

# System Design For E-Auction In Developing Nations.

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## ABSTRACT

The research has designed a system that has a strong security and trust for buyers to access before purchasing while users cannot give wrong information about their identities easily. The system is designed to detect shill bidding in online and provide a friendly and responsive customer support system. The expert system tool was used in order to achieve our desired motives. The system has been developed to increase the rate of trust in online auction system in developing nations where consumers will start engaging themselves in online auction. This will increase the business opportunities and economic development of the nation. The lack of consumer trust is one of the focused issued today as the world is moving towards advanced information and technology era. In light of this, there is an urgent need for Nigeria to develop a trustworthy system; hence we proffer a model for real-time trust management in online auction system. The objective of this research is to design a system that has a strong security and trust in it as the buyers can assess items before purchasing it and users cannot give wrong information about their identity easily. Also, to detect shill bidding in real-time and provide a friendly and responsive customer support system.

## INTRODUCTION

Online auctions can be considered a subset of e-commerce that uses auctioning methods at the pricing stage. Consumers or users are the main players that contribute to the future direction of e-commerce. In this era of ICT, cyber crimes have emerge as one of the most frequent crimes committed and the main victims of these unethical activities are consumer who participate in internet activities. This has influenced the decision-making and perception of consumer about engaging in any online transaction or purchasing activities. They are concerned about their privacy and personal information that may be misused by uninvited parties. In developing world like Nigeria, consumers are not participating in auctioning due to lack of trust between most businesses and customers on web. When the environment is with

uncertainty and risk, people need to trust to serve as mechanism to reduce the complexity of human conduct. One of the most damning indictments of Nigerian in the eyes of the world is the relatively high incidence of cybercrime in the country. There is uncertainty in the online auction transactions due to incomplete or distorted information provided by sellers in online auction. Many sites allow users to hide their identity easily by providing wrong information and it make easier to create fake accounts. The shill bidders create a new dummy account(i.e account open in short period of time) to bid on their own item for the shill bidding. Nowadays, because there is improper awareness creation of goods, works of arts e.t.c. as sellers only display their items in the shop to only the people in the vicinity, there is delay in purchase of such goods leading to degrade of goods quality and thus low profit; we need to develop a system that should be able to offer proper awareness creation of goods.

## **BACKGROUND OF STUDY**

Consumers are the main players that contribute to the future direction of e-commerce. In this era of ICT, cyber crimes have emerge as one of the most frequent crimes committed and the main victims of these unethical activities are consumer who participate in Internet activities. This has influenced the decision-making and perception of consumer about engaging in any online transaction or purchasing activities. They are concerned about their privacy and personal information that may be misused by uninvited parties. Trust always becomes a priority when it comes to doing business in an unseen and untouched environment. In Nigeria today, online auction is not trustworthy as it does not ensure warranty of items auctioned since these items are not accessed prior to auctioning. This is because most of the auctioneers are more concerned about their selfish gain, they tend to accept items or goods to be auctioned from any body notwithstanding the quality or the source of items and as a result they cannot grant warranty on any of the items as they don't have confidence in them. Again, because there is no room for proper assessment and verification of items before payment in the former systems, the customers sometimes end up getting items less than the standard ordered or not getting items paid for and correcting such mistakes takes more time and money. Furthermore ,there is an uncertainty in the online auction transactions due to incomplete or distorted information provided by sellers in online auction. Many sites allow users to hide their identities easily by providing wrong information and it make easier to create fake accounts. Hence , the shill bidders take advantage of that to create a new dummy account(i.e account open in short period of time) to bid on their

own item for the shill bidding. To maintain trust of users, it is necessary for the auction systems to detect and prevent undesired activities in the auctions in real time. It requires a strong and secure model to be established in order to provide a safe and secure environment for online transactions through which two unknown users can safely complete their transactions as well as maintain trust between the users and the auction systems.

## MATERIALS AND METHODS

PHP and MYSQL were used to enable the system achieve the required objectives. Having looked at the weaknesses and flaws associated with the present online systems, we introduce automated auction system. In the proposed system, bidders go online and place their biddings. Likewise auctioneer can place their product for auctioning online. The system enables the bidders to view the biddings while it is still on. All the parties in the bidding have access to real-time reporting of events while the auctioning is still on. The system also keeps record of customers and maintains a database for their transactions. The system uses customers past record to detect when a shilling bidding occurs and also, derives shill factor from the activities done by the participant by applying different rules to auction related activities and if finds any undesired bidding behaviours like shilling, then it will update the information regarding shilling behaviour in current transaction and notified the involved users, and cancel the corresponding auction immediately. The system also provide an avenue where the bidder that won the auction need to answer certain question when received his/her goods. Based on this, the system will use bayesian probability game model in rating and assigning category where each seller belongs such as trustworthy, not trustworthy and highly trustworthy. Furthermore, there is a platform for advertisement of goods to potential buyers and all payment are made online through the use of credit card, hence the system is integrated credit card payment system. All transactions are verified before concluded. Here, the problems and weaknesses of the present system were identified. In the present system, the major problem observed is that of security and trust as buyers can not have proper assessment of items before purchasing it. Also users can hide their identity easily by providing wrong information.

## SYSTEM DESIGN

This is the phase of system designing. It is a most crucial phase in the development of a system. Normally, the design proceeds in two stages: Preliminary or general design; Structure or detailed design. Preliminary or general design: In the preliminary or general design, the features of the new system are specified. The costs of implementing these features and the benefits to be derived are estimated. If the project is still considered to be feasible, we move to the design stage. Structure or Detailed design: In the detailed design stage, computer oriented work begins in earnest. At this stage, the design of the system becomes more structured.

### Build And Test A Prototype Expert System

Before actually implementing the new system into operations, a test run of the system is done removing all the bugs, if any. It is an important phase of a successful system. After codifying the whole programs of the system, a test plan should be developed and run on a given set of test data. The output of the test run should match the expected results. Using the test data the following test run are carried out: Unit test; System test. Unit test: When the programs have been coded and compiled and brought to working conditions, they must be individually tested with the prepared test data. Any undesirable happening must be noted and debugged (error corrections). System Test: After carrying out the unit test for each of the programs of the system and when errors are removed, then system test is done. At this stage the test is done on actual data. At each stage of the execution, the results or output of the system is analyzed. During the result analysis, it may be found that the outputs are not matching the expected out of the system. In such case, the errors in the particular programs are identified and are fixed further tested for the expected output. After having the user acceptance of the new system developed, the implementation phase begins. Implementation is the stage of a project during which theory is turned into practice. Maintenance is necessary to eliminate errors in the system during its working life and to tune the system to any variations in its working environment.

### Bidding Rule

Bidding rules define the types of bids that are allowed and which participants are allowed to place them. In a single seller auction, the designated seller is the only participant who can place a sell offer, and is typically required to do so at the beginning of the auction. If that offer is non-

zero, then the seller's offer is called her reserve price . In a procurement situation, only the designated procurer can place a buy offer, and typically, the members of a pre-screened set of suppliers are the only participants who can place sell offers. In an open, Continuous Double Auction (CDA), like the stock market, any participant can place either a buy or sell offer. In fact, in a CDA, a bidder can simultaneously place offers to buy and sell, as long as the buy offers are less than the sell offers. Much of the flexibility of auction systems comes from treating buyers and sellers symmetrically.

## Specification of the Model

### Dominance

Let  $s_i$  and  $s'_i$  be two strategies of player i, and  $S_{-i}$  the set of strategy of the remaining players.

Then:

1.  $s_i$  strictly dominates  $s'_i$  if for all  $s_{-i} \in S_{-i}$ ,  $u_i(s_i, s_{-i}) > u_i(s'_i, s_{-i})$
2.  $s_i$  weakly dominates  $s'_i$  if for all  $s_{-i} \in S_{-i}$ ,  $u_i(s_i, s_{-i}) \geq u_i(s'_i, s_{-i})$

### Nash Equilibrium

Given a strategic form game  $\Gamma = \langle N, (S_i), (u_i) \rangle$ , the Nash equilibrium is mathematically defined as a strategy profile  $s^* = (s_1^*, s_2^*, \dots, s_n^*)$  such that:

$$u_i(s_i^*, s_{-i}^*) \geq u_i(s_i, s_{-i}^*) \quad \forall s_i \in S_i \quad \forall i = 1, 2, \dots, n$$

### Bayesian Games

In Bayesian games also known as games of incomplete information, each player has a type  $\theta$  which is privately known to him, and is not known to other players. There is a prior probability distribution  $p$  over the possible types of each player. The types determine the outcome of the game. Mathematically a Bayesian game is defined as:

$$\Gamma = (N, A, \Theta, p, u)$$

Where :  $N$  is the set of agents or bidders;

$$A = A \times \dots \times A_n.$$

where  $A_i$  is the set of actions available to player  $i$ ;

$$\Theta = \Theta_1 \times \dots \times \Theta_n$$

where  $\Theta_i$  is the type space of player  $i$ ;

$$p = \Theta_1 \mapsto [0,1]$$

where  $\Theta_i$  is a common prior over types and

$$u = (u_1, \dots, u_n).$$

where  $u_i : A \times \Theta_1 \mapsto R$  is a utility function for player  $i$ .

An example of Bayesian game is the auction. In auctions a player's valuation of the object being bid for constitute his type, and a player's type is not known to his fellow bidders.

## Auctions

Mathematically in auctions the following holds:

Considering two players  $i$  and  $j$ . Let  $v$  denote the player's valuations and  $b$  the player's bids.

$$\text{Profit (utility)} = u_i = v_i - b_i$$

$$\text{Profit (utility)} = u_j = v_j - b_j$$

$$u_i(b_1, b_2, v_1, v_2) = \begin{cases} v_i - b_i & \text{if } b_i > b_j \\ (v_i - b_i)/2 & \text{if } b_i = b_j \\ 0 & \text{if } b_i < b_j \end{cases}$$

Giving strategies,  $b_i(v_i)$  and  $b_j(v_j)$  for players i and j. Giving j's strategy, the best response for i constitute the Bayesian Nash equilibrium of the game. Hence, accordingly the Bayesian Nash equilibrium is:

$$\max(v_i - b_i) \Pr ob\{b_i > b_j(v_j)\} + \frac{1}{2}(v_i - b_i) \Pr ob\{b_i = b_j(v_j)\} b_i$$

## **DATABASE DESIGN AND SPECIFICATIONS**

MySQL database was used in the design of the new system database. The structure of the tables in the database is as follows: admin\_login, bid, bidders, bidding, products. Some of the structures for the database tables used are as follows:

### **Structure of admin\_login Table**

Field	Type	Null	Key
Username	varchar(12)	NO	PRI
Password	varchar(12)	YES	

## Structure of Products for database Table

Field	Type	Null	Key
Category	varchar(50)	YES	
Products	varchar(100)	YES	
Snum	int(6)	NO	PRI

## INPUT / OUTPUT SPECIFICATION AND DESIGN

The input/output specification and design in the new system is structured to allow users to fill forms and submit the data to the database. Some of the input forms and output designed in the online auction is as follows:

Product Entry Form

Category	<input type="text"/>
Product	<input type="text"/>

Product Entry Form

Admin Password

User Name	<input type="text"/>
Password	<input type="text"/>

## Admin password form

Date	Name of customer	Phone	E-mail	Detail	Delete

## Customer information report

Picture	Auction name	Product Details	Start bid	End bid	Last bid	Delete

## Products for auctioning

**Product Upload Form**

Product Category	Computer
Product	Pentium
User Name	<input type="text"/>
Password	<input type="text"/>
Bid Closing Date	<input type="text"/> (yy-mm-dd)
Bid Start Date	12-09-16 <input type="text"/> (yy-mm-dd)
Product Details	      
Advert Rate	<input type="text"/>
Picture	<input type="text"/> <a href="#">Browse...</a>
<b>Submit</b>	

Model for Real-Time Trust Management - Windows Internet Explorer

http://localhost/auction/ratedetails.php?category=2

Search Site Safety Weather Facebook Page Tools

Intranet settings are now turned off by default. Intranet settings are less secure than Internet settings. Click for options...

Developed by: Orji Ifeoma. M.

**Seller's Rating Form**

Bid No	1
Product Category	Computer
Product	Pentium M
Product Details	2GB Ram, 80GB HD, Web Cam
Bid Closing Date	2012-10-02 (yy-mm-dd)
Bid Start Date	2012-09-13 (yy-mm-dd)
Name of Winner	Uzoma Onyia
Phone No	08067534512
Address	4 Ziks Av Enugu
E-Mail Address	uzo@yahoo.com
Bid Amount	53000.00
Did you receive the goods?	Yes
Is there any delay in delivery?	Yes
Is the product intact?	Yes
Does it have all the features as stated by the seller?	Yes
User Name	

Internet | Protected Mode: On 100% 2:18 Effie

Model for Real-Time Trust Management - Windows Internet Explorer

http://localhost/auction/advert.php

Search Site Safety Weather Facebook Page Tools

Intranet settings are now turned off by default. Intranet settings are less secure than Internet settings. Click for options...

Developed by: Orji Ifeoma. M.

**A Model for Real-Time Trust Management**

HOME SIGN UP UPLOAD PRODUCT AUCTION SALES PRODUCT ADVERT CLOSED BIDS ABOUT US RATING ADMIN LOGIN

**Products Advert Rate**

Picture	Product	Product Details
	Pentium M	2GB Ram, 80GB HD, Web Cam
	Men Shoe	size 48, Italian shoe
	Land Cruiser	Toyota Jeep. AC, 2008 Model
	Pentium V	Dual Core, 4GB Ram, 80GB HD, Multimedia

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Model for Real-Time Trust Management - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites Go Links

Address Http://localhost/auction/bidproducts.php

Developed by: Orji Ifeoma. M.

**A Model for Real-Time Trust Management**

HOME SIGN UP UPLOAD PRODUCT AUCTION SALES PRODUCT ADVERT CLOSED BIDS ABOUT US ADMIN LOGIN

**Products for Bidding**

Click Bid to proceed to the product bid form

Picture	Auction Name	Product Details	Start Bid	End Bid	Last Bid	Select
	Men Shoe	size 48, Italian shoe	2012-09-14	2012-10-14	2000.00	<b>Bid</b>
	Land Cruiser	Toyota Jeep. AC, 2008 Model	2012-09-14	2012-09-25	0.00	<b>Bid</b>
	Pentium V	Dual Core, 4GB Ram, 80GB HD, Multimedia	2012-09-16	2012-10-16	78000.00	<b>Bid</b>

Start auction CHAPTER THREE - M... Model for Real-Time... untitled - Paint Local intranet 1:49 AM

## RESULTS AND DISCUSSION

This work has been successfully completed and has been capable of maintaining trust between the users and the auction system and also, to restrict undesired bidding behaviours like shilling at runtime. Furthermore, it would allow all the parties in the bidding to have access to real-time reporting of events while the auctioning is still on and also give room for users to assess the goods they want to bid for. In addition, this research will help to guide other researchers to conduct more studies related to consumer trust in e-commerce and uncover a more practical solution for this issue. This research work has explored the operation of online auction systems, observed certain problems, and therefore proffer a model for real-time trust management to solve the problems discovered. Moreover, the bayesian probability game model was used in deriving a equilibrium bid. In addition, expert system methodology was employed in developing the need and specification of the real-time trust management in online auction system after studying the existing system. This research has Created an online system for customers to view all products that is up for auctioning and for the customers to upload their products for auctioning. The system has a platform for customers to post their bids and online advertising of products. The system gives bidders access to view auction details and detect shilling biddings. The system makes available the bidders history and maintain a robust database for managing the auction sales. It also maintains a database of bidders information.

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