

# Consumer Verification System for Authentic Product: Case Study of Manufactured Product

John B. Oladosu  
University of Ibadan, Ibadan  
/ Ladoke Akintola University of  
Technology Ogbomoso, Nigeria  
johnoladosu@gmail.com

Damilola A. Taiwo  
Department of Computer Science  
University of Ibadan, Nigeria  
damijeconfirm@gmail.com

Christopher A. Oyeleye  
Ladoke Akintola University of  
Technology, Ogbomoso, Nigeria  
caoyeleye@lautech.edu.ng

## ABSTRACT

The problem of fake products by counterfeiters and unregistered manufacturers is real and constitutes a major threat to the health and safety of the Nigerian population. A descriptive study was carried out on the present means of identifying authentic products and fake ones by the members of the society in this work. The sources of information for this work include online journals, NAFDAC sites and face to face interviews with members of the society both student in the University of Ibadan and consumers in Ibadan and its environ. All the respondents agreed that there is a fake and counterfeit drug problem in Nigeria, and many considered this a major problem. The respondents commonly used visual security techniques before drug purchasing. These were: Seals/embossments, character of print, and mobile authentication system. The respondents' most likely action after a counterfeit drug encounter was to return the drug back to the supplier. The study showed that consumers should be giving privileges to authenticate products before it is being purchased or consumed. There is an indication that the present system (such as NAFDAC registration number and Mobile Authentication System) has limitation to achieve 100% authentication process since the system can be copied by counterfeiters. This study proposes a solution to the limitation of the existing system by developing a bar code authenticating system. The system uses 13 digit code consisting of a series of vertical bars of variable width that are scanned by a laser; printed on consumer product packages, to identify the item from a computer that provides the information about the product and registers inventory information. This system gives a 100% authenticity and trust to the society because there is no two products that can have same barcode and this code cannot be easily guessed by counterfeiters or uploaded to the consumer's verification system database.

## CCS Concepts

• **General and reference** → **Cross-computing tools and techniques Experimentation**

## Keywords

Authentic Product, Consumer Verification System, Counterfeit Product, NAFDAC

*CoRI'16*, Sept 7–9, 2016, Ibadan, Nigeria.

## 1. INTRODUCTION

Since inception, product manufacturing has been a way to increase production and distribution of consumable products in Nigeria and beyond. This process has assisted manufacturing companies in Nigeria to get their products distributed and consumed. Over the time manufactured products have gone wide into all parts of the countries, that even existing products were re-produced by other manufacturing companies for distribution. Soonest this act turned to a menace to global economies as counterfeiting. Counterfeiting became a common thing in our society, claiming lives of people through the use of fake manufactured food and drugs [1].

Counterfeiting can be described as the act of making a copy of already existing product with an intention to deceive the consumers of that product. Synonymous to this is faking or forging [2]. Counterfeiting results in distribution of fake, cheap, and substandard products, that causes havoc to the consumers. Counterfeited products were first reported in 1968, which mean people have been dying since around 1970 from effect of this problem [3].

When mass production of counterfeited goods was detected in Nigeria, the government declared war against counterfeited goods by setting up an agency to monitor, screen and test for authenticity of products either imported or manufactured here in Nigeria. This team was named National Agency for Food and Drug Administration and Control (NAFDAC), with the mission and vision to sa feguard public health, and to eradicate fake manufactured products from Nigeria. Manufactured products include the following food, drugs, cosmetics, chemicals, detergents, medical devices and drinks including bottled water [4].

In 2001, Dora Akunyili became the head of NAFDAC and one of the things she first did was to stamp out corruption in the agency. After succeeding she moved forward to the major mission of NAFDAC, which is to safeguard the public health by ensuring that only the right quality food, drug and other regulated products are manufactured, exported, imported, advertised, sold and used [5].

An incidence occurred in 1995, when Nigeria reportedly donated 88,000 doses of meningitis vaccine to its neighbor Niger Republic. Before the authorities realized that these vaccines were fake, about 60,000 (Sixty Thousand) people had been "inoculated". Akunyili said that when she took office in 2001, fake drugs were openly circulating in Nigeria. This is the same way fake manufactured products are circulated concurrently in and outside Nigeria [6].

### 1.1 Background

The legal right of every consumer is the right to verify any manufactured product before the product is consumed. This process is to encourage the producers of this product to monitor their production work before final distribution, control the number of manufactured product during production so the product would

not get expired before complete cycle and also fight counterfeiters to stop production and spread of fake products.

Today, it is easy to counterfeit manufactured product despite all governmental designed systems in controlling fake products from being distributed in Nigeria. The reason for this is that consumers are not given the direct right to be independent in verifying manufactured product before consumption. Manufactured products are distributed to the community, for member of the society's consumption. Therefore, consumers should not depend only on the governmental designed system that can be counterfeited during the manufacturing cycle, because when this causes havoc, it cannot be correctly traceable to any company. Even if one tries to, it can be legally denied in court. This means that consumers have to be empowered to use their consumers' right to verify all products before consumption.

The proposed consumer's verification system for authentic product is a large database system, with the capacity to connect the 3 (three) key stakeholders together for better relationship and better service production. The three key stakeholders include National Agency for food and Drug Administration and control (NAFDAC), *Manufacturer* and the *Consumer*. Note that the arrangement below follows the hierarchy of the system relationship. Every other user can be sub divided under these 3 groups.

- i.) **NAFDAC Organization:** National Agency for Food and Drugs Administration and Control is a governmental organization that controls and manages thorough registration of all orally consumable products in Nigeria.
- ii.) **Manufacturer:** This can be related to the producer of product and services to be sold to the society.
- iii.) **Consumer:** An example of this term is a person who buys manufactured goods in order to be able to use the product to satisfy his or her need at a specific time.

When dealing with this 3 key groups, the number one (NAFDAC Organization) have to officially monitor and test the product that is about to be distributed before it is been publicly made available for the consumers for consumption, knowing fully well that consumers cannot officially test the content of a product by him/herself. This is why consumers rely on the trust from NAFDAC and manufacturers to get the best authentic product for consumption [7].

Consumer's verification system for authentic product tends to give members of the society the opportunity to confirm the authenticity of this product using double channel confirmation. First, NAFDAC Registration number; seeing and verifying this with the consumers verification system if positive has given the consumer an impression that the product has gone through thorough clinical or laboratory test and has been certified fit for consumption.

The understanding that this system (NAFDAC Registration Number) can be counterfeited by counterfeiters makes registered manufacturers to include barcode system on their products with a copy of the product information in the company database. With this system, if NAFDAC number is counterfeited then the manufacturer's barcode information will not be counterfeited. Going back to history, in the recent years, members of the society only purchases products with NAFDAC No., because this is the best governmental designed system presently, that control the distribution of manufactured product in the society. NAFDAC

registration agency has been very active in the area of controlling and regulating the quality of consumed products in Nigeria over the years, but it has not been without its problems. Lots of counterfeited products have been sold to consumers in Nigeria with *fake NAFDAC number* or without *NAFDAC number*, yet only NAFDAC agents know if a NAFDAC registration number is authentic or fake. This makes the consumers depend fully on the NAFDAC registration number printed on the product to show that the product has passed through thorough clinical or laboratory test and certified fit for society consumption and distribution.

Consumer's verification system for authentic product is a system that is intended to improve the development of our society and empower members of the society to independently confirm the authenticity of a purchased product before consuming such a product. This will help reduce spreading and selling of fake manufactured products by un-registered manufacturers to our society. Lastly this system will enforce manufactures to register their companies' product with NAFDAC Agency before advertising, distribution or selling such a product.

## 1.2 Current Solution

In India any time you are worried that a drug is fake or a counterfeit you can verify the authenticity using this three methods which include the following: either by calling +919901099010 and verifying your medicine over the phone via one of PharmaSecure's agents, or by sending the short code on the drug to 9901099010, or last by visiting [www.VerifyMyMedicine.com](http://www.VerifyMyMedicine.com) website portal, where you simply enter the authentication code printed on the drug package [8]. In Nigeria exactly 2<sup>nd</sup> February 2010, NAFDAC mandated a new system called MAS which means mobile authentication system.

### MAS (Mobile Authentication System):

The Mobile Authentication System is a pin printed under the silver panel on the drugs that is currently registered under mobile authentication service. All manufacturing firms using this system must get NAFDAC registration number first before using this system on their manufactured product. NAFDAC enables consumers in Nigeria to confirm whether the drug they are about to buy is genuine using a mobile phone. The consumer simply sends an SMS to 38353 to confirm the genuineness of the drug. Every MAS-enabled drug comes with a unique 10-digit number covered by a panel. All the consumer needs to do is to scratch off the panel to reveal the 10-digit number. Then the consumer texts the 10-digit number to 38353 and in a few seconds they will receive an SMS with OK to confirm the authenticity. This system is a toll free system which is available on drugs Ampiclox and Lonart but not on all other manufactured products [9].



Figure 1. Mobile Authentication System (MAS)

### 1.3 Weaknesses of Current Solution

The existing systems, MAS, allows consumers to verify product status through the short code under the silver cover that can be easily counterfeited or copied by counterfeiters with the aid of technological equipment. Since all registered products for MAS must have a NAFDAC Number, this means consumers are being given a double security measure for drug authenticity. For years now we have not had a record of any fake or not unregistered product through the Mobile Authenticity Service; all messages have responded OK [9]. If we think about this, does it mean that all product with Mobile Authenticity Service is authentic?

If this system is a manufacturer's designed system, which means it's a system designed for manufacturers use only. It makes it easy for counterfeiters to use this same similar system to design same product or new product in which consumers will still get the same OK reply when they sent the short code on the counterfeited product [9]. Another point is that if the system is not authentic, for example, what happens to the product and the manufacturer? How will the seller or consumer make complains to appropriate firm for necessary action? This existing system does not give room for easy communication between the administrator, product consumers and manufacturers, because all complains must be directed to NAFDAC office at Lagos [7].

The present system also allows email and phone call communication, which is not effective in case of spam mails and busy communication network.

## 2. THEORETICAL FRAMEWORK

The theoretical basis of this study is discussed in this section.

### 2.1 Structure of NAFDAC Number

National association for food and drug administration control number popularly known as NAFDAC No is a 6 digit authentication number, that confirms that a product is authentic for consumption. Before a manufactured product is assigned a NAFDAC No, this product must have passed through clinical test and confirmed that all chemicals, substances and material use is good for consumption of members of the society. Also the manufacturing company facilities and source of their raw materials for manufacturing the product must be overseen for product continuity. All this is necessary in order to monitor the production of raw material. When it comes to processing of water, the NAFDAC No are seven digits, first two digits, secondly 4 digits and one alphabet. Example: 04-4567L [10].

### 2.2 Bar Code Number

Barcode are developed in colored and black and white format. This series of adjacent strips of various widths is used to store information of the manufactured product. It is a set of binary number in which the wide black bar space signifies one and the thin black represents zero, information stored in this binary set may include the price, product details and so on.

For example, Microsoft's HCCB technology uses 4 or 8 colors per patch. Barcode makes use of algorithm to decode the information saved in the lines. Barcodes can be used in variety of areas which include the following: Sales point terminal, controlling personnel access systems, mailing systems, and in manufacturing for work-in process and lastly inventory control system, etc., Barcode reading system e.g. scanner can be implemented or developed using light beam. Presently there are lots of android barcode system software that can single-handedly decode barcode encrypted information [11].

## 3. ANALYSIS OF THE NEW SYSTEM

This work consisted of the construction of a solution system that is capable of solving existing system challenges as mention above. The features of the system include:

- i.) Registering NAFDAC approved products.
- ii.) Availability of product approval status (FULL APPROVED or PENDING APPROVAL).
- iii.) Communication platform through message centre.
- iv.) Verification and uploading of new produced product details.
- v.) Consumers will be able to check for product authenticity through NAFDAC number and Bar Code that differentiates each product from the other.
- vi.) Finally the new system will be user-friendly for maximum usage on all device screen platform, which include smartphones, monitors, tablet and notebooks.

### 3.1 Use Case Modeling

Use Case Models (Figure 2, Figure 3 and Figure 4) describe the functionalities of the new system. The Use Case represents a discrete unit of interaction between a user (Consumers, Administrator and Manufacturer) and the system. This interaction is a single unit of meaningful work, such as user account creation, login etc.

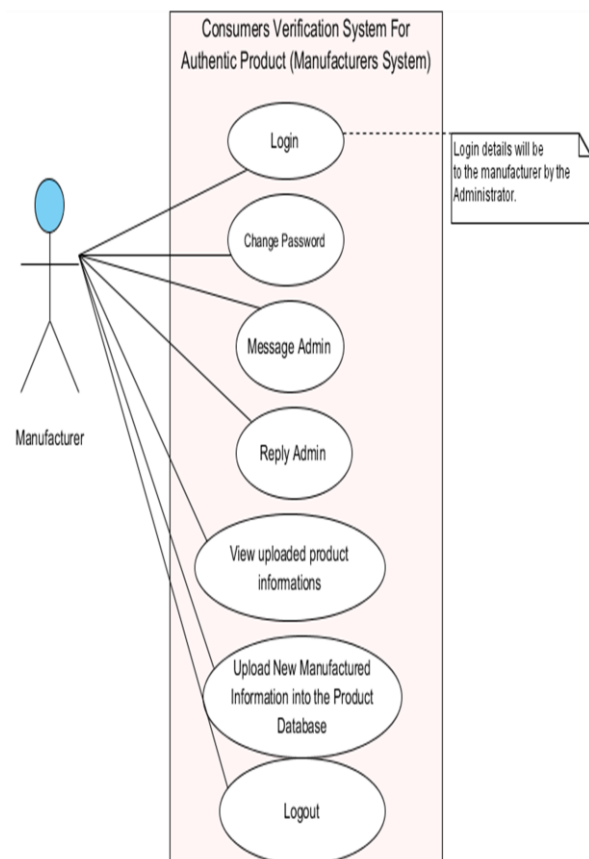
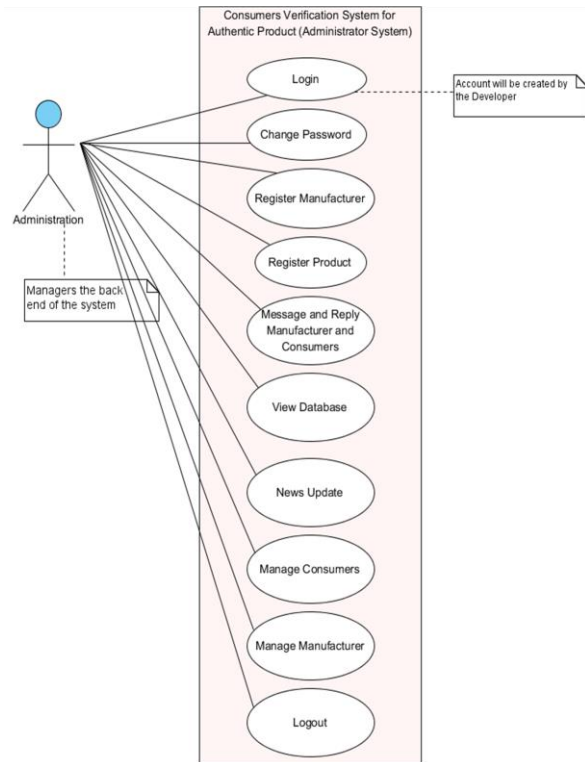


Figure 2. Use Case for Manufacturers System



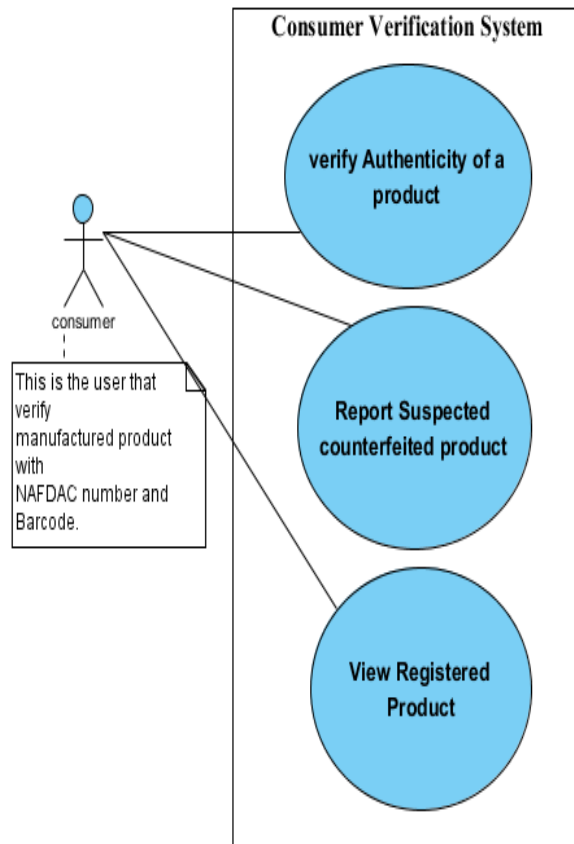
**Figure 3. Use Case for Administrator System**

### 3.2 Relationship modelling

The relationship model (Figure 5) shows the following relationships between the entities

- i.) Consumers can verify zero or many product
- ii.) Manufacturer can register expiring date & Manufacturing date of one or many product.

- iii.) Administrator can register zero or many product
- iv.) Consumer can report one or many counterfeited product to Administrator
- v.) Administrator can communicate with zero or many manufacturers



**Figure 4. Use Case for Consumers System**

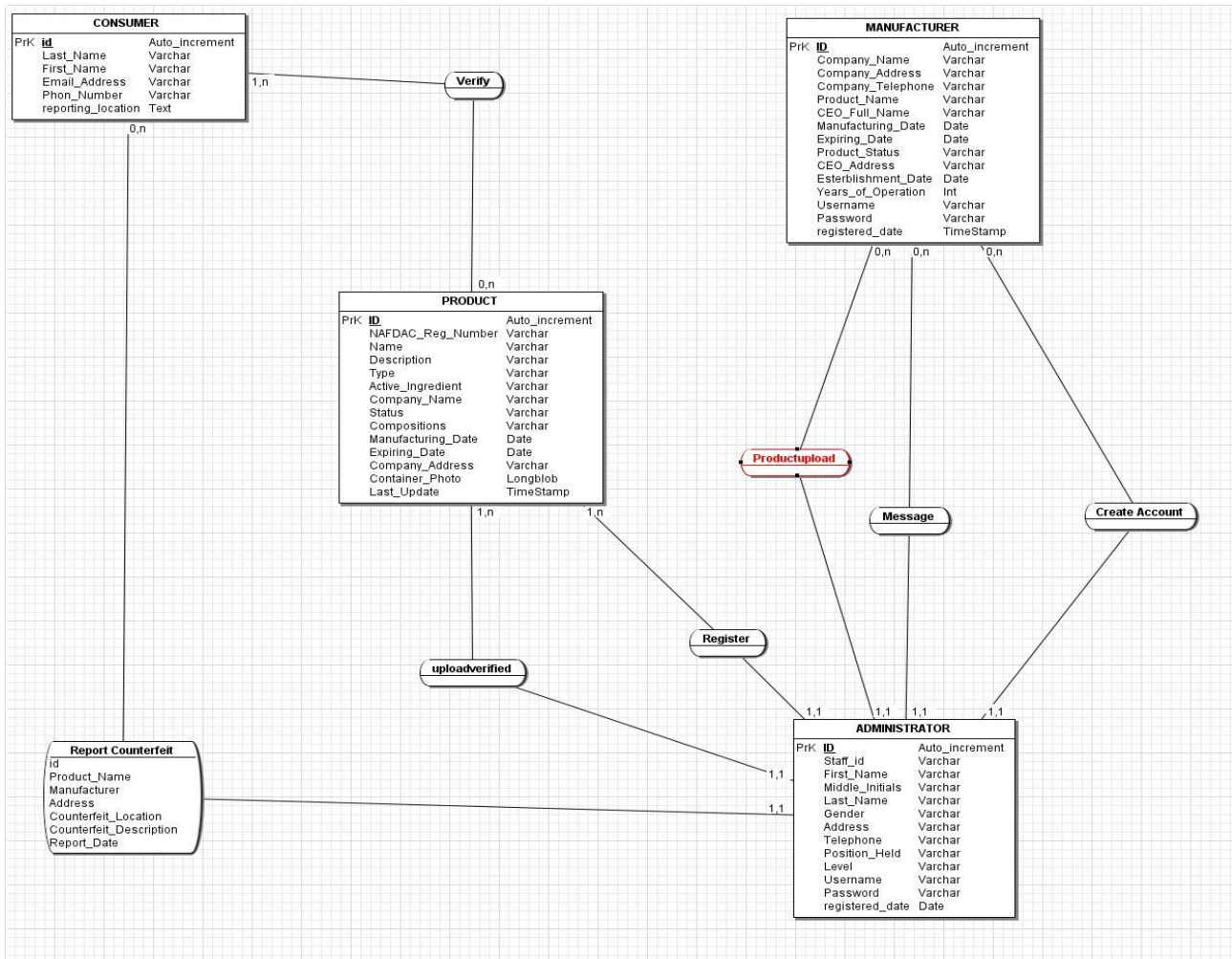


Figure 5. Relationship Model Diagram for Consumer verification System

#### 4. Implementation with screen shots

The user interface is the communicating part of the system. It describes how the user interacts with the system and how the software communicates within itself. The following interface is the webpages that will interact with the application users whenever it is launched. The Programming language used is the

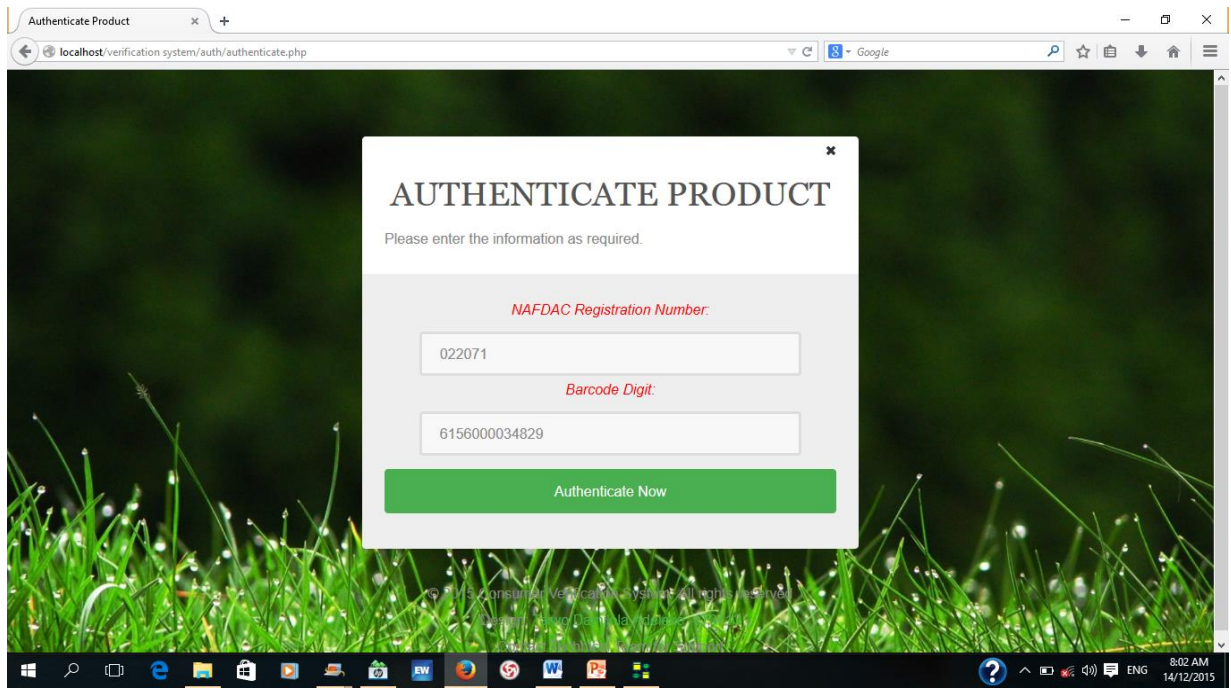
Web development Programming language, which include HTML 5, PHP, MySQL, etc.

#### 4.1 Consumer's Operation Screenshots

Figure 6 and Figure 7 show the screenshots captured from the developed system.

If product is authentic the system automatically displays the product details in the view in Figure 7.

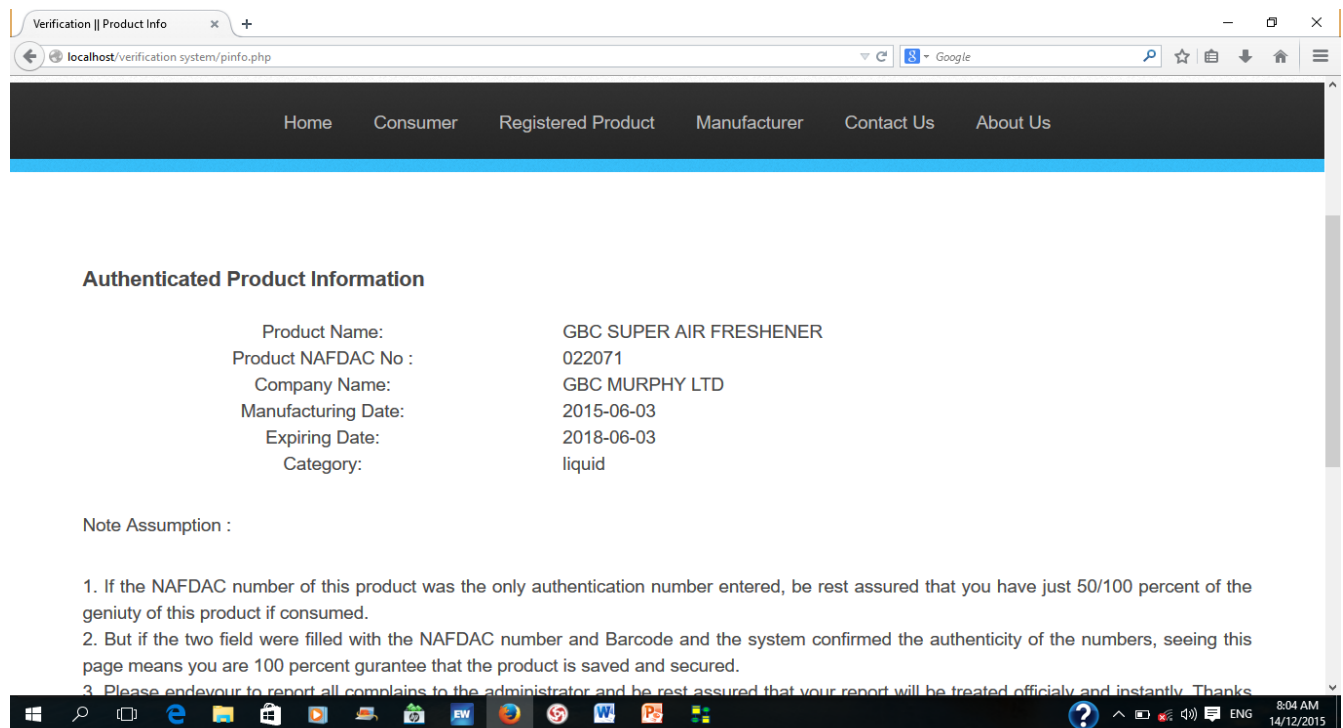




**Figure 6. NAFDAC Registration Number: The NAFDAC No on the purchased manufactured product.**

**BARCODE DIGIT:** Represent the 13 or 8 digit on every manufactured product

**AUTHENTICATE NOW:** To confirm the authenticity of the product.



**Figure 7. Authenticated product information**

## 5. Conclusion

The aim of this research exercise is to build and implement a consumer verification system for authentic product in Nigeria. It is an attempt to add value into our society on consumption of manufacturer products through authenticating all products with this system; in other words, to stop the consumption and eradicate fake products in our society. The system developed has proved functional and very effective in achieving the set goals and objectives. This service can be made available to the users by hosting it on the internet to serve as Product Verification System (PVS).

The performance of this work is no doubt a good means for reference and research work. This piece of software can be expanded and more robust if NAFDAC can implement the research work. The government can also give a back-up through broadcasting publicities and warning manufacturers of products in Nigeria to make sure they follow the right and correct procedure in producing their products. Valid NAFDAC number and Unique barcode on each specific product must be used to clearly differentiate, an Authentic producers from Counterfeiters and also make sure defaulters reported are punished. This system can be used to promote consumers right and reduce death caused from use of fake manufactured products. This work has actually provided a platform for further studies in the area fighting counterfeiters of drugs out of Nigeria.

## 6. REFERENCE

- [1] Nwosu, A. 2014. Ubiquitous Consumer-Centric System to Combating Product Counterfeiting and Boosting Entrepreneurship in Developing Economies (pp. 49-58). Virginia Peninsula Center, Newport News, Virginia, USA: Dept. of Computer Science and Information Systems, Donald R. Tapia School of Business, Saint Leo University.
- [2] WordWeb. (Ed.). 2007. WordWeb 5.2. Antony Lewis 2007.
- [3] Raufu A. 2015. Nigeria leads fight against "killer" counterfeit drugs. *World Health Organization*.
- [4] Akunyili, D. N. 2005. COUNTERFEIT DURGS AND PHARMACOVIGILANCE (Vol. 10). NAFDAC: NAFDAC Federal Republic of Nigeria.
- [5] Frenkiel, O., and Dora Akunyili. 2005. "One Woman's War with Fake Drugs."
- [6] Kolawole, J. A., Jacob Adegboyega. 2012. Tollgates to Effectiveness and safety of medicines in Drug Therapy.
- [7] NAFDAC. 2013. National Agency for food and Drugs Administrative control. Retrieved 23-05-2015, 2015
- [8] Hoax. 2012. DRUG AUTHENTICATION CHECK - FACTS ANALYSIS HOT. from [www.hoaxorfact.com/health/drug.authentication-check.html](http://www.hoaxorfact.com/health/drug.authentication-check.html). Accessed April 07, 2012.
- [9] Mejabi, L. 2015. All you need to know about NAFDAC's SMS short codes. from [smartsmsolutions.com/blog/item/149-all-you-to-know-about-nafdac-s-sms-short-codes](http://smartsmsolutions.com/blog/item/149-all-you-to-know-about-nafdac-s-sms-short-codes). Accessed on 21 July, 2015)
- [10] Omojokun, J. 2013. Regulation and enforcement of legislation on food safty in developing countries. (pp. 263-280).
- [11] Bagherinia, H., Manduchi, R. 2011. A theory of color barcode (Vol. 2015, pp. 806-813). USA: Department of Electrical Electronics Engineering, University of califonia.