



# Development of Architectural Model for Estate Valuation System

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**Abstract:** Estate valuation is the art, practice and science for the determination of the value of the entire property description and the interest therein. Estate valuers quest for a better method that will bring effectiveness, accuracy and efficiency in their practice. The need to optimize valuation process and method has become a timely contemporary demand. The research was designed to develop architectural model for estate valuation. The study was poised to; identify the traditional method of estate valuation, design a template for estate valuation, implement the estate valuation template, test and deploy the estate valuation template. The study adopted the waterfall model. It breaks down the project activity into linear sequential phases where each phase depended on the deliverable of the existing one and the next one to a specialization of events. The study achieved its aim; architectural model for estate valuation system (AMVS). The AMVS was implemented on the PHP programming platform with MYSQL as database. The system was tested and deployed. The system validity and originality was measured by comparing its outputs with the direct results of a professional valuer over the same estate property and disparity in results was negligibly minimal. The system is recommended for use by users with basic knowledge of computer operation and doing so with recommended data categories as indicated in the documentation as related to the estate valuation practice, alongside the use of recommended standard hardware and software specifications should be closely adhered to.

**Keywords:** Development, Architecture, Model, Estate, Valuation, Property

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## 1. Introduction

The origin of estate valuation and surveying started from the time of creation. At creation God created Garden of Eden and put Adam and Eve to take control of it. Adam and Eve can be referred as the first estate valuers and surveyors whose estate was the Garden of Eden. Estate is trace to the word “etat” in Latin meaning “statue” in French. Estate ownership is accorded prestigious status, thus landed property is always known as estate. From estate managers’ point of view, land is not only the surface on which the activities of humans take place, but also beneath the surface into the earth interior including its mineral resources therein. Materials below and above the surface and on the surface are components of the estate as well as all improvements on it such as buildings, crops, minerals, sea resources, games and so on. Estate valuers and surveyors are recognized professions and is distinctly rooted in feudal environment of Europe. The head

of the menor of medieval owned extensively in Europe.

From the start, the stewards were regarded as men of honour. The relationship of fiduciary can be entrusted on them, which accrues the nickname “noble”, which is connected to the estate valuer and surveyor profession. It is noteworthy that estate firms are required to work with the pace of increase demand for record keeping. To accommodate what is needed for effective accounting, book keeping was needed a necessary tool. This brought about the ever increasing challenges of record keeping, book keeping, statistical data analysis and accounting.

In view of the foregoing, we embarked on the study to proffer solution accordingly. It was designed to develop a computerized system that will be used in the estate valuation practice to reduce or if not entirely eliminate the challenges faced by the manual method used for valuation in the profession. Thus, the description and determination of property and interest in it by art, science and practice is

regarded as estate valuation. Valuation means the process of securing optimal use of land and its makeup resources by meeting the economic and social needs of men. This necessitates the need for maintenance, services, improvement of an estate after the determination of structures.

Valuation means describing the assessment of finance of a building of industry in terms of the use of land. The high state of record generation and the demand for data and innovation in technology is evidence of the challenges constraining the valuation practice. The method of valuing real property is referred to as estate valuation. Market property value is the value usually sought for, for selling or buying or letting (as agent) a personal property or commercial property and that of the interest therein.

Basically, the process of solving a problem where the influence of government, economic, sociological and physical forces are analyzed in relation to the property is valuation. Having an efficient and effective valuation calculation system is one of the major problems facing most of the estate valuation firms in Nigeria. Some of the firms freely confess they have difficulty handling it adequately.

No matter how simple or complex the challenges are, the way forward is to explain in simple ways the influence of sociological, physical, governmental and economic forces have on a particular estate property. A diversion from the old method requires change in the valuation tools especially the use of a computerized method instead of traditional practice.

The valuation methods should be examined regularly and periodically. If desires are significant to an extent that they not the same with the previous valuation, then the charges for current and future valuation have to be adjusted. By examining and itemizing the different methods which have been used to value and find out the level they have been used, it will make practitioners and investors have better idea and set a goal that is more convincing judgment for investment action.

With the computerized process advocated, the surveying along with the valuation of an estate establishment will be an investment on the profession. However, it is both professional and common sense to note that valuation is a service rendered by those who value the estate, who act as an agent or representation of actual owners. Thus, those who value estate should be recognized as men of honour, trust in public confidential relationship.

#### *Statement of the Problem*

As the economy globalizes and capitals becomes more mobile, valuation gains momentum in privatization, acquisition, joint ventures and restructuring to create values. The constraint of proper dimension is why estate valuation is not automated and why and how to automate it. The study was designed to; automate estate valuation process, project the cost price by various assumptions, and proffer solution to the hazards the valuers face in the field. The overall outcome will be to optimize the practice and professional value of the experts and that of the property he values.

#### *Specific Objectives*

The study was aimed at developing architectural model for

estate valuation. The study intended to:

- 1) Identify the method of estate valuation.
- 2) Design a template for estate valuation
- 3) Implement the estate valuation template
- 4) Compare the results of the proposed system with those resulting from the traditional method
- 5) Test and deploy the estate valuation template

#### *Significance of the Study*

This study will be of immense importance to organizations saddled with the management of an estates and properties. It will automate and optimize the valuation practice along with its products.

#### *Scope of the Study*

The study is restricted to the valuation of bungalow estates and properties.

## **2. Related Literature**

### **2.1. Hedonic Demand Theory**

Hedonic regression (HR) or hedonic demand theory (HDT) is an open process of estimating the demand for goods, or its value to customers [10]. It breaks down the items under investigation into different character, and arrive at estimates of contributing value of each characteristic. This makes the component goods being valued to decrease to its various parts that the market prefers. Hedonic model is generally computed by means of regression analysis like the sales adjustment girds (SAG). Other methods of evaluating the HR exist, but the most commonly used is the SAG. The common method used in real estate economy and appraisal is Hedonic model, as houses have some simple characters (such as the amount of rooms, size of building, or distance to attractive centers) which make them agreeable to hedonic regression model than most of the goods. Consumer price index (CPI) is used to solve problems, in hedonic regression where it manages the effects of improvement in the qualities of products [16].

The Hedonic demand theory relates to this research work. The real estate economic features and characteristics includes; size of house, distance from city centers, structural designs such as numbers of bedrooms, sizes of bedrooms, entrance and exit doors, neighbors attributes such as security, road, electricity, dumping yard, drainage systems and so on. Hence in modern estate development valuation, the hedonic demand theory, is one best theory to be applied.

### **2.2. Subjective Theory of Value**

The theory of subjective value (TSV)

3explains that the value of item cannot depend on the labour that is invested into a goods [11]. The subjective theory of value agrees that the consumers' needs and want determines the value of a goods. The value is not essential and is instead more valued to different people depending on their desire. The object that is believed to have some value is subjective, which means arguably that it won't be measured steadily. For example, suppose the weather is very cold

outside and you only have a wool coat, you will want to wear that coat to keep you from freezing. In a case like this, the wool coat might worth more to you than a gold necklace. If, in another way round, the temperature is warm, you will not want to use the coat, so your desire for the coat will be meaningless. In effect, the coat's value depends on your desires and need of it, and so, it is the interest you place on it, not any inherent value of the coat. In the theory, it may be easy to make or multiply value, move ownership of it to an owner who respect the object at an increased value. This may be true even when the object's renewed situational circumstances, culture importance, emotions, or nostalgia value changes or remains the same [17].

The subjective-value theory believes that transfer of ownership of a particular object to another person may or may not have significant value depending on the immediate needs and desires of the person. The proponents of the theory also believe that in an ordinary trade, trying to trade goods and services between individual brings market competition when they can provide for goods they perceive as being of more value and this can yield a market equilibrium over of prices. The subjective theory of value is relates to this research. Every individual has value for shelter and accommodation, for comfort. So if one desire a shelter or an accommodation then an estate becomes more valuable than any other thing needed at that moment.

### **2.3. Computerized Real Estate and Property Management**

In the work of Amadi [2], he tried to explore on computerized estate and property management as well as its availability for use by estate surveyors. His aim was to examine the various ways by which computers can be applied to estate and property management. His study intended to; put readers in limelight of how computers can be applied to estate and property management, examine the benefit and problems that can be derived from its use, and highlight the existing level of involvement of estate firm in the use of computers. The work selected the study area, the research process, collected and presented its data. The result of Amadi's work [2] shows that the method of storing data emanating from estate management and a secured and better accessible database is more effective and convenient when compared to the manual method. In Amadi's work [2] he did not create an enterprise database that would store valuation data. This is a gap this current study wishes to bridge.

### **2.4. Computerized Estate and Property Management**

In the work of Oboravo [7], she developed a computer software that have the capability of managing real estate providing quick access to records. Her aim was to determine an organizations requirement for managing its physical assets and facilities. The methodology used in Oboravo's work [7] was survey research methodology driven by observation, questionnaire and sampling of the existing documentation and forms. The result of his work shows that the system developed offers secured storage of business data. In the

work, she did not create a system that allows users have access to the value of the property being managed and the system is not dynamic. The proposed system is poised to close the gap which left open in the work of [7, 15].

### **2.5. Price Variation Can Be Inferred from Sample of Submarket**

The changes in the size of items are the determining factor in real estate market. When item need for. When any real estate market is big, it will influence the cost of the item. In other to check and compare and get a better results those items which are not useful need to be removed from the real estate market. In Kummerow proposal, [4] value is the worth of species of feasible price distribution on the items for a particular data. The investigation of real estate market price lead to the separation of data on the market collection. The collection of items in the market determines how such market can be seen as more viable to other market, separated differently the data that are not useful to the market under investigation and that which is been studied [11]. Series of price from a cycle of business transportation should be key to a particular direction which can lead to spotting out the items that control the change in price of items.

The prediction of a plan offered for the identification of real estate market is a collection defined based on the location and property interchange. The ability to accept and pay for the market selling and buying price constitute all the real estate market property because of the difficult nature and the structure of the estate. The changes in price or item increase the interest of those who want the item there by determining the price range, [3]. Reference to each characteristics that contributed to the price may change. Where all the changes and measurements were all omitted in the real estate market, attributes like standard deviation can be used to obtain the price needed. Due to limited and incorrect nature of real estate market this is considered as random error because the errors and limitations are unexplainable.

### **2.6. Need to Value Real Estate, Role of Valuer and Method of Valuation**

Real estate encompass the provision of accommodations for human activity wherein the exclusive rights to process and or own accommodation are traded in a market environment. It is peculiarities from other commodities that are considered in economic, legal and monetary terms. Real Estate is made up of two qualities viz;

- a. Static quality: This refers to physical structure on the site, fixed location which are also referred as link.
- b. Dynamic Quality: This is usually immaterial and are in form of emotion, prestige and off-the-site influence [1].

### **2.7. Economic Distinction**

Accommodation is a basic and vital need in the life of every man hence great economic importance is placed on realty. The economic attributes of realty is likened to fall

between monopolistic competition and oligopoly. The cost for real estate is usually given with the benefits accruable. The purchaser therefore adjust his bidding to range within the benefits. Therefore, it is agreeable that if demand for realty within an area or geographical location is high, the cost for possession would also be considerably high [13].

The right to property ownership also varies with respect to market collection as commercial property are the concerns of commercial enterprises with the negotiation conducted by commercial real agent and vice visa. Furthermore, real estate is not movable and this distinguishes it from other classes of assets. Hence, there is bound to be disparity in location which will affect some major attributes such as economic, social, cultural, aesthetic and political influences; its cost places a unique factor on it against other assets.

In the work of Chin and Chau [3], they posit that real estate market continually adjust to equilibrium as price is adjusted according to supply influence. Real Estate markets are integral in a regional and national economy and is therefore influenced by change in the economy. There is high risk in real estate as a result of high capital cost and the need debt funding for acquisition [12].

### 2.8. Legal Distinction

Initially the formal recognition of ownership and transaction provided the crown and later Government had to tax land owners known, Land Tax. Due to economic development, communities had need to transact interest in land which required recognition of ownership with the right of occupation. The origin of common law was based on judicial precedence, which gave birth to law of contract. As economic development became dynamic, so did spatial use of real estate [6, 9]. Statute laws were enacted where common law could not hold. As emerging community became aware of the changing role of real estate, laws were enacted to provide Government the right to acquire land, provide compensation and town planning to regulate site use.

Therefore, in order to transact in real estate, the assistance of skilled legal practitioner is required.

It is legally accepted to transfer or trade the right of ownership of real estate. This distinctively differentiate real estate from other asset. Real Estate can also be used to secure high amount of loans. These features put real estate at great market risk, business risk and financial risk. Real Estate is treated as a fixed asset in commercial view and not readily tradable [8, 14].

## 3. Method Adopted in the Proposed System

The method used in the proposed system is the waterfall model [5]. The waterfall model analyzes the project activities into various parts. It is one of the less iterative and flexible tactics as progress flow in one direction (downwards like a waterfall) through the phase of conception. It is simple to use and understand. Each of phase has to be completed fully before the next phase can commence. This model is basically used for small projects which has no certain requirements. The right track is determined by taking a review on each of the phases which can lead to decision taken either to continue with the project or not. Testing is done when the work is complete.

## 4. System Analysis

The present system is the valuation approach already in use for estate valuation. Experts rely on mere professional guidelines subjected to manual computation and assemblage of facts and methods. For critical analysis of an estate, enormous time, effort, and resources are spent leading to delayed contract execution and ultimately protracted time of disposal of estates and properties marked for sale or procurement. The system allows for rulebooks errors. It is not smart as it ought to in a 21<sup>st</sup>-century characterized by innovations and automated activities and procedures.

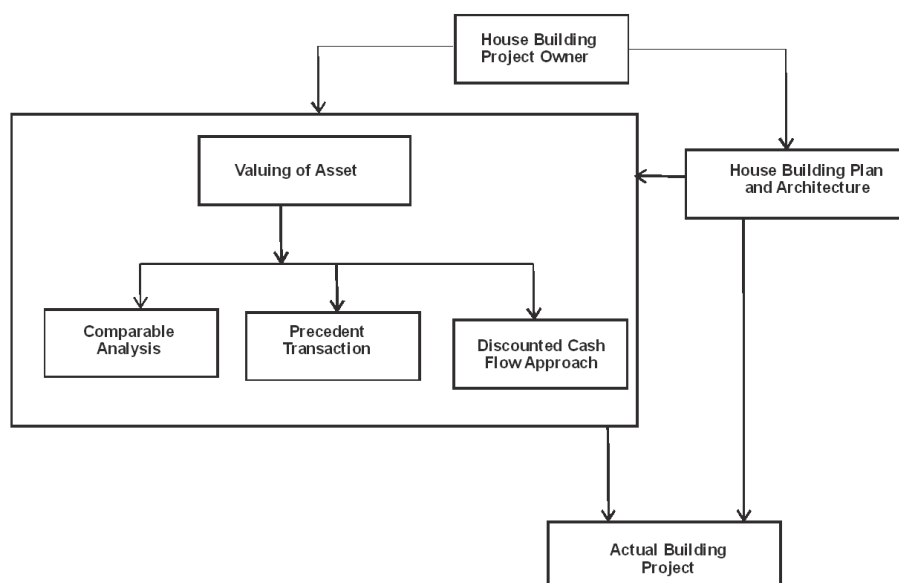


Figure 1. Architecture of the present system, [2].

#### 4.1. Proposed System

The study's system is an architectural model with requisite computing attributes in the valuation practice. It is designed for the professional in particular and the interested buyer or seller in general. To use the model the user needs to understand the meaning of each the attributes and provides the inputs accordingly. In so doing the user is already placed in position to value an estate or property, the results of the valuation is expressed in understandable format devoid of unnecessary professional jargons. The units of the output are naira and kobo, the legal currency of the Nigeria State. The advantage of the model is that it is template that can be used anytime and anywhere as much as it fall in line with the category of estate and property for which it is designed. So in-depth details and analysis are no longer required all the time in haven estates and properties valued.

#### 4.2. System Architecture

The architecture of the proposed system has four segment, the Admin/User, server, query, and database segments. The Admin/User segment is the User interface, the server runs on local server, the query segment receive query from server and sends to the database while the database segment is responsible for storing data in the system the output also displays the valued cost for a selected building category.

#### 4.3. The Estate Valuation Architecture

The architecture of the proposed estate valuation has four

segments. The presentation, application, report/output and the data segments. The presentation segment is the admin/user interface section, the application segment is connecting the presentation segment to query and data segments, query section connects with both application and data segment which holds the data. The application segment is responsible for the estate valuation process.

P- is the present cost of building the estate, LS-is the total life spent by the estate before valuation, VL-is the value of land that contains the estate, S-is the salvage value, DV-is the depreciation value of the estate and TV-is the total valuation.

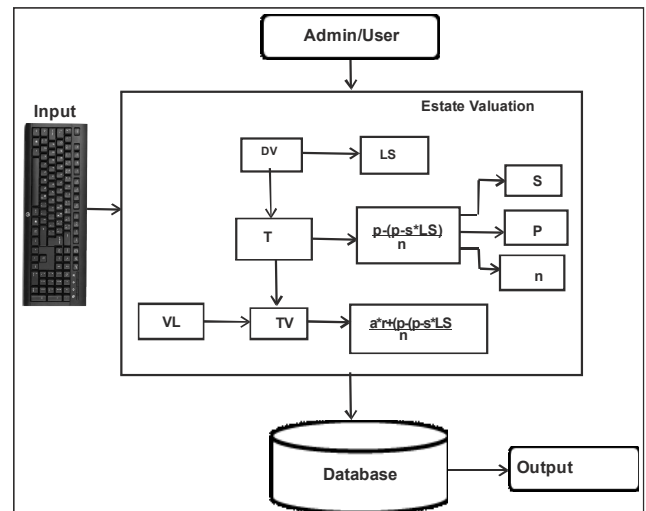


Figure 2. Architecture of the Proposed System.

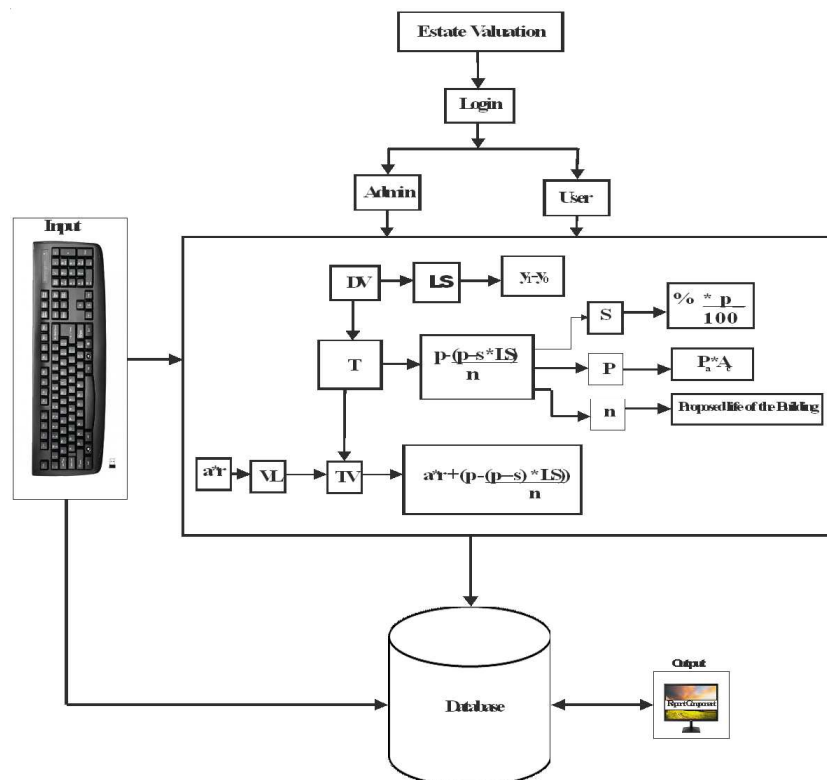


Figure 3. Architecture of the Proposed Estate Valuation.

$$LS = y_1 - y_0$$

Where LS is the total life of the building

$y_1$  is the year of valuation

$y_0$  is the year the estate was build

$$VL = A * r$$

Where VL is the value of land

A is the area of land

r is the rate of land

$$P = p_a * A_c$$

Where p is present cost of building the house

$P_a$  plinth area

$A_c$  is plinth area cost

$$S = \frac{p}{100}$$

Where S is the salvage value

% value

P is present cost of building the house

$$DV = \frac{p - (p - S \times LS)}{n}$$

Where, DV is the depreciation value

P is present cost of building the house

S is the salvage value

LS is life spent by the building

n is the proposed life span (number of years) of building

$$TV = VL + DV$$

Where TV is the total valuation

VL is the value of land

DV is the depreciation value

Substituting VL + DV into Equation (6) we have:

$$T = \frac{a \times r + (p - (p - s) \times LS)}{n}$$

Where T is the valuation equation

The login form features a header with 'Login' and 'Sign Up' links. Below these are input fields for 'enter email address' and 'password'. A 'Sign in' button is positioned at the bottom. There are also links for 'Forget details?' and a 'remember' checkbox.

Figure 4. Login form.

#### (1) Input Design

The input design of the proposed system highlights the segment or input form where the user of the system adds information to the system. In the input form, the system administrator has the privilege of adding new building to the system or updating an existing plan in the system. Other users fill an input form that enables them to view an uploaded building in the system.

The registration form contains seven input fields: 'FIRST NAME:', 'LAST NAME:', 'PHONE:', 'EMAIL:', 'ADDRESS:', 'STATE:', and 'LGA'. At the bottom, there are two buttons: 'CANCEL' and 'save'.

Figure 5. Registration Form.

This form is titled 'Estimating the value of a property'. It includes a 'Choose the picture of the building' section with a 'Choose File' button. Below this are sections for 'Enter house age' (with 'Enter age of Building' and 'Rate' fields), 'Present cost of Building' (with 'Enter cost of Building' field), 'Salvage value' (with 'Enter Salvage value of the' field), and 'Building Depreciation' (with 'Enter Depreciation of Buil' field). A green 'Value building' button is at the bottom.

Figure 6. Input Design of Estate Valuation of the Proposed System.

#### 4.4. Process Design

The processing task of the proposed system is done by the systems local server. The system administrator login into the system on the local server, submits the registration details of a new building and the cost valuation to the server and the server processes the data and saves it on the database. Thereafter the building and the cost valuation can now be available for the users of the system to view on his own dashboard and as well print if needed.

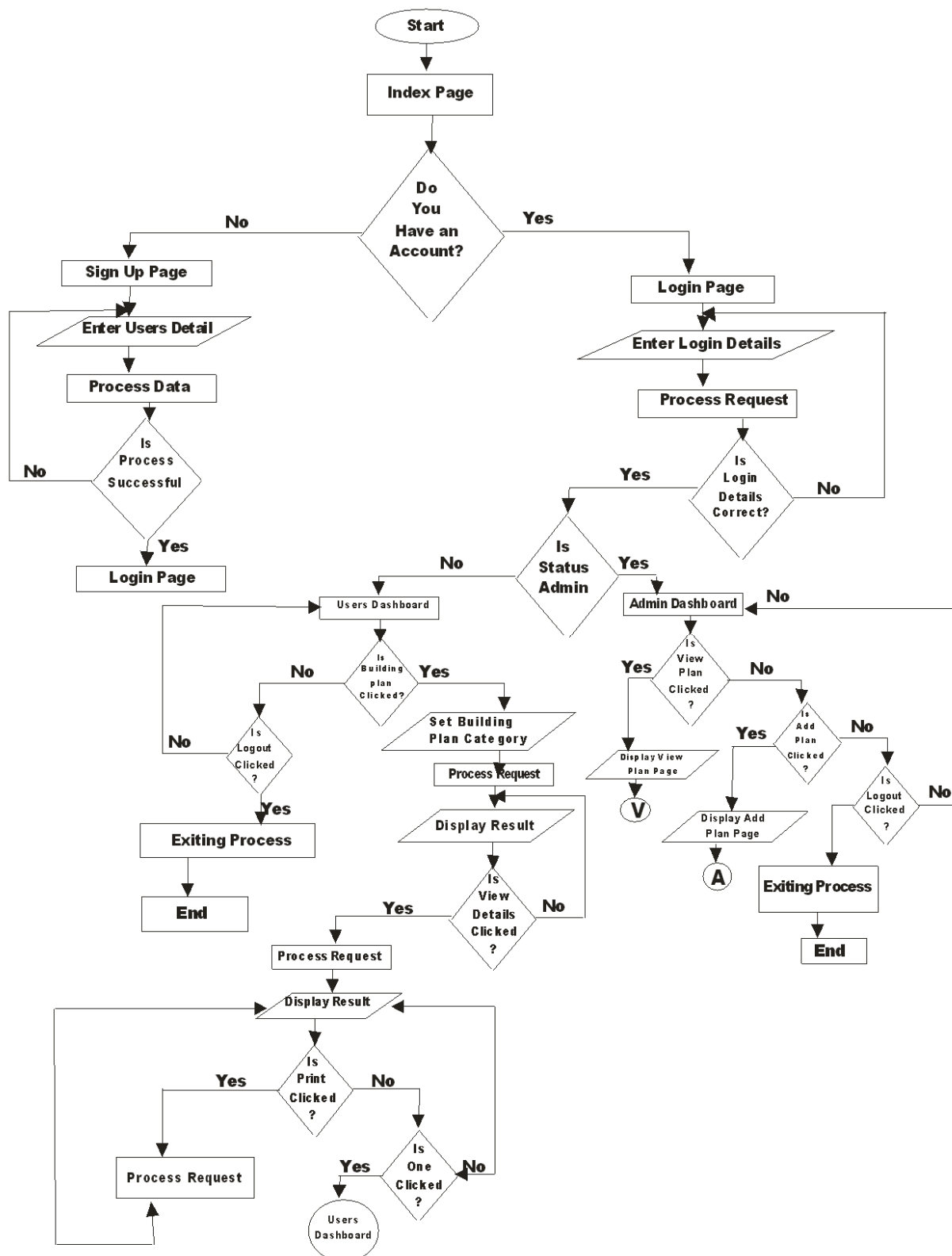


Figure 7. Process Flow design of the Proposed System.

#### 4.5. Output Design

The design of output is the most important task of any system. In the output design the bungalow selected during the

input is displayed here. Once the right data is entered and the right bungalow is selected, the architectural design will display and the cost valuation will also display on the output.



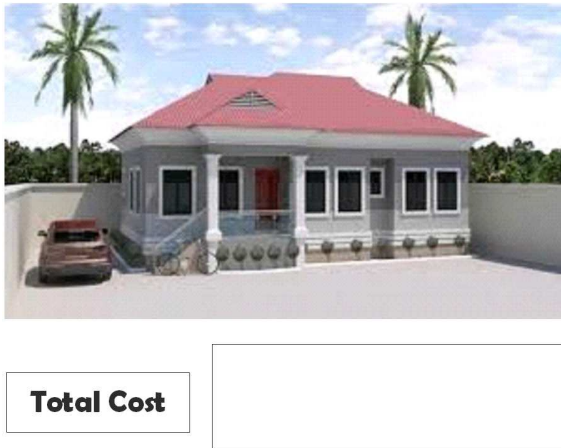


Figure 8. Output Design of the Proposed System.

#### 4.6. Database Design

The database design of the proposed system highlights how data will be structured in the database of the proposed system. It has a database (Estate Database) that consists of two tables: the user table and the building plan table. The user table holds the credentials of authorized users registered in the system whereas the building plan table holds the details of the building/architecture and valuation uploaded in the system.

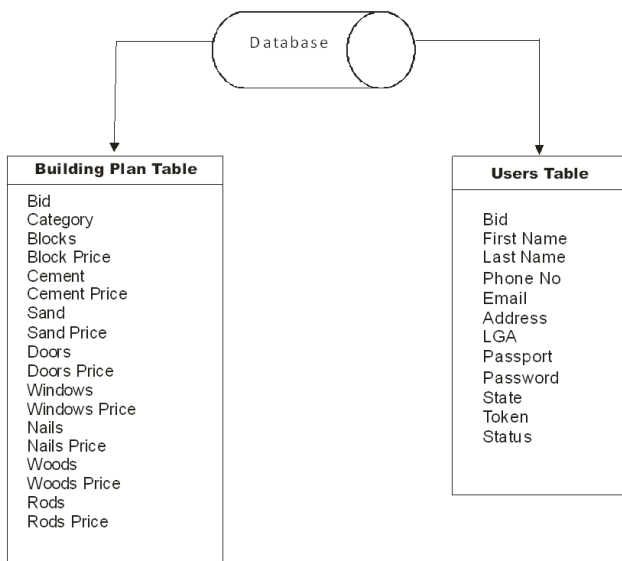


Figure 9. Database Design of the Proposed System.

### 5. Results

The human mind increases with acquisition of new findings with exposure to new occurrences. The research results are as follows:

- i. The study outcome provided an alternative or complementary model for professional estate valuation and because of its additional features, it prove more efficient and convenient.
- ii. It provides computational means of training students

- both in theory and in practice in estate management.
- iii. It has an accurate and a more reliable database of properties valued.
- iv. It will introduce an effective, sustainable system, which continues to maintain accurate up to date information of valued properties through effective information technology.
- v. It will ease the stress involved in calculating and reaching a price of a valued property using the parameters provided.
- vi. It will provide a software that will generate result that is accurate, timely and error free
- vii. It will give accurate estimate of material needed to complete a bungalow project.

### 6. Summary

The study was design to develop an architectural model for estate valuation. Its target was to complement or assist the professional valuers in the valuation process. The objectives of the study were to identify the method of estate valuation, design a template for estate valuation, implement the estate valuation template, and test and deploy the estate valuation template. Theories, related literature and empirical study were used to enhance the study. The existing system constraint were examined and a proposed system was developed to enhance the valuation practice. The new system has the user section were the user registers and login to the system and supply required data through the input section for the valuation operation. The valuation section receives the data supplied by the user and manipulate it and send the result to the output and the database section stores every data sent to it which can also be retrieved when needed. The method adopted was waterfall model and the programming language used was PHP with MYSQL its database.

### 7. Conclusion

Each valuation technique has its own unique strength and weakness based on the current economic climates. However, there is a better way of attaining accuracy in the services of the estate management. Architectural model for estate valuation system is the key and a preferred tool for comparing an efficient and effective valuation scheme and ultimately in complementing the professional approach to estates value determination. The study developed an architectural model for modern estate valuation. The model captures the parameters that are requisite for the practice and operations of a professional estate valuation; when provided and adequately applied, the input parameters of the model would accurately compute the estimated cost of an estate property as a valuer would. The model is viable to both the professional valuer and a skilled end user vested with computer knowledge. The model's validity and resourcefulness was measured by comparing its results when simulated with results computed by a professional valuer over the same estate property.



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