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Development of a Mobile Application for Marketing Agricultural Farm Products

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Abstract

The procedure of marketing agricultural products has not been easy or in favour of the farmers especially those that are not close to the urban centres. However, smart farming and precision agriculture are adopting technology in promoting food security. In this study, an Android app to market agricultural products is developed in Android studio using JAVA programming language, Extensive Mark-up Language and MYSQL as a database. The app allows buyers to select the products of their choice and proceed to purchase using the available payment methods. The presented Android mobile application that markets agricultural products is significant, as it will aid the dissemination of information on the availability of farm products effortlessly from the users' comfort zone. This is an important research issue because of the strategic significance of mobile applications and their promising impacts on business promotion.

Keywords: Mobile application, Android, marketing, agricultural products.

Introduction

The marketing level of agricultural products specifically in low income economies has been on the low side. Mobile Applications (Apps) are downloadable software solutions that perform specific operations for the users through their hand held devices (Bomhold, 2017). Mobile app development is important to organizations as many organizations are actively involved in the creation of mobile strategies focusing on an app.

Mobile applications are standalone, smaller units of software with minimally defined functionalities. These applications often offer users services that are similar to those available on Personal Computers (PCs). Agricultural marketing is a process that starts with the development of marketable agricultural commodities and includes pre and post activities that are cost-effective. Agricultural products marketing is one of the issues that has a direct impact on the cultivator's success. All activities involved in the transportation of goods and other items from the cultivating field to the end users are included in the marketing processes.

In recent times, the usage of apps has been on a steady increase. Over 2.87 million apps are reported to be available in the digital space currently (Buildfre, 2022). Mobile apps play key roles in digital marketing strategies. Its usage is impacting economies across the globe (Arora *et al*., 2017).

Mobile apps play major roles in business survival and reigniting customer experiences as a result of the global health and financial crisis that arose from COVID-19 pandemic. For example, the usage of Zoom app exploded in 2020 and generated over $2.6 billion revenue. Mobile apps consumers show higher loyalty intentions, high probability of purchase and likelihood to purchase more goods per shopping trip (Criteo, 2016).

Emerging economies are increasingly collaborating with scientists and businesses throughout the world to improve product and service diversification efficiency. By providing online marketplaces and tools that support client involvement and sales, relevant technology, such as mobile apps, could lessen entry barriers for emerging SMEs and so allow for more favorable competition (Gierten and Spiezia, 2016).

Android operating system is a free and open-source mobile operating system that is based on the Linux kernel. It is particularly intended for touch-screen mobile devices, such as smartphones and tablets. Apart from mobile phones, the technology has also been used in digital cameras, smart televisions, and other electronic equipment.

In the current digital world, almost every human activities across every sector is migrating from manual operation to electronic operation. Today, there is an increasing rate of mobile applications users virtually in every sector of our lives (Thomas, 2021).

A mobile application is a departure from the traditionally developed software solutions that run on PCs. Each application of mobile apps offer a limited and single feature such as a calculator, a game, or mobile web browsing. The limited hardware resources of early versions of mobile devices did not support multitasking in mobile applications. However, their uniqueness has attracted attention because it allows end users to select from the array of functions their devices offer (Janani, 2022).

Mobile applications development is classified into three. These are web app development, native app development, and hybrid app development (Nayebi *et al.*, 2012).

The following are the benefits of an online linked android app in the marketing of agricultural products:

Profitability: Online stores renders higher profit margins than conventional market because of lower overhead and ease of access.

Liability: Mobile applications users do not observe mall's operational guidelines like the manual system of marketing.

Reach: Mobile application-based systems can reach an almost unlimited customer base and the constant development of android supported smart phones facilitates this process.

Customer info: By evaluating the most-visited pages and most-viewed things online, an app can gain a lot of information on shopper habits. It can also receive email addresses and residential information for marketing purposes.

Simplicity: Apps on Android have the potential to be really simple. Entrepreneurs with online presence can sell things they store in their homes and ship them themselves, or they can hire a third party to fill orders for

them without physical contacts with the buyers.

Low barrier to entry: It is less expensive and much easier to promote products on mobile app than running a physical store. If sales are not high, the business is less vulnerable because rent and employee costs are not incurred.

By evaluating the most-visited pages and most-viewed things online, an app can gain a lot of information on shopper habits. It can also receive email addresses and residential information for marketing purposes. Mobile agents are developed to serve many purposes. The software tools needed for web app development include HTML5, CSS, JavaScript on the Client Side and PHP, Perl, Python Ruby, etc. and other server-side technologies (Valdellon, 2022).

Dagar (2015) stated that the fundamental motivation behind promoting Marketing Information System (MIS) framework is to support farmers in understanding the different marketing strategies. Information about the real market prices should be known by the farmers and it would benefit the farmers if it is available in a single platform.

Mobile applications offer interesting potentials for customer engagement because of specific services that the platform render such as built-in features (Kim *et al.*, 2013). Access to services and information without are facilitated on mobile application platforms without time or distance barriers (Alnawas and Aburub, 2018).

Mobile applications provide competitive advantages to organizations and supports digital customer orientation towards the provision of superior customer experiences [15].

Stocchi *et al.* (2022) presented an existing marketing research review that centres on mobile applications. The study clarified and expanded the body of knowledge that surrounds how apps are changing the customer experiences and value across iterative customer journeys that leads to competitive advantages.

Nuanmeesri (2019) highlighted a one-stop service supply chain mobile app for elderly farmers for the purpose of marketing and distributing agricultural products and location-based logistics for consumers.

The mobile application market has grown at an exponential rate in recent years. This is attributed to the increase in the use of handheld devices. Organizations seek to be present in the digital space for customer interaction. In this light, it's critical to research current mobile app usage and the factors that influence its

acceptance across age groups. Qualitative assessment of mobile apps' flexibility, pattern of usage and the associated believes call for investigative study (Arora *et al*., 2020). The usage of mobile marketing technologies helps small and medium scale enterprises to enhance their sales promotion methods with the goal of increasing product and service sales. However, there has been little focus on building a framework that allows for the examination and shared knowledge of the factors impacting the use of mobile marketing technology by SMEs in Nigerian (Eze *et al*., 2018).

Studies on the place of promoting apps through influencers are reported in Hu *et al*., (2019) or through leveraging reviews and ratings from users [20]. Inegbedion *et al*., (2020) investigated marketing of agricultural products and improving the turnover of farmers in South-South, Nigeria using social medial platforms. The study employed structured questionnaire as a tool for data collection. The major indicators considered in the study include demands for farm products, cost of marketing and farmers' turnover.

Xiao *et al*. (2021) presented a review of a paradigm shift in the marketing of farm products using Internet infrastructure. The enhancement of logistics system, the deep processing of agricultural products and the formation of branding could be achieved with the adoption of information technology.

Liu in (2021) constructed an intelligent marketing technology in an innovative way for agricultural products from data collection, storage and analysis in the era of big data. Big data center and public platform can be harnessed innovatively to promote the sales of agricultural products towards achieving sustainable development goals. Effective marketing strategy supports the development of rural economy agriculture wise.

Sivakumar (2021) presented a mobile application that breaks the delay and chain of middlemen in getting agricultural products from the farmers to the consumers. On the application. Farmers could get to know about farm products and buy directly from the farmers. Luckyardi *et al*. (Luckyardi *et al*. (2022)) reported the utilization of mobile based applications that supports commodities marketing and enhance the management of farm products in a competitive marketplace. Adoption of technology for promotion of farm products can open new markets for farmers and increased profits.

Wibowo *et al*. (2021) reported the roles of mobile applications in promoting the sales of farm products in modern markets. Adopting technology makes the activities of farmers more visible to their target market. The study aims at bridging the long chain of getting agricultural products across to the consumers and to avoid the burden of caring bulky farm produce to the market and returning it back home as a result of unavailability of buyers. The gaps between the volume of agricultural activities and the marketing processes can only be addressed by the adoption of information technology.

Methodology

The chapter highlights the methodological approach and design of the study. The architecture of the system is presented in this section. The menus and sub-menus of the mobile application are represented in the architecture. The Android application was programmed in Java programming Language and Extensible Markup Language. The Java code was used to create the Android template of the application while Extensible Markup Language (XML) was used for the interface; the backend of the application was done with MSQL which is a Backend-as-a-service (Baas) application development platform that provides hosted backend services such as a real-time database cloud storage authentication etc.

The Application was built from several libraries, files and modules which are made up of Android Manifest, Java files, Resources files and Gradle scripts. The Android manifest defines the structure and metadata of the application its component and the requirements. Java class file controls various aspects of the graphic user interface created with XML. The gradle script was used for automatic building, testing, and deployment and enables debugging of the application. The Resources file contains subdirectories which are used to store image files for the GUI, layout files which are XML are used to design the GUI, Menu files are used to design the navigation drawer and menu.
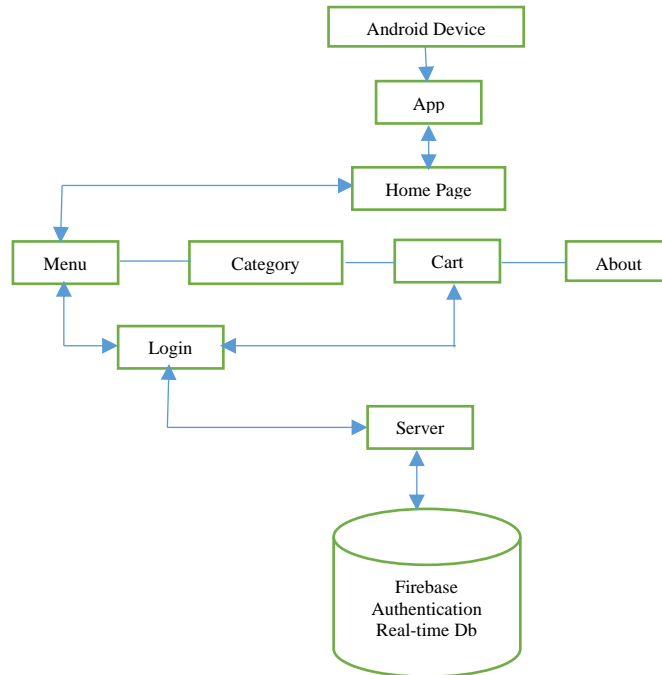
Figure 1: The Proposed System Architecture

This section discusses the software and hardware requirements, t h e design of the Android application, and implementation and testing of the functionalities of the system components. The software requirements include Android Studio which provides a unified environment for building the mobile application, Java programming language for controlling the structure of the program, XML was used to store information and data in a format that is readable by both humans and computers and MySQL that provides the database services. The hardware requirements include processor Intel (R) core(TM) Duo, CPU 2.00GHz and above, 2GB to 8GB of RAM, 60GB to 1TB of hard disk drive and an Android mobile device of 4.4 kit Kat and above.

Figure 2: The Admin Dashboard

Figure 2 shows the Admin Dashboard, where the Admin can add users, delete users, edit other basic information, add products as they become available and check sales reports within a particular period.

Figure 3: product category (cash crop: cocoa)

The product category is divided into four namely; cash crops, food crops, livestock and poultry. Figure 3, shows the available products in the cash crop category and its description and price listedbelow them.

Assessment of the App's Response Time

Table 1 shows the result of the evaluation test carried out to ascertain the efficiency of themobile application. The evaluation was basically on the Android versions, types

of phones, and network availability. The result from the evaluation test shows that mobile phones that use a 3G network have a Launch Response Time of 12 seconds while mobile phones that use 4G network has a launch response time of 7 seconds.

Table 1: Assessment of the Mobile Application

Andriod Name	Android Version	Launch Response Time	Network Availability	Remark
Infinix hot4	6.0	17sec	1	Considerably fast
Gionee x5	5.1	12sec	1	Very Fast
Techno l8 lite	6.0	20sec	0	Slow because is searching for network beforereturning to error page.
Techno Camon 12	9.0	14sec	1	The network on the phone is fast
Techno y2	4.4	18sec	1	On 3g network, not that fast
Infinix smart 5	10	12sec	1	Considerably fast
Infinix hot 8	8.1	9sec	1	The phone isusing 4g network, it makes the apprun faster
Techno Spark 5	8.1	14sec	1	Fast, because there is a goodnetwork
Huawei 40 pro plus	10	4sec	1	The phone has good network
Infinix 7	10	7sec	1	The phone has good network

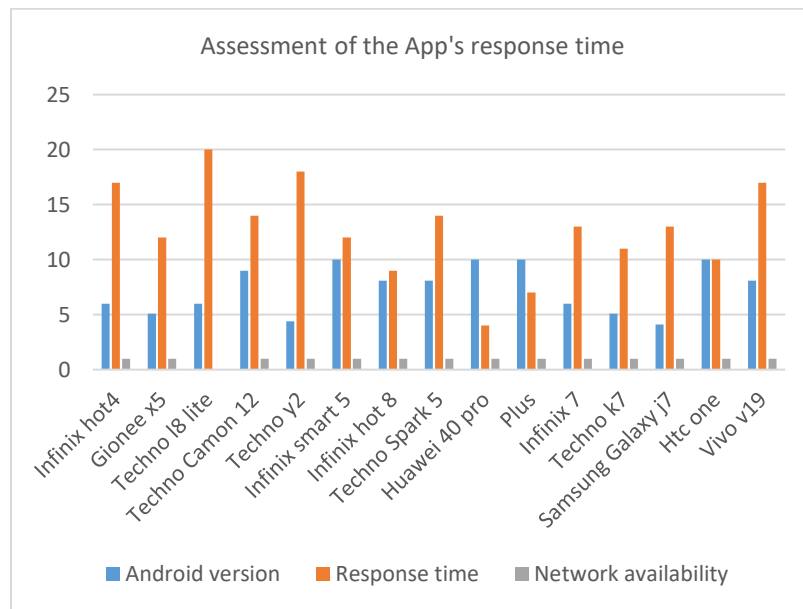|				
Techno k7	6.0	13sec	1	A bit fast
Samsung G alaxyj7	5.1	11sec	1	Fast because there is a goodnetwork
Htc one	4.1	13sec	1	Fast becausethere is a good network
Vivo v19	10	10sec	1	Fast, the phonesupport 4g network
Itel A33	8.1	17sec	1	3g enabled, not that fast

Figure 4: Visualisation chart of the assessment's response time.

Figure 4 shows the visualization of the assessment response time in seconds based on the different versions of the Android operating system that was used to test-run the application.

Conclusion

The open-source nature of the Android platform has made it easy to develop user-friendly applications that serve the needs of end users. In this study, a mobile application that allows farmers to post their farm products for easy access by consumers has been

developed. The application allows the farmers' services to be accessible beyond their immediate environment which makes their products get discovered by many buyers. The usage of this app would ease the farmers' burden in marketing their farm products.

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