

Original Article

# Development of Mobile Market Intelligence System (A Case Study of Ede Federal Constituency, Osun State, Nigeria)

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**Abstract** - Telecommunication, specifically mobile phones, can solve the existing information asymmetry in the market sector. Sometimes, a major challenge consumers face is where and when to buy a particular product, be it consumable or non-consumable. This paper presents the application of Software Development techniques to make useful, accurate, and reliable information about markets available to people. "Mobile Market Intelligence System" is a system that brings information about markets in the Ede Federal constituency to the users' doorstep. On touch, the user can access the markets in this constituency, the day of a market, common product available in such a market, and the distance from the user's location to the market. The location of the market is enhanced by the use of GPS (Global Positioning System). The system was developed using Javascripts, android studio, and mysql. The proposed system was evaluated based on the users' assessment to determine the system's efficiency in terms of ease of usage, reliability, and relevance of the system. Likert-Scale Responses (LSR) were used to evaluate the strength and acceptability of the system.

**Keywords** - Application, Constituency, Information, Market, Mobile.

## I. INTRODUCTION

Mobile technology is rapidly evolving; over the years, its uses are becoming diverse and are gradually replacing some similar sources in the market that are also used for communication. Mobile technology has improved from a simple device used for phone calls and messaging into a multi-tasking device used for GPS navigation, internet browsing, gaming, instant messaging, etc. A market is a place where two parties can gather to facilitate the exchange of goods and services. The parties involved are usually buyers and sellers. The market may be physical like a retail outlet, where people meet face-to-face, or virtual like an online market, where there is no direct physical contact

between buyers and sellers (Kenton, 2020). Better market information reduces traders' transaction costs. It allows them to locate markets they would not otherwise have found and conclude more profitable deals. A lack of accurate market information acts like a non-tariff barrier that inhibits intraregional trade. Buyers may turn to buy things from outside their domain or the immediate environment if they do not know what is available from neighboring or nearest markets (Andrew, 2003). An intelligent system is a system that incorporates intelligence into applications being handled by machines. Intelligent systems perform search and optimization along with learning capabilities (Burcak, 2015). GPS positioning is based on trilateration, which determines position by measuring distances to points at known coordinates. At a minimum, trilateration requires three ranges to three known points. GPS point positioning, on the other hand, requires four "pseudoranges" to four satellites.

GPS answers five questions simultaneously:

- "Where am I?"
- "Where am I going?"
- "Where are you?"
- "What's the best way to get there?"
- "When will I get there?"

Ede Federal Constituency is one of the constituencies in the western part of Osun State, Nigeria. It consists of four local governments Ede North, Ede South, Egbedore, and Ejigbo. The number of popular markets in the constituency is about 23. Each market has its peculiar product commonly sold, such as farm products, clothes, domestic appliances, food pieces of stuff, etc. Table 1.0 below shows the details of the markets.



**Table 1. Markets in Ede Federal Constituency Markets**

S/N	MARKET NAME	ADDRESS	COMMON PRODUCT	DAY(S) INTERVAL	S/N	MARKET NAME	ADDRESS	COMMON PRODUCT	DAY(S) INTERVAL
<b>1</b>	<b>Ede North</b>				16	Olola market	Ola	All items	4
2	OjeOlobi	Station Road Ede	Cloth, food item, kitchen utensil, home appliances	4	17	Obadamas ifa	Masifa	All items	4
3	OjeOlofi	Elerin junction Ede	Cloth, traditional wear	16	18	Obadaifeo dan	Ife Odan	All items	4
4	Timi Market	OjaTimi Ede	Food item, kitchen utensil	1	19	Isundunrin Market	Isundunrin	All items	4
5	Olorunda (total) Market	Station Road Ede	Food item, fruit	1	20	Ilawo market	Ilawo	All items	4
6	Owode Market	Gbongan Road Owode, Ede	Food item, cloth, kitchen utensil	4	21	Isoko market	Isoko	Specifically food items	4
7	Atapara Market	Atapara Ede	Food items	1	21	Igban market	Igban	Specifically yam	1
	<b>Ede South</b>				23	Oguro market	Oguro	Food items	4
8	Sekona Market	Station road Sekona	Food items, fruit	4					
9	Sinya market	Baba sinya Ede	Food items	4					
	<b>Egbedore</b>								
10	Olorunsogo Market	Dada Estate	Food item, kitchen utensil, cloth	1					
11	Ara Market	Station Road Ara	Food item, fruit	4					
12	Iragberi Market	Station road Iragberi	Food items	4					
	<b>Ejigbo</b>								
13	Ogiyan market	Station road, Ejigbo	Cloth, kitchen utensils, food items	7					
14	Oja Oba(Kings' Market)	Ejigbo central mosque	Food items, kitchen utensils	1					
15	Odebara	Ejigbo	Specifically food items	1					

**II. LITERATURE REVIEW**

Mobile communication technologies offer many services that improve the quality of life for people: give an example, SMS referred to as texting (Short Message Service) and the transfer of documented information that is MMS (Multimedia Messaging Service) gave rise to the age of information exchange supported by audio, visual and imagery means. These developments rendered the mobile phones, means of mobile entertainment, a new channel of marketing for manufacturers and retailers, a means of multimedia shopping as well as Internet connection, reservation handling, ticket purchasing, and marketing of goods and services (Burçak, 2015). The following are some of the reasons why mobile phones are considered to be important where the marketing activities are concerned (Yuan & Cheng, 2004):

- The fact that customers always carry their mobile phones on them regardless of where they go;
- They are always open for communication;
- The more attention-grabbing nature of one-to-one contact with customers;
- Being able to maintain the messages received for later response by the customers;
- Opportunity to have one-to-one audio-visual communication with customers;
- Being suitable for customers and effective for the marketing executives.

Therefore, it can be said that mobile phones have become very effective tools of communication as they provide means of instant contact by their users who carry them in their pockets, purses, and briefcases as they remain switched on at all times, providing a high quality of

communication, allowing enterprises to establish personal contact with their clientele using them as a tool in their marketing activities to communicate with their customers on the one-tone basis (Howard, 2003; Yuan& Cheng, 2004; Scharl, Dickinger& Murphy, 2005).

Along with computation, mobile marketing also provides great opportunities to firms with respect to establishing direct communication, without any time or location constraints, with consumers (Haghirian, Madlberger&Tanuskova, 2005). When compared with traditional media, the following fundamental advantages of mobile marketing

- Success criteria can be followed in more detail, reliably, and easily.
- It allows live campaign measurement and follow-up.
- SMS marketing is very cost-effective.
- It allows for one-to-one marketing.
- It is interactive.
- It enables instant response from the consumer.
- It permits corporate targeting (mobile advertising can be sent only to those at a certain place or participating in a certain activity).
- The rate of return is greater than 10%.
- Mobile advertisements remain stored in the memory of the device.
- It allows for the instant dissemination of the marketing message and creates a powerful viral effect.

**A. Challenges Encountered in Mobile Marketing**

Although many businesses have started to allocate a permanent budget to mobile marketing from their annual budget, some issues cause mobile phone users not to show the expected interest and positive attitude to mobile commerce and shopping, and make mobile marketing activities difficult (Baueret et al., 2005; Barutçu,2007). It is possible to summarize these issues as follows:

- Mobile phone screens are small
- Difficulties encountered in writing and reading of messages
- High cost of mobile calls
- Mobile phone batteries running out in a short period
- The technological skills of mobile phone users are possibly poor

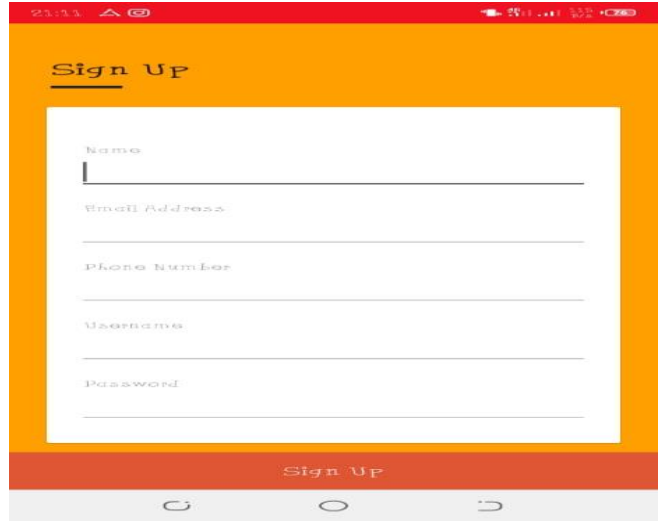
**III. METHODOLOGY**

Relevant data were gathered through personal observation and direct interviews. Since the larger percentage of the marketers are not educated, it wasn't easy to use sophisticated means of data collection. All the markets in the constituency were visited to ascertain the kind of product available in the markets, the day(s) of the market in a week, the volume of the markets, and other relevant information.

**A. System Interfaces**

**a) Sign Up**

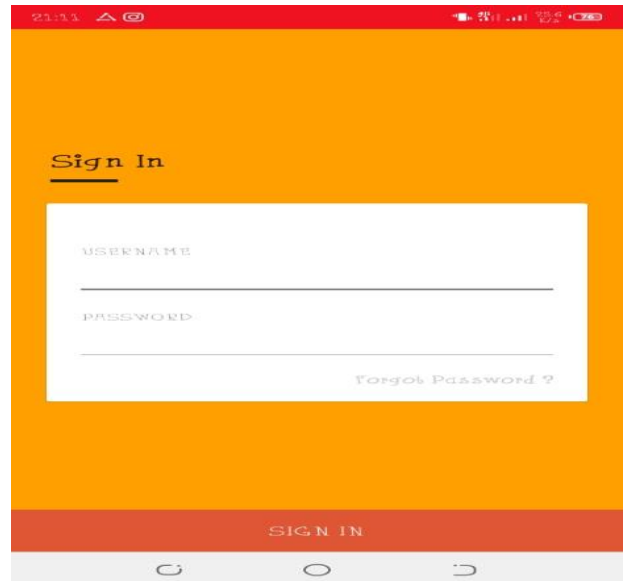
The first-time user uses this interface to register and supply the log-in details to the system. Data to be captured here includes name, phone no, email address, username, password, and the data will be saved onto the server and used for the subsequent log-in.



**Fig. 1 Sign Up Interface**

**b) Sign-In**

The valid user uses the sign-in interface to gain access into the system, where the user enters the correct username and password and click on log in to continue.

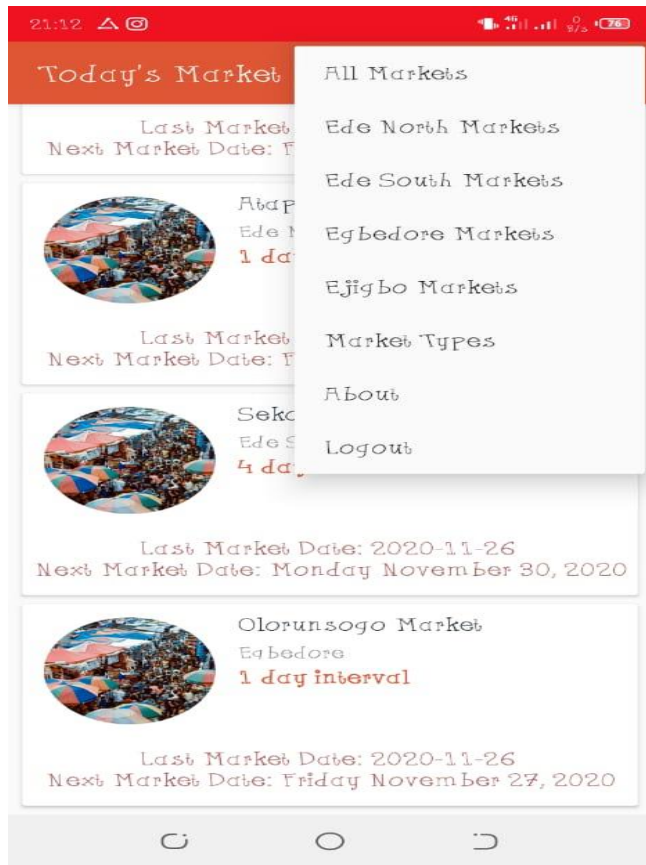


**Fig. 2 Sign-In Interface**

**c) Dashboard**

The dashboard shows various operations and modules of the application that user(s) can work on. Here user can navigate to various operations, which include:

- Checking information about all the markets in Ede Federal Constituency
- Access information about markets in each local government
- Access markets information by:
- Products available
- Market distance from the user's location
- General information about the application

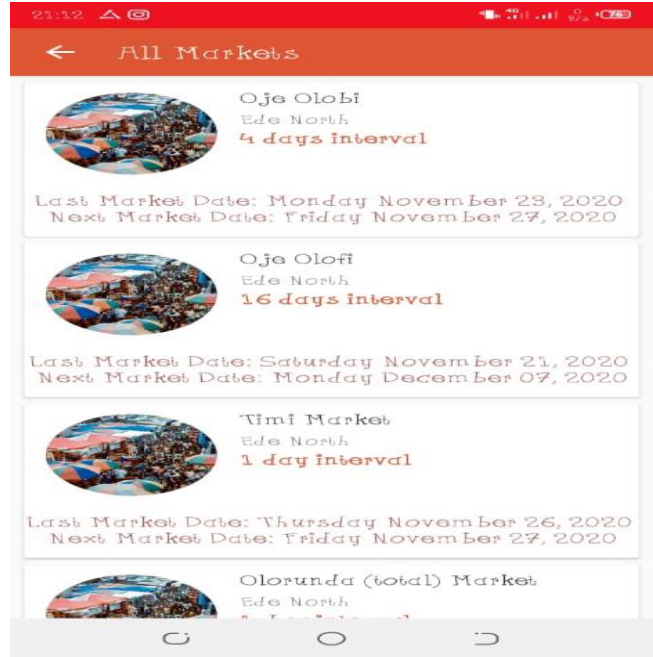


**Fig. 3 System Dashboard**

**d) Market Information**

This interface displays information about market(s) to the user; the information displayed here is based on the user's criteria. Information required by the user may include.

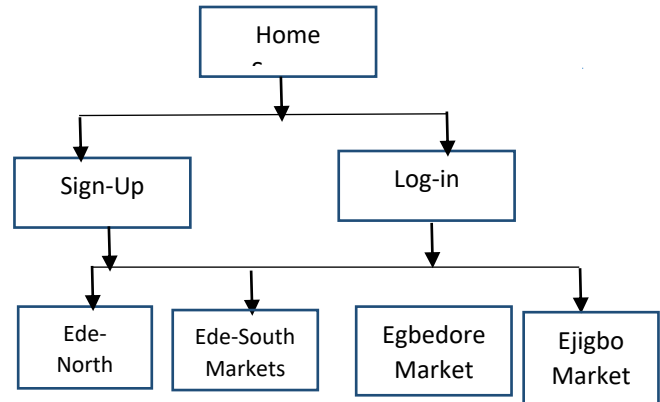
- Market day
- Market location
- Common Product available
- Distance of the market from user's location



**Fig. 4 Market Information**

**B. System Architecture**

The system's design was decomposed into modules to provide a software structure that implements the functions elaborated in the system's detailed design. The modular design of the system shown in Figure I focuses on the internal processing function, decomposing high-level functions into sub-functions, defining internal data stream and data stores, and establishing relationships among functions, data stream, and data store. The activities of the mobile market information system, including log-in, sing-up, check market day, market distance, and commonly available product, were noted. A top-down, modular approach was employed to decompose the proposed system, which reduces complexities inherent in higher-level modules.



**Fig. 5 System's Modular Structure**

**IV. SYSTEM EVALUATION**

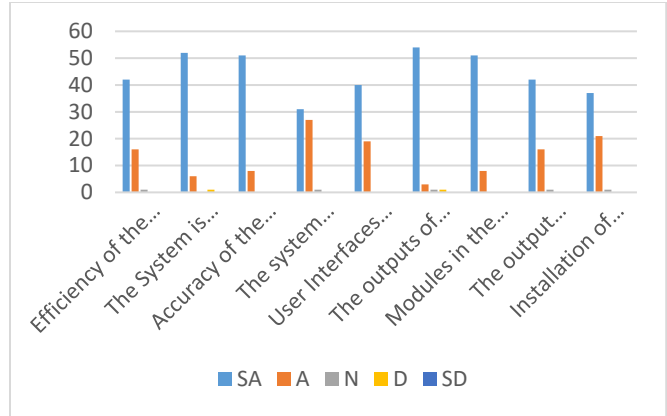
The application was installed on sixty-two (62) mobile phones, which the user cut across the four local governments in the federal constituency. A questionnaire was incorporated into the system, which the user will fill after using the application. The response of the users was gathered from the server and analysed using Likert-Scale Response (LSR). LSR is a five (or seven) point scale that allows the individual to express how much they agree or disagree with a particular statement (McLeod, 2019). A Likert scale assumes that the strength/intensity of an attitude is linear, i.e., on a continuum from strongly agree to disagree strongly, and makes the assumption that attitudes can be measured. At the evaluation time, only fifty-nine (59) users responded, filled, and submitted the questionnaire through their mobile phones. The system was evaluated using the following internal and external software rating factors:

- Efficiency
- Responsiveness
- Accuracy
- Timeliness
- Clarity
- Validity
- Modularity

**Table 2. System Evaluation Result**

Questions	SA	A	N	D	SD
Efficiency of the Application is almost 100%	42	16	1	0	0
The System is highly Responsiveness to input data	52	6	0	1	0
Accuracy of the application is highly commendable	51	8	0	0	0
The system processes the input and outputs the result in a short time limit	31	27	1	0	0
User Interfaces are very clear and interactive	40	19	0	0	0
The outputs of the system are Valid and correct	54	3	1	1	0
Modules in the application are well arranged and connected	51	8	0	0	0
The output display by the application is dependable	42	16	1	0	0
Installation of the application is easier, faster, and friendliness	37	21	1	0	0

SA = Strongly Agree, A=Agree, N=Neutral, D = Disagree, SA = Strongly Disagree



**Fig. 6 Graphical representation of System evaluation**

**V. CONCLUSION**

This paper presented a new approach of providing important and necessary information about markets in the Ede Federal Constituency; this objective was achieved by implementing the Mobile Market Intelligence system. The system was developed in Javascripts, android studio, and mysql developed the system. The evaluation was carried out to determine the efficiency and acceptability of the system. The result in table 2 shows that the system met up the required objective, widely accepted. The system was highly rated for internal and external software rating factors such as efficiency, responsiveness, accuracy, timeliness, clarity, validity, and modularity.

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