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DECISION SUPPORT SYSTEM FOR PROMOTING CEMENT SALES IN DANGOTE CEMENT INDUSTRY, OBAJANA-KOGI STATE, NIGERIA

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ABSTRACT

This project work is concerned with the use of an Intelligent Decision Support System for development of Customer-Driven marketing strategies. Intelligent system, if well harness, may provide a day-to-day operational production planning in order to meet the customer's needs and yearning. In this work, a thorough investigation into the existing system is made and inherent pitfalls identified. A new system is proposed with a model presented which provides the ability to evaluate the capacity for new orders and unforeseen events such as equipment downtime and changes in operation; help managers deal with uncertainty and produce intelligent advice on setting marketing strategy. The proposed system acts as a decision supports system (DSS) used to augment the task of planners and schedulers to run production more efficiently, thereby invigorate customers services. Various mathematical and statistical tools were used for analyzing the data such as time series model for forecasting and SPSS package to assess the trends of sales. The object oriented programming paradigm is used in the analysis and design. The system is very promising as it offers better customer/manufacturers relationship and strategic plans for outstanding services.

Keywords: Decision Support System, Marketing Strategy, Sales Promotion

INTRODUCTION

In the business world managers make decisions everyday, some more consequential than others. In fact, decision making is one of the most significant and important activities in business. Organizations devote vast resources of time and money to the process. Businesses make decisions on issues such as whether to expand the workforce, extend business hours, use different raw materials, or start a new product line, etc. Computer systems can help in the decision making process by providing fast and accurate analysis capabilities. Computer aided decision-making software falls into three major categories: (i) decision support software that helps in analyzing information to aid decision making. (ii) Artificial intelligence software that can make decisions or perform tasks on behalf of the user. (iii) Intelligent agent software that handles repetitive tasks such as searching, retrieving and monitoring.

The term decision support system, used broadly, means any computer- aided system that helps in decision making process. In its narrowest sense, a decision support system (DSS) is software that uses models, information, and an interactive user interface to help in decision making. An intelligent decision support system may be defined as an interactive computer-based System or sub system intended to help decision makers use communications technologies, data, documents, knowledge and /or models to identify and solve problems, complete decision process tasks and make decisions. In general, Decision Support Systems are a class of computerized information systems that support decision-making activities.

[3] [7] [10] explained that DSS can be developed to support strategic marketing decisions that influence consumer behaviour to enhance sales promotion. Marketing Strategy on the other hand is a means by which the marketing objective is achieved. In recent years, the use of computer-based information systems in the field of strategic marketing has been increasingly highlighted. Researchers have attempted at different periods the idea of developing effective information systems in support of marketing strategy development, recent development, has enhanced Intelligent Decision Support System model for use in the day-to-day operational production planning of manufacturing industries. These built up system will provide manufacturers the ability to evaluate the capacity of the system for new orders, unforeseen events, become a problem solver, maintain high ethical standard, become a product expert, understand buyer's behavior and discover customers' needs. Recently the decision support system has been extended to accommodate some other computer supports such as fuzzy logic and expert system although expert support systems have both advantages and limitations in supporting marketing strategy development.

In this study, an intelligent decision support system for customer-driven marketing strategies for cement industries is presented which integrates the power of different support techniques and technologies such as experts support system, fuzzy logic system and decision support system to support the development of marketing of products/or services, price, distribution, and promotional strategies to meet the needs of targeted buyers or consumers.
The inter-relationship between the manufacturers of cement and the consumers and/or users are becoming more complex and the amount of data for decision making is becoming an illusion, it is in this respect that this research work is been undertaken.

At present the problems with the use of incentives such as holiday promotion, patronage promotion, and quantity promotion to purchase additional products believed to have affected the customer's original purchasing power to enhance productivity, is absent, this leads us to the following issues: how can quantity discount, seasonal discount and promotional allowances enhance effective marketing in the company? How can we use DSS to aid the marketing department in decision making? How can we enhance long-time marketing planning? How do we encourage online purchasing ? Attempt to answer these questions and many others constitute the research problem of the study. To address these problems, this paper will extensively investigate relevant literature in DSS and marketing strategies with the objective of formulating a framework for customer-driven transaction; develop a piece of software to promote good relationship between customers and manufacturers and to integrate the strengths of diverse decision support techniques and technologies into development of customer-driven marketing strategies for cement industry.

The significance of this research work cannot be over-emphasized because it helps us to know that customers define the business and that manufacturing is performed on the basis of customer's orders. It is expected that the result of this study will boost both supply and demand as it will stimulate customers to buy products by ordering from firm's website or from regional deport distributors. Also, the study will help to build strong emotional bonds with customers by appreciating their patronage; find out more about the customer's needs and possible ways to satisfy them and provide incentives to purchase additional products.

Related Works

Different writers have defined marketing in various ways [8] defined marketing as a means by which individuals and groups obtain what they need and wants through creating and exchanging products and values with others. This definition of marketing rests on the following concepts: needs, wants and demands, product utility, value and satisfaction, exchange, transactions and relationships, markets, and marketers. Marketing management relate with the process of planning and executing pricing, promotion, and distribution of ideas, goods and services to create exchange that satisfy individual and organizational objectives. This definition recognizes marketing management as a process involving analysis, planning, implementation, and control. It covers ideas, goods and services that rests on the notion of exchange and that the goals is to produce satisfaction for the parties involved. The exciting new challenge that the practice of marketing faces has never been greater in the history of business practice than now.

[1] Argues that the marketing manager is the most significant functional contributor to the strategic planning process, with leadership roles in defining the business mission, analysis of the environmental competitive and business situations, developing objectives goals and strategies, and quality plans to implement the business strategies for sales promotion. The further asserted that sales promotion efforts complement and reinforce advertisement for consumer orientation behavior towards their products. [7] Highlighted decision support system as an interactive system that helps the management of an organization to take decisions between different alternatives or options available to them by

arriving at a reasonable decision that is cost effective. The managers used appropriate tools such as sampling of products to the customers, coupons, price discount among others to stimulate quicker and greater purchase of products to enhance sales promotion [8]. Persuasion of customers or consumers to purchase existing or new products influences buying decision of customers [3]. [5] Explains and attested that DSS concept addressed the real time problems and needs with its application development.

DSS construction tools serves as a general –purpose IT technologies to implements Information analysis, process control, disaster prevention and crises management [6]. Decision support system impacts positively on creating values for marketing decisions through an interactive system of man-computer system in making decisions and controlling complex situation [9]. An intelligent decision support system was developed to assist in the day-to-day scheduling decisions at a manufacturing industry. Decision support system is aimed at exchanging ideas by sharing thought, feelings, towards the development of an organization or an establishment for their utmost development in achieving their stated goals and achievement [6]. It provides the manufacturing management a tool that helps in resolving crises and in planning. However, certain tasks in problem solving are ambiguous and complex; it is an active IDSS that is needed to resolve the problems. Infarct, there is an increased trend toward including intelligent systems in computer-based information systems (CBIS). IDSS is an interactive computer-based system, which help decision-makers utilize data and models to solve unstructured problems. Marketing is the performance of activities that seek to accomplish an organization's objectives by anticipating customer or client needs and directing a flow of need-satisfying goods and services from producer to customer or client. Marketing strategy is about figuring out how to do a superior job of satisfying customers.

[2]Reported on Data–driven marketing as a process of collecting and combining immense amounts of on-line data with the aim of analyzing such data and making insightful decision about the customers. [12]Investigated how neuro-marketing research process link between customers thought and action for promoting their purchasing power. The idea behind this neuro-marketing try to convince the customers reasoning into buying or purchasing quantities they ordinarily would have not buy. This research explains that the knowledge of consumer's interest and desires will lead to better products and productivities. [13]Examine the correlation between the behaviour of a customer in relationship with their reasoning, decision making, and emotional responds to marketing. Marketing plays an essential role in providing consumers with need-satisfying goods and services and more generally, in creating customers satisfaction. Production and marketing are both important parts of a total business system

aimed at providing consumers with need-satisfying goods and services. It means finding attractive opportunities and developing profitable marketing strategies. To make it more comfortable and convenient for target customers to buy their goods/services, the company must put some controllable factors like product, place, promotion and price into consideration. Computer–Based Information Systems are constructed to solve particular problems facing different categories of management in an organization. Some of these information systems are: Transaction processing, Management processing, Executive Information system, Decision Support system, and Management Support system. [11]Examine the roles of modern information and communication technology on the impacts on promoting marketing. According to [11] large amounts of data needs to be filtered to avoid unnecessary data for processing.

[4]Use neuro-marketing studies to detect the direction of its customers through mobile tracking. The manufacturers or producers attract customer's attention by striking product colours in a web page so as to catch the attention of the customers. This research work emphasizes that Cement products should be ordered from the website without necessarily being on the company site to avoid the risk attached with it. For years, decision-making has been considered a pure art - a talent acquired over a long period of time through experience. Different styles of management could be used in approaching and successfully solving the same type of managerial problems in actual business practice. [3] Maintained that connected products are transforming competition. These styles are often based on creativity, judgment, intuition and experience, rather than on systematic quantitative methods based on scientific approach.

METHODOLOGY

Businesses need to plan how they will generate and satisfy demand for their products and/or services. Sales promotions are a vehicle by which businesses increase the demand for and visibility of their products and/or services. These promotions cost money and these costs must be justified by structured analysis. Additionally, proposed sales promotions affect future demand, so increased resources must be allocated to satisfy the promoted demand. With the advent of e-commerce, customer expectations are much higher than in the past. Therefore, if a business promotes a product or service, it is expected to provide these in a timely fashion. Many promotions could be considered as interventions or customer driven marketing strategies, because they can cause a time series process to deviate from its expected evolutionary pattern. It is assumed that the intervention event occurs at a specific time, has a known duration, and is of a particular type. In realizing these objectives, a software design methodology leveraging object-oriented analysis and design approach will be adopted.

```
import java.util.Date;
import java.util.HashSet;
import java.util.Set;
import javax.persistence.Column;
import javax.persistence.Entity;
import javax.persistence.FetchType;
import javax.persistence.GeneratedValue;
import static javax.persistence.GenerationType.IDENTITY;
import static org.jboss.seam.ScopeType.CONVERSATION;

import javax.persistence.Id;
import javax.persistence.JoinColumn;
import javax.persistence.Lob;
import javax.persistence.OneToOne;
import javax.persistence.ManyToOne;
import javax.persistence.OneToMany;
import javax.persistence.Table;
import javax.persistence.Temporal;
import javax.persistence.TemporalType;
import javax.persistence.NamedQueries;
import javax.persistence.NamedQuery;

import org.hibernate.validator.Email;
import org.hibernate.validator.Length;
import org.hibernate.validator.NotNull;
import org.jboss.seam.annotations.Name;
import org.jboss.seam.annotations.Scope;
@Entity
@Name("orderLine")
@Scope(CONVERSATION)
@Table(name = "order_line")
@NamedQueries({
            @NamedQuery(name =
"OrderLine.FindOrderLineByCustomerOrder", query = "select ol from
OrderLine ol JOIN ol.customerOrder o WHERE o.customerOrderId =
:customerOrderId")   })
public class OrderLine implements java.io.Serializable {
        private Long orderLineId;
        private CustomerOrder customerOrder;
        private Product product;
        private int quantity;
```

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```
public OrderLine() {  }
@Id
@GeneratedValue(strategy = IDENTITY)
@Column(name = "order_line_id", unique = true, nullable = false)
public Long getOrderLineId() {return this.orderLineId;}
public void setOrderLineId(Long orderLineId) {
        this.orderLineId = orderLineId;}
@ManyToOne(fetch = FetchType.LAZY)
@JoinColumn(name = "order_line_customer_order_id", nullable = false)
@NotNull
public CustomerOrder getCustomerOrder() {
        return this.customerOrder;   }
public void setCustomerOrder(CustomerOrder customerOrder) {
        this.customerOrder = customerOrder; }
```

Research Design

The research methodology is centered on sales promotions tools or activity that enhances marketing and managerial decision which foster good relationship between the producers of cement and their users. A visit to Dangote Cement factory, Obajana gives the researcher first hand information of what is obtainable in the factory.

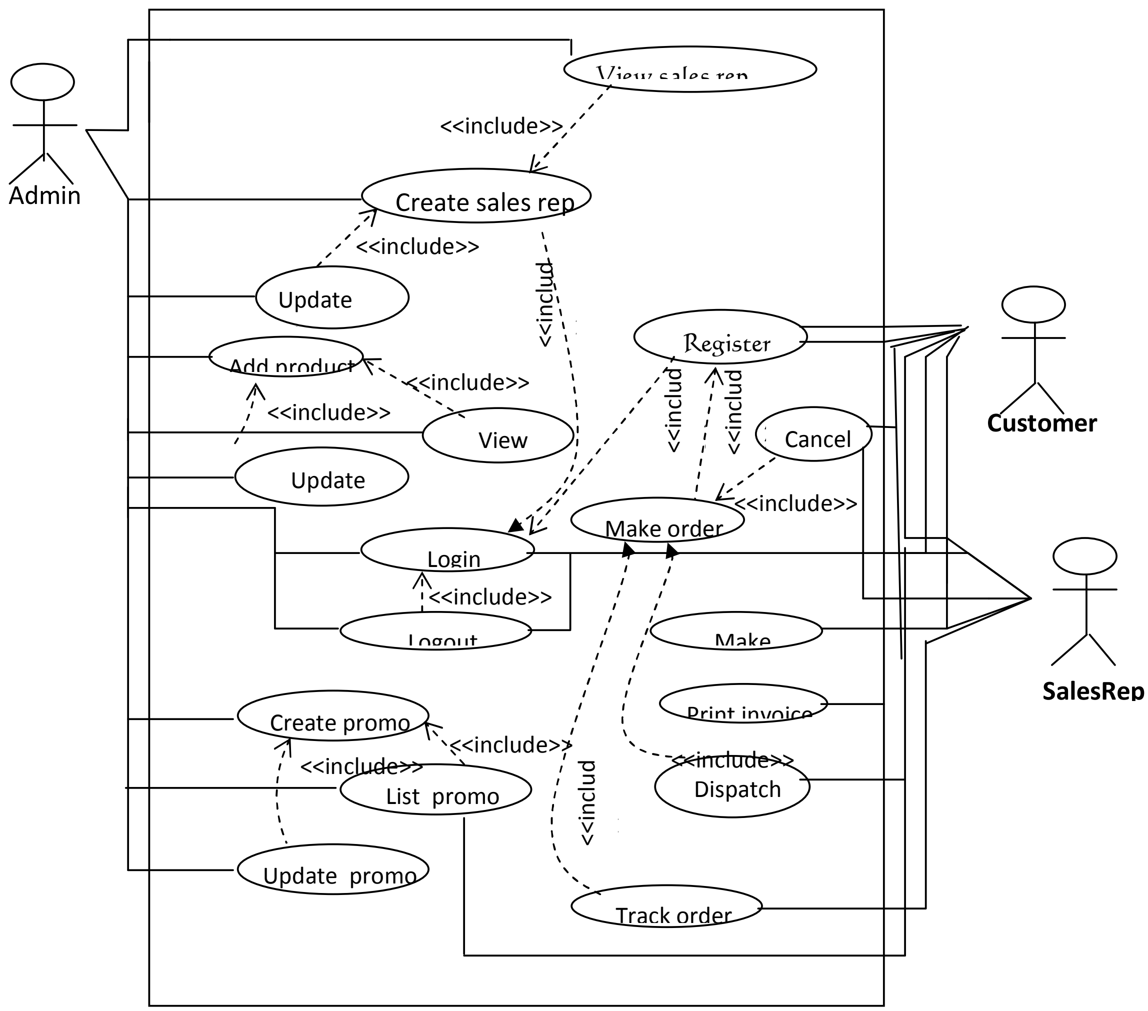

Figure 1: Use-case boundary diagram of the system

Data Collection

The method adopted by the researcher in collecting data including both primary and secondary sources. The primary source include interview conducted with marketing department staff to collect raw data for analyses while the secondary data sources was obtained from the previous journals and Dangote cement review bulletin and a host of others which enables the researches to base the analyses on both descriptive and analytical methodology.

Data Analysis Techniques

The analysis is based on an interactive or collaborative relationship between the management and the users or consumers of cement - individual users, construction companies, block molders, and building contractors. Statistical package for Social Sciences (SPSS) will be used to analyze the estimated yearly

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and monthly sales in the company which shows the trends of sales. Similarly, time series model is one of the predicting models used in this research to understand the trends of the existing market and to predict or forecast what the market will be in future so as to equip the management decision plan for promotional sales.

Findings and Discussion

The results and findings of this research are stated in this section as follows.

Table 4.1: Yearly Sales of Cement from Year 2013 To 2017 From The Company

Year(Time_t)	Yearly sales of cement (in billions ₦)
1	62.00
2	81.26
3	113.90
4	123.90
5	152.80

Table 4.2 Fitting of Linear Model for the Yearly Sales of Cement ANOVA (B)

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	5028.358	1	5028.358	168.004	.001(a)
	Residual	89.790	3	29.930		
	Total	5118.148	4			

a Predictors: (Constant), Time_t

b Dependent Variable: Yearly sales in Billion Naira(Y)

Coefficients (a)

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	39.500	5.738		6.884	.006
	Time_t	22.424	1.730	.991	12.962	.001

Dependent Variable: Yearly sales in Billion Naira(Y)

The Model is Y= a+bt, where a=39.500 and b=22.424, hence

$Y = 39.500 + 22.424t$

Testing for the fitted Line

H_o: $\beta = 0$ *(The model does not fit)*

H_1: $\beta \neq 0$ *(The model fit)*

$\alpha = 0.05$

Decision rule: Reject H_o if p value is less than α $/2$, if otherwise do not reject Ho

Decision: P value= 0.001< 0.025 *We reject Ho*

Conclusion: we conclude that the model fits and it can be use for forecasting.

Forecast for 2018

Y = a +bt

=39.500 + 22.424 (t)

=39.500 + 134.544 (6)

=174.044

Forecast for 2019

Y = 39.500 + 22.424.(t)

= 39.500 + 22.424 (7)

= 39.500 +156.968

= 196.468

Forecast for 2020

Y =39.500 + 22.424 (t)

=39.500 + 22.424 (8)

=39.500 + 179.392

=218.892

Forecast for 2021

Y = 39.500 + 22.424 (t)

= 39.400 + 22.424 (9)

= 39.500 + 201. 816

= 241.316

Forecast for 2022

Y = 39.500 + 22.424 (t)

= 39.500 + 33.424 (10)

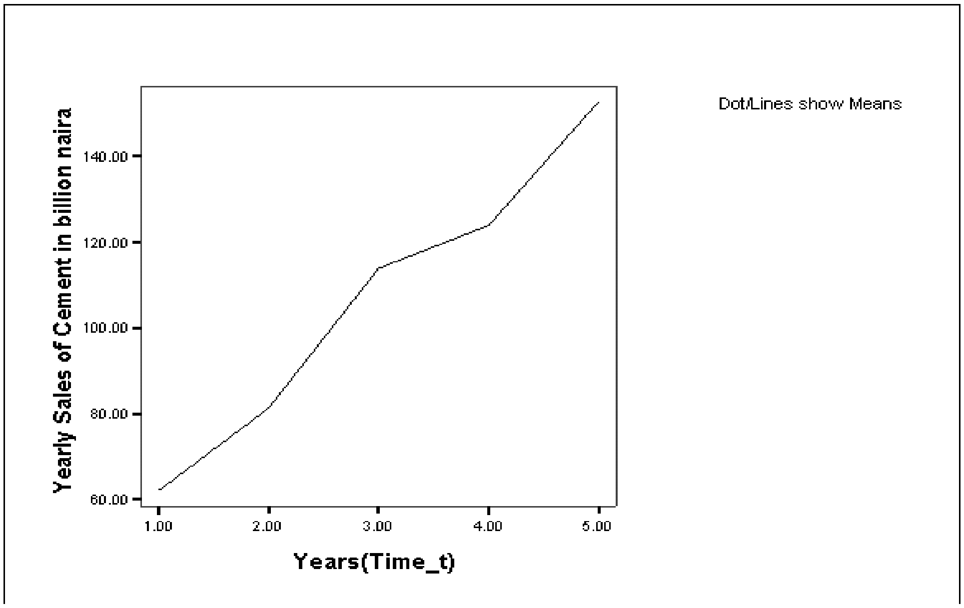
= 39.500 + 224.24

= 263.74

Table 4.2: Forecasting table for year 2013-2022

Year	T	Yearly Sales (In Billions ₦)
2013	1	62
2014	2	81.26
2015	3	113.90
2016	4	123.90
2017	5	152.80
2018	6	174.044
2019	7	196.468
2020	8	218.892
2021	9	241.316
2022	10	263.74

Table 4.3: Graph of Yearly Sales of Cement from 2013-2017 from the Company.



Monthly Sales of Cement from Year 2013 To 2017

Time_t	Monthly Sales of cement	Time_t	Monthly Sales of cement in ₦
1	3.2	31	11
2	4	32	9.2
3	6	33	8
4	6.7	34	8.6
5	5.5	35	9.1
6	7.1	36	12
7	4	37	11
8	4.5	38	11.5
9	4.9	39	10.9
10	5	40	10
11	5.4	41	8.6
12	5.7	42	9
13	6.6	43	9
14	5.9	44	10
15	8	45	11.4
16	7.7	46	12
17	9	47	10.8
18	9.2	48	9.7
19	5.1	49	10.6

20	7.2	50	12
21	6	51	14
22	7.3	52	13.5
23	6.2	53	12.9
24	6	54	11.4
25	8.4	55	12.7
26	8	56	10.7
27	7.9	57	11.8
28	10	58	12
29	10.7	59	14.2
30	11	60	17

Fitting of Linear Model for the Monthly Sales of Cement ANOVA (B)

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	405.563	1	405.563	210.651	.000(a)
	Residual	111.667	58	1.925		
	Total	517.229	59			

a. Predictors: (Constant), Years(Time_t)

b. Dependent Variable: Monthly Sales of Cement in billion naira Coefficients(a)

	Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	4.368	.363		12.040	.000
	Years(Time_t)	.150	.010	.885	14.514	.000

a. Dependent Variable: Monthly Sales of Cement in billion naira

The Model is $Y = a+bt$

$Y = 4.368+0.150t$

Testing for the fitted Line

H_0: $\beta = 0$(The model does not fit)

H_1: $\beta \neq 0$(The model fit)

$\alpha = 0.05$

Decision rule: Reject H_0 if p value is less than $/2$, if otherwise do not reject Ho

Decision: P value= 0.000< 0.025 *We* reject Ho

Conclusion: *we* conclude that the model fits and it can be use for forecasting

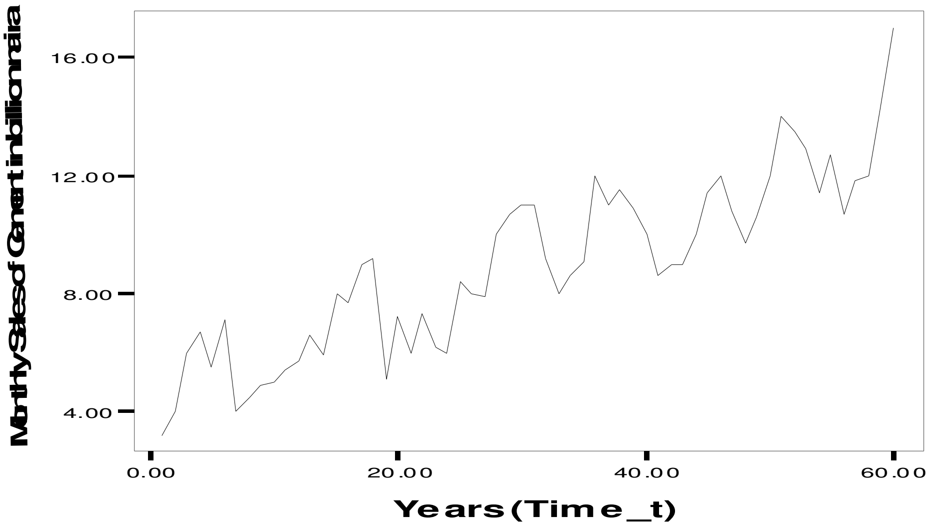


Figure 1: Graph of Monthly Sales of Cement from 2013-2017

The graph shows that there is an upward trend in the sales of cement which implies that the business is profitable and invariably means the usage of cements is increasing in terms of estate building, private buildings, construction of roads and bridges, molding of blocks and a host of others.

Main

The main page displays when the customer successfully logs into the customer driven market system. It displays the shopping catalogue as well as promo details of the system.

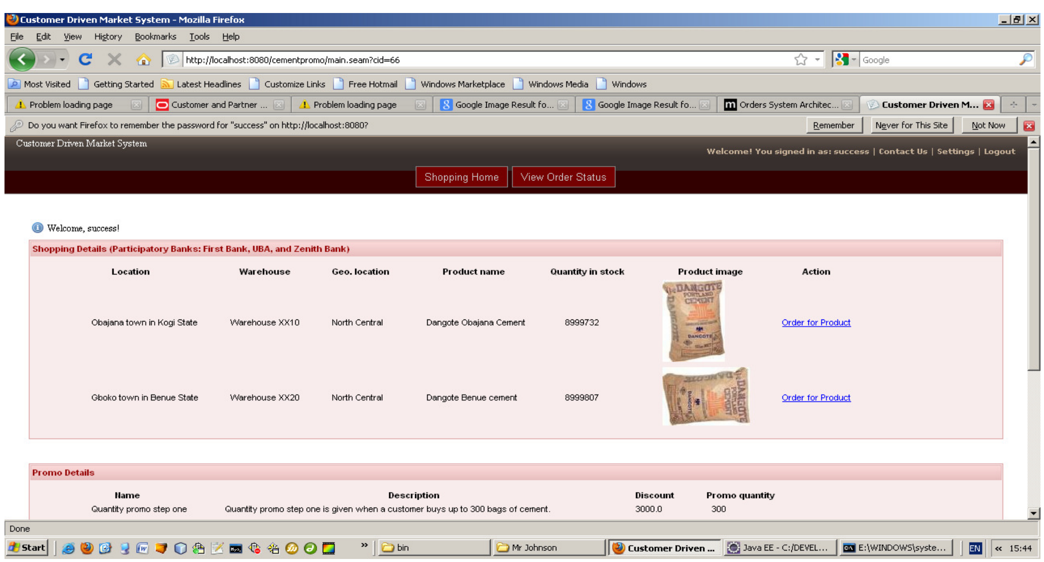


Figure 2: Screen shot of main page

Register

The register page displays when the customer clicks the register link on the home page. It provides an interface by which the customer's are used to register to the system.

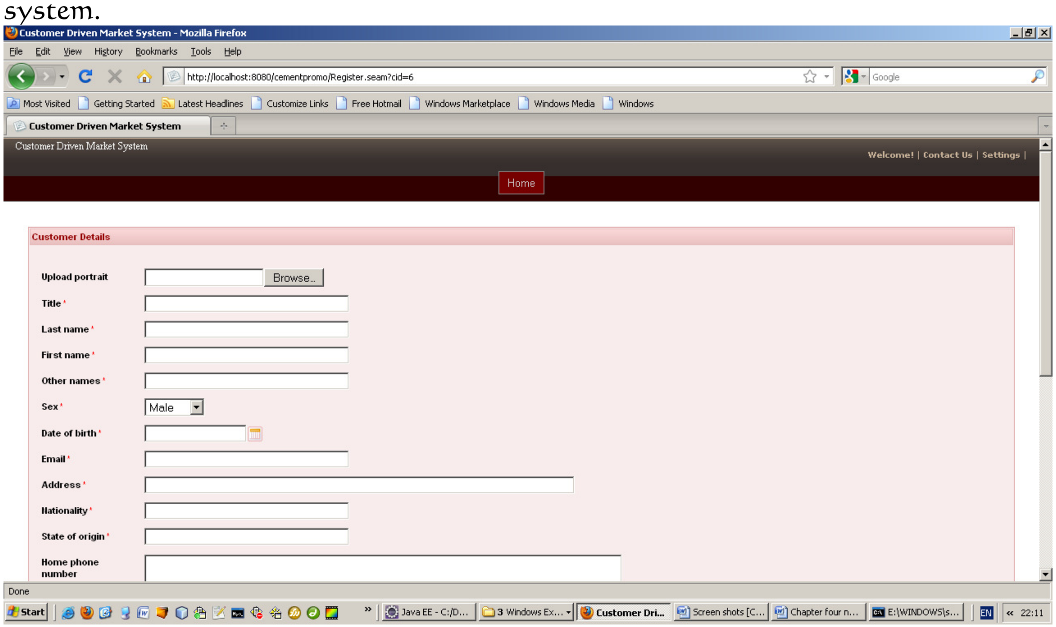


Figure 3: Screen shot of register page

Shopping

The shopping page displays the details of the product which a customer selected on the main page. It is also used by the customers to specify the quantity of product they want to order for.

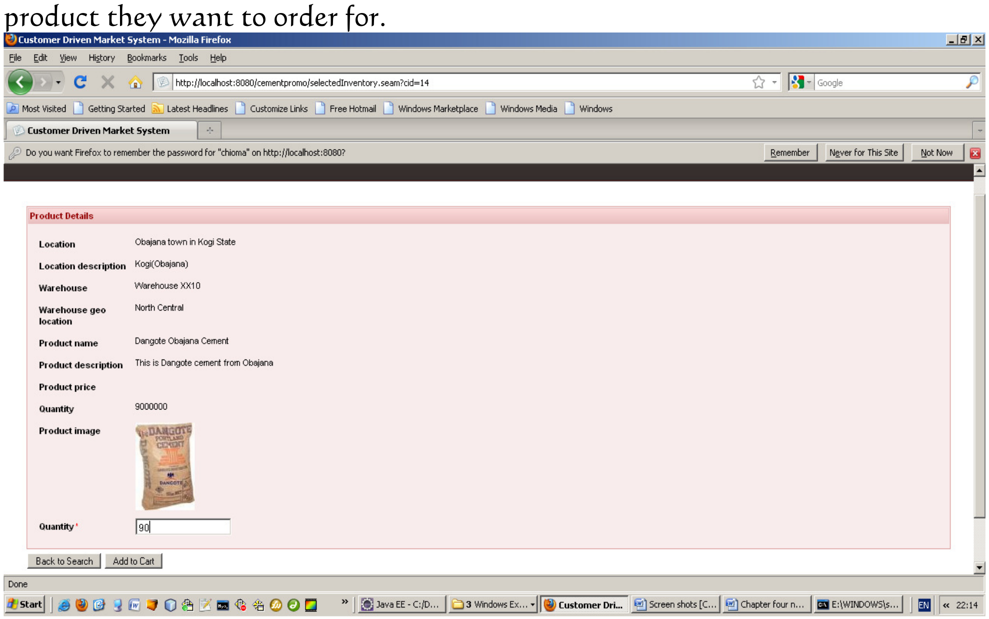


Figure 4: Screen shot of shopping page

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Make Order

The make order page is used by customers to specify the order details of their cement order.

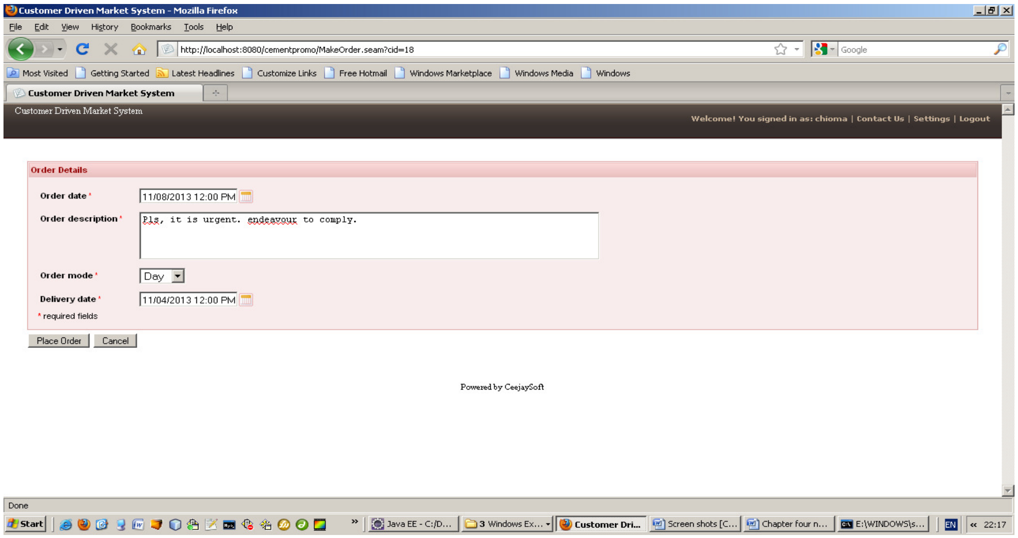

Figure 5: Screen shot of make order page

Add Shipment

The add shipment page is used by customers to specify the shipment details of their cement order.

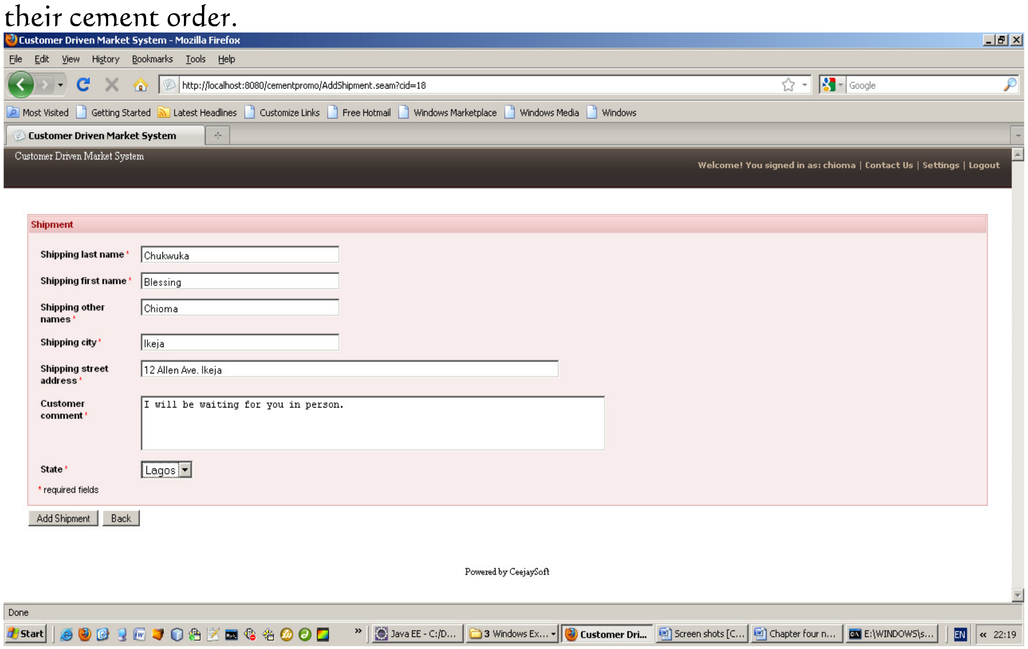

Figure 6: Screen shot of add shipment page

Make Payment

The make payment page is used by customers to specify their credit card details for the payment of their cement order.

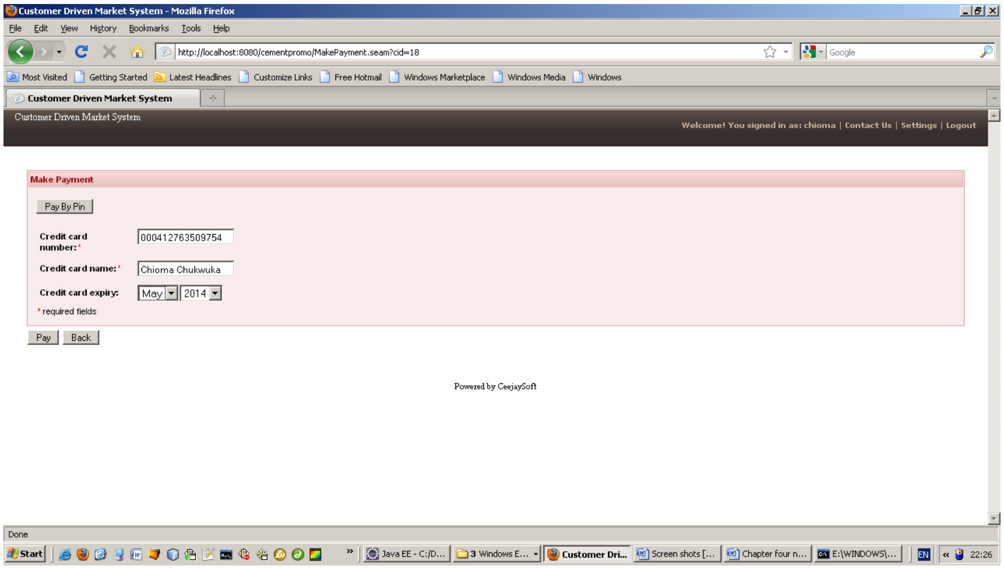

Figure 7: Screen shot of make payment page

Make Payment by Pin

The make payment by pin page is used by customers to specify their scratch card details for the payment of their cement order.

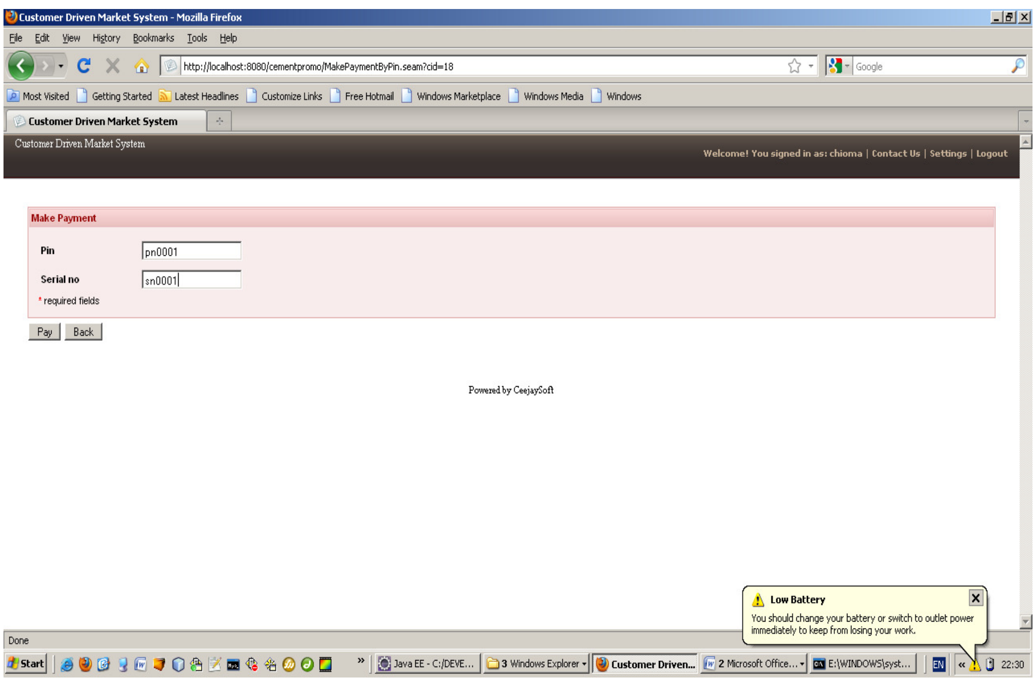

Figure 8: Screen shot of make payment page

Invoice Page

The invoice page shows the invoice details for the placed cement order.

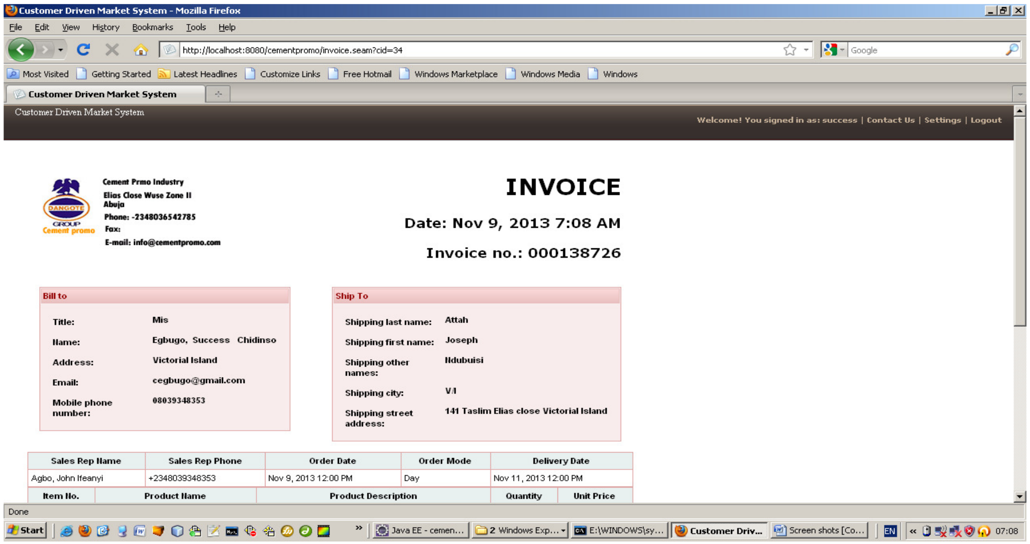

Figure 9: Screen shot of invoice page

CONCLUSION

Decision Support based customer–driven marketing strategy for promoting sale will have a clear far-reaching impact on society and organization if properly harness. Productivity enhancement is a major objective for manufacturing enterprises. Following from this premise, the research has been designed to promote marketing by introducing promotional strategy such as christmas promo, patronage promo,and quantity promo in order to achieve manufacturers marketing demand for their products. It is recommended that the use of the system should be adopted by the companies or organisation so as to help minimize time, risk, cost and frauds associated with the existing system where customers have to go and cues for order and shipment of their products to their various destinations. The researcher try to draw some general conclusions from the results that will be of use to the management in making decisions. This research work strife to improve the financial performance of the organisation since sales promotions are effective demand boosters. Sales promotions are relatively easy to implement and tend to have immediate and substantial effects in sales volumes.

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