online trading system (e-commerce) which functions to increase product sales and possibly speed up existing business process operations. In particular, MSMEs in the Malang Regional Cooperative and Micro Business Bureau are prohibited from selling themselves without using IT support. This has an impact on the products being sold which are not widely known to the public so that MSME income tends to be low. Therefore, in this research we tried to design an e-commerce application which aims to increase the income of MSMEs, especially in the Malang Regency Cooperatives and Micro Enterprises Service (Tirtana et al. 2020).

In a journal entitled "Implementation of E-Commerce Applications for Home Industry Empowerment". This study answers that the role of technology, in this case the internet, is very important as an information and marketing medium for introducing or promoting product sales online. Designing e-commerce applications with system requirements interface specifications which include visitor, customer or member pages and admin pages, offers several benefits including easy access to updated product information, buyers can immediately buy the desired product in real time without having to go to the store just by accessing a website from anywhere at any time via the internet, can human error be reduced thereby increasing the efficiency and effectiveness of the sales management process. This web design can be further developed by updating the interface and information so that website users can more easily get information about the products being sold, as well as adding other design methods for further research (Hermaliani, Fatimah, and Qomariyyah 2020)

In a journal entitled "Application of Progressive Web Application (PWA) in E-Commerce". It was concluded that by implementing web application manifests in PWA, users can run e-commerce applications like native applications can be run by clicking on the icon on the smartphone home screen. E-commerce can also be accessed on various platforms using desktop and mobile browsers in an offline state with the insertion of a service worker, so users can access commerce.e-commerce without the internet. However, not all pages or features can be accessed offline. Tested against the Basic Progressive Web App Checklist, the eCommerce PWA quality score was quite good at 93.75 out of 100, the maximum score. Of the 16 test criteria, 15 of them can be implemented in e-commerce. In this research, there is a limitation, namely that the PWA application for offline mode can only be applied to one site so that the application can work when there is no internet network but its accessibility is very limited(Nurwanto 2019).

A research "Implementation of progressive web applications for e-commerce applications as a solution for improving the performance of web-based applications". The results of the research carried out are that by implementing PWA in e-commerce, users can run e-commerce applications like native applications which can be run by clicking the icon on the cellphone home screen. Testing was done based on the Basic Progressive Web App checklist, the eCommerce PWA quality score was quite good at 93.75 out of 100, the maximum score. Of

the 16 test criteria, 15 of them can be implemented in e-commerce, and the results of the questionnaire test show that PWA adoption is going well(Amrullah, Salim, and Manga 2021).

Research in a journal entitled "Website Design as a Promotion and Sales Media in the Abon Home Industry". Marketing activities carried out by the Lestari Jaya Pangan abon home industry are currently still not well managed. Sales are still carried out conventionally by offering them to shops and supermarkets as well as through intermediaries so that sales of shredded products are still limited to the Malang area. To overcome this problem, a website was designed to support the marketing and sales activities of the shredded home industry. Website design using an online sales system with the Opencart Content Management System (CMS) tool. With this website, marketing activities will be more effective and can increase sales turnover(Dewi and Garside 2016).

2. Research Methods

The application development steps from each stage of application development are:

Requirements planning

In this phase, users and analysts meet to determine the goals of the application or system and determine the information needs arising from those goals. The focus of this phase is on solving business problems. While technology and information systems may drive some proposed systems, the focus will always be on efforts to achieve business goals (Kendal 2010).

Design

This phase is the design and repair phase which can be described as a workshop. Analysts and programmers can work to build and display visual representations of working designs and models to users. This design workshop can be held over several days depending on the size of the application to be developed.

Implementation

During this implementation phase, analysts work intensively with users in workshops and design both business and non-technical aspects of the business. As soon as these aspects are agreed upon and the system is built and refined, the new system or part of the system is tested and then introduced into the organization(Kendal 2010)

3. Result and Discussion

The steps that need to be taken to implement PWA in the application are as follows. First, insert a service worker whose function is to provide offline functionality, push notifications, content updates, content caching, and many others. The following is a snippet of the script in the file.

Fig 1. Service worker file script snippet

The existence of this service worker file allows applications to be accessed on unstable networks and even offline. However, the service worker will run in offline mode if the application has previously been run in online mode for caching files and JSON requests by storing data on the page being accessed.

Fig 2. Implementing PWA in Offline Mode

Creation of application manifests in JSON form. Its function is to set the application name, short name, description, icons, background color, theme color and application orientation on the smartphone.

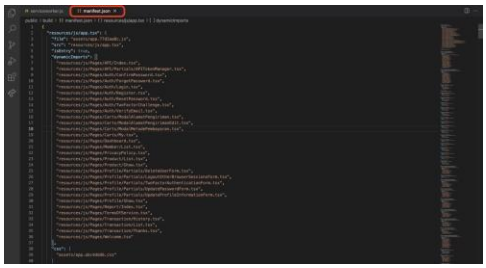

Fig 3. Manifest file script snippet

By implementing a web application manifest in the application, it allows users to add the application to the smartphone home screen or in other words the application can be installed on the mobile version so that users do not need to open a browser.

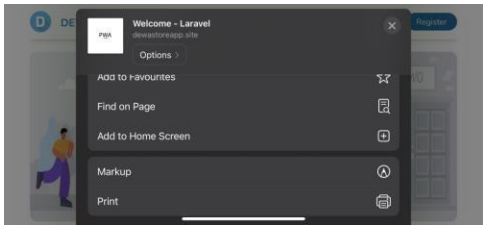

Fig 4. Add to home screen

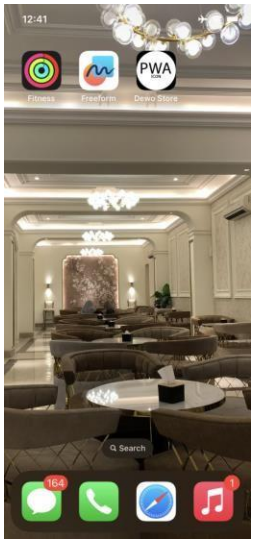

Fig 5. Result Add to home screen

Additionally with the implementation of the manifest, we can create a splash screen with the icon and name of the application if that has been added. Applications that are installed when running no longer display an address bar like when accessed via a browser.

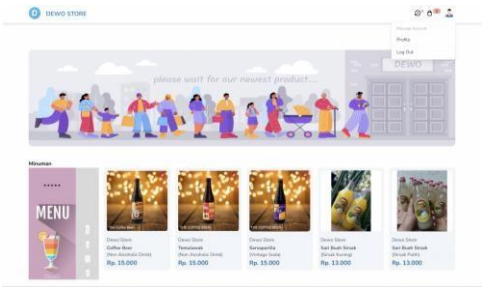

Fig 6. Homepage Display

This page is a page that contains a list of products for sale and grouped by category. When the user has logged in and the email is valid, the user will be directed to this page.

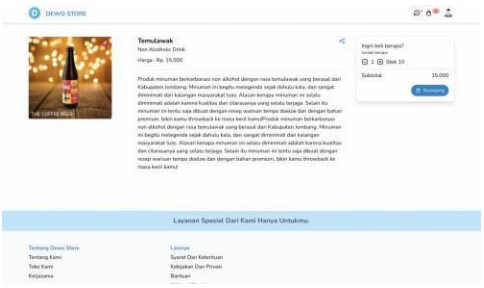

Fig 7. Product Detail Display

This page contains more detailed information about the products selected on the dashboard page. And on this page the user can carry out the add to cart process by entering the desired quota.

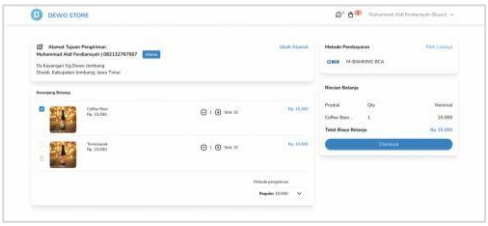

Fig 8. Checkout Display

On this page there are 4 components, namely product, delivery address, delivery method and payment method. Where users when making product transactions are required to fulfill these 4 needs.

In this test, black box testing was used. Application testing with Blackbox Testing aims to see that the program is the same as the program's tasks without knowing the program code used(Wijaya and Astuti 2021). In the system development process there are five improvement phases. After working on feedback in the five phases, the fifth phase is the final application revision process that is carried out. Because when tested by the user, all the features in the application and several problems were running as expected. So the application is complete and as expected. Based on the test results, it can be concluded that the results of testing all features with black box testing obtained a total percentage of 100% from 19 tables and there are 90 test points in it. And got a score of 87.5 out of 100 maximum scores for PWA testing using Lighthouse tools and manually. From these results it can be concluded that the system developed can work as expected.

4. Conclusions

Based on the problem formulation and research results, it can be concluded that the system can solve all the problems that exist in the Dewo home industry. Then for the assessment the application obtained a total percentage of 100% from 19 tables and there were 90 test points in it. And got a score of 87.5 out of 100 maximum scores for PWA testing using Lighthouse tools and manually.

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