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Building a Customer-Centric Transformation for Next Generation e-Commerce

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Abstract. In today's fast changing business environment, it is extremely important to be able to respond to client needs in the most effective and timely manner. In online business, customers will wish to view products and services online without waiting or delaying. Researches have shown that most of the systems developed recently were not customer-centric. As a result, this research has proposed a customer-centric transformation for next generation e-commerce web application, which retails various brands of cars. The developed system would enable users to register, login, place order for desired products and make payment by using cash on delivery or pay later option, however, the user will be expected to pay shipping fee depending on the location. In developing the system, different strategies - like 3-tier architecture, server and model were considered. The tools used were bootstrap and JavaScript to design the front-end, codeigniter frame work for validation and verification, and to achieve a high degree of speed and less memory requirements, MySQL database were used. The result of the implementation did not only produced a customer centric website with many functionalities and user-friendly interface, but also provides an easy access to viewing orders placed by Administrators and Managers.

Keywords: customer, merchant, transformation, next generation, e-commerce.

1. Introduction

Advances in technology and communication, combined with the explosive growth in data and information, have given rise to a more empowered global consumer [1]. Development of customer centric transformation for next generation requires putting the customer at the heart of everything you do. Understanding your customers' values and adopting the right culture, technology and skills are critical to success.

According to [2], customers have changed, unlike in the olden days, consumers have higher expectations and more information at their fingertips than ever before. They can now transact in new ways such as the Internet or television, mobile devices, or in kiosks. However, some still prefer traditional stores option. Customers are king on the Internet, and so they should be treated as such. Today, many customers are on social media environments, as a result, if they have a poor experience of a particular brand or product, they do not just switch to another provider, they use the media (social) to make sure their friends, colleagues and family know all about it.

In this consumer-driven landscape, customer focus is a strategic imperative. Companies across the globe are striving to actively embrace customer centricity. They are seeking to increase customer satisfaction and loyalty by focusing on understanding customers' needs and preferences to reduce customer churn. At the same time they are seeking to grow their businesses in a challenging environment [3]. Baker, [4] reported that e-commerce is unquestionably in an age of ascendancy. Virtually anything that has been made in the last 100 years can be found for sale somewhere on the Internet. This reality is confounding traditional retailers, wholesalers and distributors and more as their facilities cannot match the scope of offerings found in the electronic showroom of the worldwide web. Captains of industries wanted to be known, as a result, creating online channels for their products and services. They can use electronic commerce to reduce transaction costs by improving the flow of information and increasing the coordination of actions and still be able to grow top line revenues. It is unfortunate that many wholesaler/distributor or manufacturer think that e-commerce is not too relevant to their current systems and processes [5].

The social relevance of e-commerce is permanently on the increase. Next generation shopping models are positioned mainly Niche PiggyBack- where sellers of similar products come together, beside well known big players like Amazon, to market more easily, usually retaining their own blog or eCommerce site elsewhere

too. That phenomenon leads to more customer satisfaction, loyalty and finally to more revenue for the vendor [6]. Presently, not many sellers are launching such new platforms and services. However, one can foresee a situation where online shopping will become a must-have for every shop owner. As a result, sellers should focus on upcoming trends to be part of next generation shopping.

1.1 Defining Customer-Centricity?

Customer centricity is not just about offering great customer service, it means offering a great experience from the awareness stage, through the purchasing process and finally through the post-purchase process. It is a strategy that is based on putting your customer first, and at the core of your business [7, 3]. According to [8, 9], many companies turn to various marketing concepts such as product-orientation and market-orientation when pursuing sustainable competitive advantage where one of the newly debated concepts is customer centricity [10, 11, 9]. Levitt [8] reported that creating customer-value is the key to competitive advantage [8]. He also stressed the importance of companies to be customer-centric oriented because they otherwise would fail to see market opportunities, as a result, fail to create value for their customers. Karina, [12] also supported the report of [13] that customer-centric orientation has become central due to the changes in the market. He stressed that face-to-face interactions should be replaced with technology driven touch points, and demanding new ways to build customer relationships. There are many reasons as to why it is essential for firms of today to create customer centricity.

[9] argued that customer-centric marketing is important in handling fragmented market, rapid developments in technology and rendering efficient customers' service. He added that creating long-term relations to the firm's most valuable customers is the greatest possibility to build sustainable competitive advantage. [10] agreed with Sheth et al., [9] and said that customer centricity is an opportunity for firms to develop a sustainable competitive advantage. He added that the approach is an effective way to handle the complex and globalized market. Firms who are customer-centricity oriented will definitely increase in profits and higher degrees of customer loyalty.

2. Next Generation e-Commerce for Retail

Majority of households in North America and United Kingdom now shop online, in addition to using more traditional channels like stores and catalogs. These valuable shoppers are demanding. According to [5], they want to shop when they want and how they want through both Web and traditional channels. As a result, sellers are expected give details of their products including cost prices on the Web. IBM noted that the shoppers are hard to attract and even harder to retain, meeting their demands is well worth the effort, because they spend more than their single-channel counterparts up to three to four times more [5]. Therefore, sellers should bear it in mind that more than likely, their most valuable retail customers are not exclusively online shoppers rather they are multichannel ones.

In fact, it is easy for retailers to gain a distinct competitive advantage by using new technology to deliver an integrated multichannel customer/shopper experience. A research conducted in 2006 showed that Web has influenced more than 20 percent of all retail sales [5]. It was also noted that the most efficient way to attract and retain most valuable customers is by first optimizing the e-commerce channel. IBM went further to say that sellers can transform ordinary customers into highly profitable ones if retailers can offer e-commerce sites that use next-generation capabilities to seamlessly integrate the e-commerce channel with more traditional retail channels [5].

According to [14], there is a fundamental shift in the way that commerce is changing in response to a generation that is growing up digital. Zimmerman [14] in his paper reported a survey conducted by Acquity Group, the survey involved more than 2,000 American consumers, and some interesting trends emerged from the results. The survey revealed that "consumers like to see what they get — and get it quickly." For example, the survey showed that 73 percent had used a service such as GrubHub, 46 percent had taken advantage of expedited delivery from a third-party service, and 51 percent had used in-store pickup, barely a majority. As reported by IBM, personalization is the foundation of loyalty [5]. More customers will be won when shipment is fast and delivery is not shady.

In conclusion, IBM has proposed a next-generation e-commerce that will allow sellers to integrate online systems with both delivery and customer service systems among others. With it shoppers can easily gather product details, special events and promotions, store hours and locations, and more from any channel [5].

3. How to Create a Customer Centric Strategy for your Business

Customer centricity is not just about offering great customer service, it means offering a great experience from the awareness stage, through the purchasing process and finally through the post-purchase process. It's a strategy that's based on putting your customer first, and at the core of your business [7].

When businesses put customers at the core of business, they collect wealth of data within their Customer Relationship Management (CRM) software. Here are some of the things that can be derived:

i. Data to understand buying behavior, interests and engagement of customers will evolve
ii. Opportunities to create products and services for best customers will be identified
iii. Lifetime value can be used to segment customers based on top spending customers

Research conducted by Deloitte and Touche found that customer-centric companies were 60% more profitable compared to companies that were not focused on the customer [3].

3.1 Customer Centric Operating Models

A customer-centric organization builds an operating model around a deep understanding of its customers, what they value and the contribution each makes to the profitability of the company.

This requires:

i. Designing business processes that recognize different customer Segment needs
ii. Delivering a positive and seamless customer experience at every touch point across the customer life cycle
iii. Maintaining an active dialogue with customers (and acting on feedback)
iv. Fostering a culture that places the customer at the heart of the decision-making process

4. The Proposed System

The proposed system uses three-tier architecture; and some of the services supported by its database include: catalog-style Web site with search, update, and display functions. All these make it suitable for e-commerce site to function perfectly. Figure 1 shows the proposed system architecture.

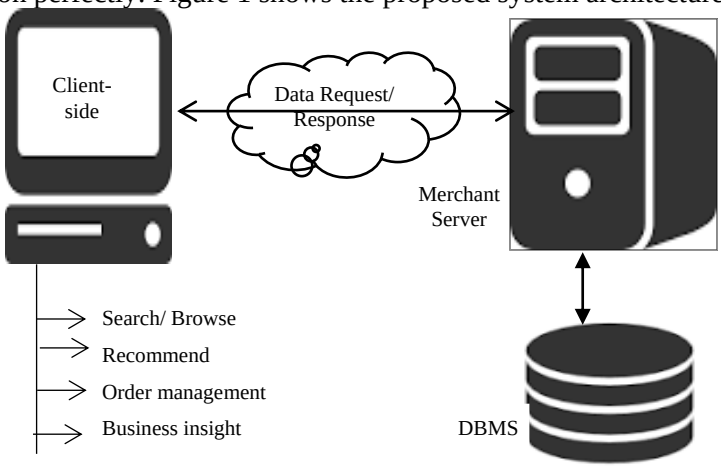

Figure 1: Architecture for the Proposed Customer Centric E-Commerce Payment System.

4.1 Client layer

The top-most level of the site is the user interface. This layer was designed using bootstrap and JavaScript. The main function of the interface is to translate tasks and result to something that user can understand. Basic functions include:

i. Provides user interface
ii. Handles the interaction with the user
iii. Sometimes called the GUI or client view or front-end
iv. Should not contain business logic or data access code

This is the customer side; and the focus of the project was to develop a client layer that is customer centric, the design includes:

i. Search/ Browse: The customer must be able to readily find the products of interest either by searching the product catalogue or via browsing of the catalogue. Great customer experience requires guided search and navigation to help customers rapidly find the right product(s) of interest.

ii. Offer / Recommend: Providing offers and recommendations greatly improves cross-sell and up-sell. Offers and recommendations are real-time, personalized, and relevant to provide a compelling shopping experience. Offer recommendations should also incorporate business insight to specifically target customers with similar interests.

iii. Order Management: Once the customer has decided on the particular products, the ordering process must be efficient and accurate.

iv. Business Insight: To consistently improve the customer experience, information needs to be collected from all interactions across all point of interaction and made readily available for real time analysis.

4.2 Merchant layer

This layer coordinates the application processes commands, makes logical decisions and evaluations, and processes data between the two surrounding layers. Codeigniter will be used to develop this layer.

Basic functions include:

i. The set of rules for processing information
ii. Can accommodate many users
iii. Sometimes called middleware/ back-end
iv. Should not contain presentation or data access code

4.3 Database layer

Here information is stored and retrieved from database or files system. The information is then passed back to the logic tier for processing, and then eventually back to the user. Wampserver is used to host and create the database.

Basic functions include:

i. The physical storage layer for data persistence
ii. Manages access to DB or file system
iii. Sometimes called back-end.

5. System Design Tools

Overview of the development tools that was used to develop the proposed website are hereby discussed.

5.1 Codeigniter

CodeIgniter is an Application Development Framework, a toolkit for building web sites using PHP. Its goal is to enable you to develop projects much faster than you could if you were writing code from scratch, by providing a rich set of libraries for commonly needed tasks, as well as a simple interface and logical structure to access these libraries. It lets you creatively focus on your project by minimizing the amount of code needed for a given task.

5.2 Javascript

JavaScript is most commonly used as a client side scripting language. This means that JavaScript code is written into an HTML page. When a user requests an HTML page with JavaScript in it, the script is sent to the browser and it's up to the browser to do something with it.

Javascript is one of the most simple, versatile and effective languages used to extend functionality in websites. Uses range from on screen visual effects to processing and calculating data on web pages with ease as well as extended functionality to websites using third party scripts among several other handy features, however it also possesses some negative effects that might make you want to think twice before implementing Javascript on your website.

The Javascript language is relatively easy to learn and comprises of syntax that is close to English.

Javascript is relatively fast to the end user: As the code is executed on the user's computer, results and processing is completed almost instantly depending on the task (tasks in javascript on web pages are usually simple so as to prevent being a memory hog) as it does not need to be processed in the site's web server and sent back to the user consuming local as well as server bandwidth.

5.3 Bootstrap

Bootstrap is a powerful front-end framework for faster and easier web development. It includes HTML and CSS based design templates for common user interface components like Typography, Forms, Buttons, Tables, Navigations, Dropdowns, Alerts, Modals, Tabs, Accordion, Carousel and many other as well as optional JavaScript extensions. Bootstrap also gives ability to create responsive layout with much less efforts.

The biggest advantage of using Bootstrap is that it comes with free set of tools for creating flexible and responsive web layouts as well as common interface components.

Save lots of time: You can save lots of time and efforts using the Bootstrap predefined design templates and classes and concentrate on other development work.

5.4 Wampserver

WAMP is an acronym formed from the initials of the operating system Microsoft Windows and the main components of the package: Apache, MySQL & PHP. Apache is the most popular open source web server, MySQL is the most popular open-source database, used by huge number of websites around the world (among them, you will find Google, YouTube, Wikipedia, Facebook, Flickr, etc) and PHP is a widely used general-purpose server-side scripting language designed to produce dynamic web pages.

By combining these components into a single installation package, WampServer allows users to set up a server locally on their Windows machine to create dynamic web applications with Apache, PHP and the MySQL database in the same development conditions as on the production server.

One of the great benefits of WampServer is that it allows you to develop, upgrade components, perform any web development task and carefully test everything offline first, which reduces the risks of creating problems on the live server.

6. System Requirements

6.1 Use-case diagram for the proposed website

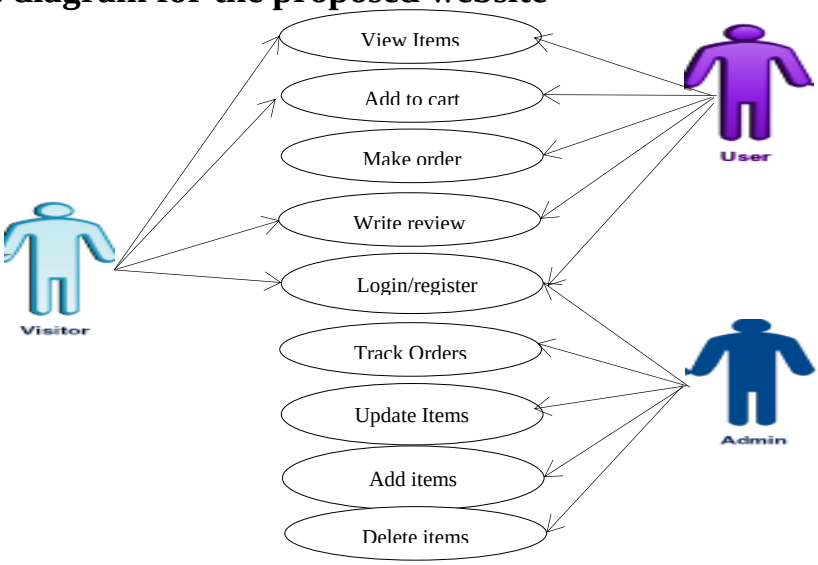

Figure 2: Use-Case Diagram of the Proposed System

6.2 Use cases description

The use case diagram of the proposed system as shown in figure 2 are hereby explained,

View Items: The customer and visitor requests to view the products in a product category. The system will display the product information of the selected category.

Add to cart: When the customer finds the products he wants, he adds them to the shopping carts. The system will store and keep track the information of the products that have been added into shopping cart.

Make order: When the customer finishes shopping, he requests to checkout.

Login: When the customer finishes shopping, he requests to checkout. If the customer has not yet logged in then the system pops up login page. The customer can login to the e-Commerce shopping system by enter his user name and password. The system will verify that the login name matches the login password. If they do not match, error message will be indicated to the customer.

Write review: The visitor or the customer may request to write review about a product.

Register: If the customer is a new user, he can request to register with the system. The system displays a registration page and asks the customer to choose a login name (email address of the customer) and password. The customer is also required to enter their name and address. Shipping information and credit card information are optional entries at this point.
Track Orders: The admin request to know the status of the product.
Add Items: The admin request to add product to the inventory.
Delete items: The admin request to delete items from the inventory.
Update Items: The admin requests to update inventory. The system will update the product information in the database.

6.3 Process Model

A Process Model tells us about how the data is processed and how the data flows from one table to another to gather the required information. This model consists of the System Functional Flow Diagram and the Information Architecture.

6.3.1 System Functional Flow Diagram

A system functional flow diagram shows a top-down functional decomposition of a system and exposes the system's structure. The objective of the Functional Decomposition (in figure 3 below) is to break down a system step by step, beginning with the main function of a system and continuing with the interim levels down to the level of elementary function.

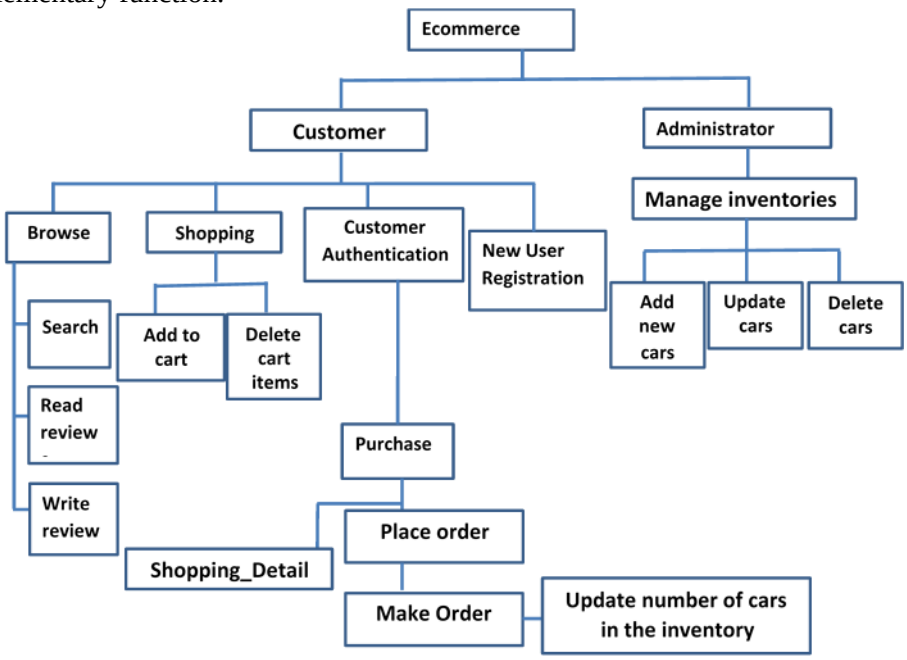

Figure 3: System Functional Flow Diagram

6.3.2 Information Architecture (IA)

Information architecture (IA) as shown in figure 4 refers to the structure or organization of the website. It describes the ways in which different pages of the site relate to one another and ensures information is organized in a consistent and predictable way on each page.

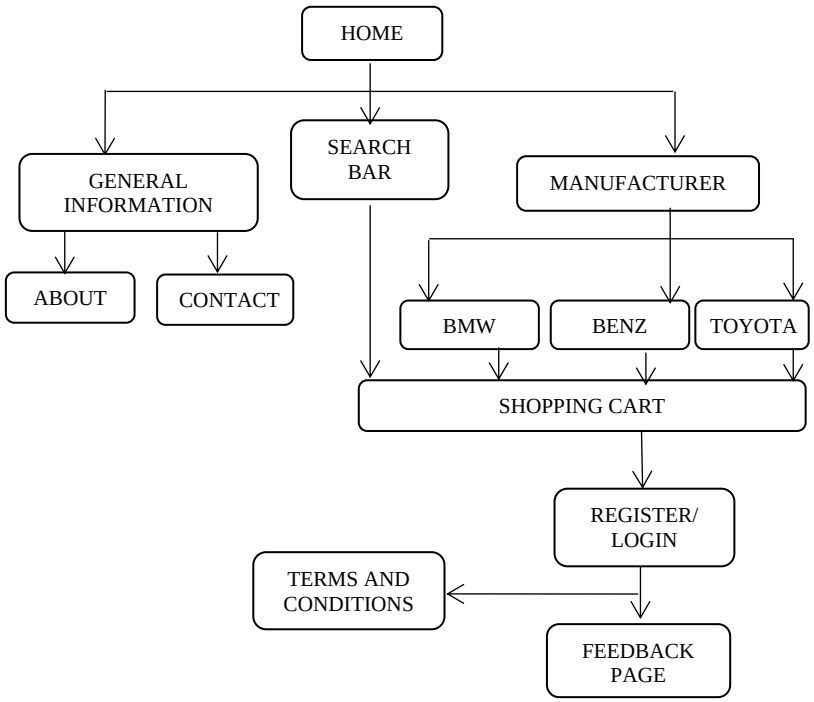

Figure 4: The Information Architecture for the Proposed System

7. Proposed System Model

7.1 Mathematical Model

To evaluate the customer centricity of a website Ψ, we need the analysis of some data which can be supplied by the website administrator.

Let the total number of visitor to a website Ψ be $ŧ_{visit}$,let $ŧ_{reg}$ be the total number of visitor that registered and $ŧ_{noreg}$ be number of visitors that only visited but did not register over a period of time ŧ.

Assumption:

We assume that visitor must visit a website Ψ before he can choose to register or not, then will can express $ŧ_{noreg}$ and $ŧ_{reg}$ as a subset of $ŧ_{visit,}$, i.e $ŧ_{reg}$, ŧnoreg Є $ŧ_{visit}$, for ∀$ŧ_{visit}$. To evaluate the total number of registered users that left website Ψ (i.e. which is denoted as $ŧ_{left}$) over a period of time ŧ:

We put $ŧ_{con}$ as total number of registered users that are consistent with their visit to the website Ψ over period of time ŧ. $ŧ_{left}$ can now be evaluated as the difference between $ŧ_{reg}$ and $ŧ_{noreg}$

$$ŧ_{left} = ŧ_{reg} - ŧ_{noreg} \quad (1)$$

Since it is only registered users that are eligible to purchase a product. We can measure the satisfaction of visitors to a website Ψ over a period ŧ by comparing $ŧ_{left}$ and $ŧ_{con}$ i.e. If $ŧ_{left} > ŧ_{con}$ then, it means customers were not satisfied with their visit to the website but, if $ŧ_{left} < ŧ_{con}$ then, it means customers were satisfied with their visit to the website.

The second condition is essential to the growth of any e-commerce website, and some of the things that can help achieve that is to use all the models, factors and approaches of customer centricity to build a customer centric e-commerce.

Percentage measure of customer centricity of a website Ψ denoted as $P_{centric}$ over a period ŧ of time can be measured using

$$P_{centric} = \frac{ŧ_{left}}{ŧ_{visit}} * 100 \quad (2)$$

Website with $P_{centric} > 50\%$ can be consider a customer centric website otherwise the website is not customer centric.

Capturing the list of ordered items: We first generate the list of cars added to cart by customer C, let P_{cart} denote the list of car(s) added to cart and let k represent each of those cars on the list.

$$P_{cart} = \sum_{i=1}^{n} k_i \quad (3)$$

Where n is the total cars added. Now to generate the customer order list $O_{list,}$ we have:

$$O_{list} = P_{cart} + O_{num} \quad (4)$$

Where O_{num} is the customer order number. Then we can derive equation to calculate the total amount A of car(s) k_i purchased by a customer C as:

$$A = \sum_{i=1}^{n} a_i \quad (5)$$

Where n is number of car(s) k_i purchased by customer C and a_i is the individual price of the selected items. The equation to calculate the total amount A of cars(s) k_i purchased by a customer C over a period of time ŧ is:

$$A = \sum_{j=1}^{\uparrow} \sum_{i=1}^{n} a_i \quad (6)$$

Where time ŧ (period of time under consideration) is calculated in month therefore j = 1,2 ..12

7.2 E-Commerce Sites Competitive Model

The model of [15] was adopted. Consider n web sites offering similar services, m (m > n) customers visit some sites, m_i is the number of customers that use site i, m_{ij} is the number of customers that use both site i and site j. P_i is the probability of using site i for every customer, so the expectation population of customers using site i is

$$EP = \sum_{k=1}^{m} P_i m \quad (8)$$

Assuming that the probability of using site i is independent on using site j, the probability of using both sites at the same time is

$$P_{ij} = P_i P_j, \quad (9)$$

then

$$m_{ij} = P_i P_j m \quad (10)$$

xi is the fraction of the population, that is a customer of site i, namely,

$$x_i = \frac{m_i}{m} = P_i \quad (11)$$

x_i is determined by three main factors:

If there is no competition with any other sites, it grows with a rate αi, and then saturates at βi. αi is the growth rate of individual sites, βi denotes their capacity to service a fraction of the customers. They are both determined by each site's performance, such as advertisement, linkage user friendliness, etc.

On the other hand, if other sites offer competing services (by having a good customer centric website), Υ_{ij} is the competitive strength between site i and site j. $x_i x_j$ denotes the fraction of using both sites at the same time, that is,

$$x_i x_j = \frac{m_{ij}}{m} = \frac{p_{ij}}{p_i p_j} \quad (12)$$

However, both sites provide similar services, and then some of these customers will stop using one or the other. Υ_{ij} $x_i x_j$ is the rates at which they will stop using site i, and the rate they abandon site j is given by Υ_{ij} $x_i x_j$. In addition, due to the particularity of e-commerce, customers usually ‘‘preferentially’’ use the services of sites possessing more customers and that is easier to use (customer centric website), so $\omega_{ij}(x_j - x_i)$ is the effect of ‘‘preferential choice’’. ω_{ij} $(0 < \omega_{ij} < \Upsilon_{ij})$ denotes effect degree. ω_{ij} is usually small, so its impact on the system is small. However, when two sites are similar, ω_{ij} plays an important role [15].

8. SYSTEM IMPLEMENTATION

8.1 Customer Centric Online Automobile Shopping Application

The user interface design will closely follow our System Functional Flow Diagram (Figure 3). Figures 5-8 show the designs of the web pages.

8.1.1 Home and registration page

The Home Screen will consist of screen where one can browse through the products which we have on our website. The registration page allows new users to register.

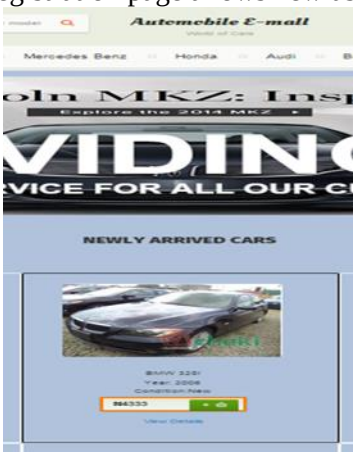

Figure 5. The home page Figure

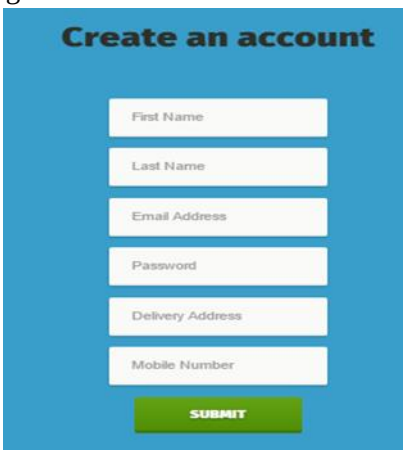

Figure 6: The registration page

Login page and product order pages: Admin and users have different login pages. Product page consists of cars which can be filter by name of makers on the navigation bar. This page appears same for both visitors and users.

Figure 7: The user login Page

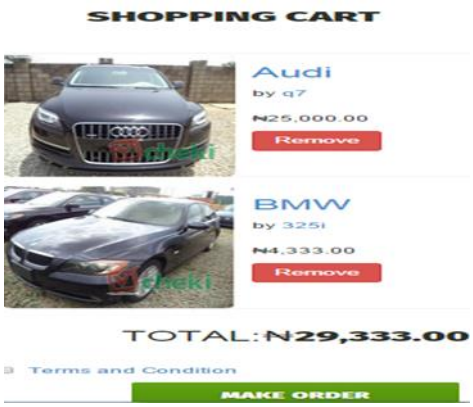

Figure 8: The order page.

If the entry is *successful*, customer will gain access to the system. Customer though the interface will choose a desired merchant and select items from the items’ list (e.g the system displays item ID, item price, and the required quantity and total amount of the purchased goods) and add them to the cart. He can make other purchases also (Figure 9). At the end of his selection, the system will begin payment initialization as follows:

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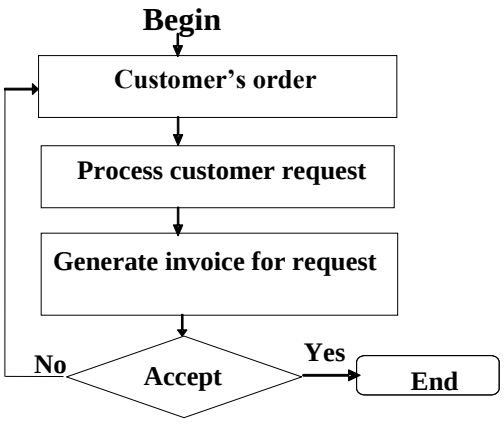

Figure 9: Data Flow Diagram for Viewing Purchase Details at the Customer's side

9. Conclusion

The system was developed to provide user with easy navigation, retrieval of data and necessary feedback as much as possible. The shopping cart is with user-friendly shopping cart application logic. With it, it is convenient for the customer to view the contents of their cart and remove or add items to the cart. The shopping cart application described in this work provides a number of features that make the customer more comfortable. Mathematical model was developed to help e-commerce organization to measure customer centricity of their web site. This project helps in understanding the creation of a customer centric and interactive web page. The design of the project which includes system functional flow, information architecture and database design illustrates how the database is built with different tables. The case diagram also shows how different actors interact with system. The building of the project has given me a precise knowledge about how bootstrap and codeigniter are used to develop a website, how it connects to the database to access the data and how the data and web pages are modified to provide the user with a shopping cart application. To succeed in this fast-changing environment and achieve sustainable top-line growth, ecommerce organizations need to focus on redefining customer relationship, encourage and seek to create customer loyalty and try to understand the true value of customers.

10. Acknowledgment

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