AN EFFICIENT AUTOMATED REVENUE GENERATION DATABASE MANAGEMENT SYSTEM

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ABSTRACT: Missing documents, multiple record entries, redundancy in data entry and revenue records over the years are a critical challenge. Thus, we have proposed An Efficient Automated Revenue Generation Database management system. The software is designed to maintain accurate and relevant revenue generated records efficiently. The research study tries to mitigate the problem of mismanagement of revenue records, multiple record entries, missing records, redundancy of records as well as effective management of revenue records/live storage of these records. The research also established a good user oriented data bank and designed a suitable database, procuring and installing the necessary database, communication and application software and developed a detailed documentation of all revenue allocated or collected which will encourage accountability and transparency effectively.

KEYWORDS: Automation, Database Management System, Revenue Records.

1. INTRODUCTION

A major concern of most developing countries is to transform their economics from this present state of underdevelopment to a more desirable state. Revenue constitutes the vehicle of change that is used to achieve this transformation. Revenue often described as the life wire of development, translating plans into actions, and providing the means for mobilizing scarce resources and allocating them to the production of goods and services. However, revenue is considered to be useful only if it is generated within the required period and meets with the original estimated amount and is satisfactorily providing the light of this, only a handful of local government in Nigeria could clearly be described as a success. Example abounds in every sector of the economy of cases of aborted and abandoned projects due to lack of sufficient revenue generation to continue with such projects. [1][3] this is most peculiar to developing countries. A thorough examination of projects failures in Nigeria is however, revenue that could be due to weakness in the administration of one or more stage of revenue collection cycle. For the past few years there have

been difficulty in maintaining proper records and these have increasingly been the major problem of the local government officers, especially the local government revenue collection officer. There have also been issues of missing document, multiple record entry, redundancy in data entry and revenue records over the years [10]. In this research study, we have proposed An Efficient Automated Revenue Generation Database management system. The scheme was developed using Visual Basic as well as MS Access based on the requirement and specification of the user and the analysis of the existing system, with flexibility for future enhancement. More-so, the expanded functionality of today's software requires an appropriate approach towards software development [12]. The software is designed for Danko/Wasagu local governments in other to maintain accurate and all relevant revenue generated records efficiently.

The research will address issues of mismanagement of revenue records as well as avoids the problems of missing records, redundancy of records, and enhance management of collected revenue records for longtime/life storage. The research tries to establish a good user oriented data bank and design a suitable database, as well as procuring and installing the necessary database, communication and application software and developed a detailed documentation of all revenue allocated or collected which may further encourage accountability and transparency more efficiently.

The rest of the work is organized as follows. Section 1. Overview, Section 2: literature review, Section 3: system Analysis, Section 4: System Design, Input design, Process design, Database design and Output design, Section 5: The implementation and unit testing of the new system, Section 6: Conclusion.

2. OVERVIEW OF AUTOMATED REVENUE GENERATION DATABASE

Considering the growing need of information/data in the 21st century, and the wide acceptance of western education in Nigeria, computerization and

processing of Revenue records, becomes a must for every organization, company or Government respectively [10].

2.1. Automation

Is the use of control systems (such as numerical control, programmable logic control and other industrial systems) in concert with other applications of information technology such as computer aided technologies (CAD), CAM) to control industrial machinery and processes, reducing the need for human intervention in the scope of industrialization, automation is a step beyond mechanization [27].

Whereas mechanization provided human operation with machinery to assist them with the muscular requirement of work, automation greatly reduces the need for human sensory and mental requirements as well [24] [22].

2.2. Method of Revenue Generation

Danko/Wasagu is one of the local government areas of kebbi state. It was excised from Sokoto state and marged with kebbi state and it is one of the largest local Government in the state. The major sources of internal revenue to the local government are namely: Market charges, Taxes, Rents and royalties, fees and fines, local licenses, Interest, Requirement, Statutory Allocations, and Miscellaneous.

However, the revenue office is operating based on a manual database system. This system is of course not proper for safe keeping of record. The collected revenue is recorded on revenue books or cash books.

This record is however open to all and sundry as anybody can view the content of the record book. This manual system is not also fast in calculating the amount collected, daily, weekly, monthly, quarterly and also yearly. There is also a lot of embezzlement by the revenue collectors and officers because of the manual record. The automatic updating of this manual record is not also possible.

So in view of the short coming of this manual system, we proposed an Efficient automated revenue generation database system, this system is built in such a way that the collection of each type of revenue will be inputted on the computer system.

The aims of this automated system are namely: To avoid double entry of a particular record, to ensure data security, to reduce fraudulent acts to some extent, to reduce work load on the revenue officers and account staff, to ease the calculations on monthly, quarterly and yearly revenue collected as the computer will calculate automatically the amount collected on a particular type of the revenue and even the sum of the whole.

2.3. Concept of Information System

An information system is a purposeful fully designed system that brings data, computers (hardware & software), procedures and people together to manage information that is important to an organization. The main function of an information system is the acceptance of data, processing of this data and disseminating this information through the organization by keeping track of all the transactions carried out by the organization [5].

[12] defines an information system as a subsystem that supports the information needs of an organization , which among other functions help people in the organization to gather and use information, communicate with each other and people within and outside the organization and make effective decisions.

They further stated that an information system just like every other system performs input, processing and output functions and it also contains feedback and control functions.

2.3.1. Categories of Information System

The concept of an information system is an extremely broad area as it encompasses different subsystem that work together based on the information needs of the organization or institution. [2], classified an information system into four main categories namely: office Support System, transaction Support System, Management Information System, Decision Support System.

The Concept of Data Processing and Data Management in Automated Revenue Generation Database

Information/data is a critical resource in the operation and management of all Government establishments hence timely availability of relevant information is vital for effective performance of managerial functions such as planning, organizing or for future use and reference. Data processing and data management are critical components of all information systems making them seat at the heart of an information system.

2.3.2. Data Processing

Data processing refers to the process of performing specific operations on a set of data or a database. Data processing embraces the techniques of sorting, relating, interpreting and computing items of data in order to provide meaningful and useful information. It will be evident that to arrive at certain figures, the data must be processed according to predefined procedures and rules arranged in a specific order.

The concept of data processing can be summarized into three major steps namely: **1**. Preparation of Source Document, **2**. Manipulation of Data, **3**. Data Storage.

Preparation of Source Document: The first step of every data processing activity is to obtain the relevant facts/records and Figures and to set these out on source documents. It involves the act of data gathering or capturing of data into a format that is ready for processing which can be done manually or automated.

Manipulation of Data: information, inputs for processing may have to be classified or sorted, it is at this stage that actions are performed on the data to give the desired output. This stage involves transforming the data into useful outputs.

Data and Information
Data refers to raw, unevaluated facts, figures, symbols, objects and events that can be processed to produce some meaningful information. Information is a collection of facts organized in such a way that it has more value beyond the facts themselves. It is a collection of data that has been processed and converted into meaningful form [28]. Turning data into information is a process or a set of logically related tasks performed to achieve a defined outcome. This process of defining relationships between various data requires knowledge. Knowledge can be defined as a body of rules, guidelines and procedures used to select, organize and manipulate data to make them suitable for specific tasks. Consequently, information can be said to be considered as data made useful by the application of knowledge from a set of knowledge base.

2.3.3. Characteristics of Valuable Information
The value of information is closely tied to the decision that results from its use. No information has an absolute universal value, hence its value is related to those who use it, how it is used and what situation it is used. The measured difference in performance due to informational factors is called the revealed value or realistic value of information. And the comprehensive impression of information and the amount that people are willing to pay for that information is known as the subjective value of information. According to Ralph M. Stairs in his book "principles of information system" opines that for information to be valuable, it must possess and satisfies the following conditions. **Accuracy:** the information should be accurate and free from error, **Completeness:** the information should contain all the important facts that are required, **Economical:**

the information should be relatively inexpensive to produce, **Flexible:** it refers to the ability of the information to be used for a variety of purpose and not just one, **Reliable:** the ability to rely on the information or depending on the information for decision making, **Relevant:** the information should be able to lead to an improved decision making. If the information has nothing to do with the problem at hand then the information can be considered irrelevant, **Simple:** it refers to the ability of the information to be simple to find and easy to understand, **Timely:** this refers to the timely availability of the information to users whenever it is required, **Verifiable:** this refers to the ability of the information to be checked and validated for accuracy.

2.4. Data Management
Data are organized in a hierarchy that begins with the smallest piece of data used by a computer for the purpose of this discussion, a single character such as a letter or number characters form fields such as Select revenue code, Type of Revenue, Revenue code/serial, Date of collection, Amount collected. The constant increase and the demand for information have triggered the need for an effective way of managing information. The essence of data management is to effectively arrange data in an orderly manner that will make information retrieval simple and fast. In the past, the traditional approach to data management consists of maintaining separate data files for each application. For example, a revenue record file could be maintained for personal record purposes, while an additional file could be maintained for either the management or result purposes. As a result, multiple data files are created for each revenue report and these will result to data redundancy. To overcome the potential problems with traditional data management, the database approach was developed.

2.5. Database Approach to Data Management
We are constantly being inundated with information because of the rapid rise of the internet. The central point or the backbone of every information system is the database that stores that information or data. A database can be defined as a self-describing collection of integrated tables. An integrated table refers to tables that store both data and the relationships among the data [8]. Database is electronic collections of related data that can be easily stored, sorted, organized, and queried [AK08].

2.6. Database Models
A database model is the theoretical foundation of a database and fundamentally determines in which manner <u>data</u> can be stored, organized, and

manipulated in a database system. It thereby defines the infrastructure offered by a particular database system.

2.7. Benefits of Databases in Automated Revenue Generation System

The benefits of database approach in automated revenue generation system are **1**. Databases help in result processing by enabling the storage and retrieval of large quantities of information or data. For example, it stores the entire records or information of all the revenue records in the local Government. **2.** It provides facilities for data centralization. Its groups revenue records result files, into one single database. Thereby, removing the need for multiple or separate data files and solves the problem of data redundancy.

Specialized hardened computers are frequently used to synchronize the flow of inputs from (physical) sensor and events with the inflow of outputs to actuators and events. Using lead to precisely controlled actions that permit a tight control of almost any industrial process. Automation has had a notable in a wide range of highly visible industries beyond manufacturing. Automation Teller Machines have reduced the need for Bank visits to obtain cash or carryout transactions [27]. In general, automation has been responsible for the shift in the world economy from agrarian to industrial in the 19th century and from industrial to services in the 21st century [27].

3. SYSTEM ANALYSIS

Is a detailed study of the current system leading to the component: Input, Processing and Output specification of the new system. During system analysis, various operations performed following the system and three components are analyzed. System analysis is the process of collecting and analyzing facts of an existing system in order to fully appreciate the prevailing situation in process of designing and implementing an effective computerized system.

3.1 Existing System

The existing system is purely manual such that the operation involves staff in the revenue department going round where necessary to get the dues collected and are also charged with the responsibility of putting them on records and documents [11].

3.2. File Maintenance

An effective and sufficient record is important for the successful operation of any revenue Generation to triumph excellently in their various dealings with e.g marketers, workshops, product baying license,

Haraji and Jangali. Maintaining records is very important as it enable reference. At the early stage of any revenue collection process irrespective of whether it is manual or computerized system there must be a proper documentation of all revenue records and this include. Type of revenue collected. **2**. Amount collected. **3**. Date of collection**. 4**. Revenue code and serial number.

3.3. System Procedure

This is to describe what goes on during a Revenue collection process.

3.3.1. How Revenue is collected

Is done usually base on agreement between the revenue officers and the marketers, it may be on market day basis, weekly, monthly or yearly basis.

3.3.2. Payment

Payment of revenue is done with cash. The amount of money to be paid depends on the kind of business you do (slaughter fee, sales of livestock fee, and sales of mudus fee etc). All payments are made to the Revenue officer who in turns records them in a record book.

3.4. Input Analysis

The usual method of entering data into the existing system is by manually writing into the record book and file. This information is very vital since it marks the beginning of Generating report.

The Revenue Input Form

This form can be filed either by the revenue officers or the deputy director finance, as the case may be when the reports are ready. This form provides the user with an interface to enter all the data information which are namely: **i.** Select revenue code, **ii.** Type of revenue, **iii**. Type code and serial number, **iv**. enter date, **v.** amount collected.

3.5. Output Analysis

Output refers to the end result of the report or the outcome. The required usual output is usually the revenue information stored in the Database after all processes are completed. The database also contains all previous data stored in it.

3.6. Program Flowchart

Figure 1 is a flowchart design for the proposed system (Automated Revenue Generation Database system). The system allows inputs to be made and saved so that it can perform any task as modeled by the programmer.

In this project work, I employ the commonly used flowchart for the following reasons:

1. The flowchart allows the user to view the logic of the problem's solution in a pictorial fashion.

2. It serves the programmer by breaking up a larger problem into smaller steps which can be individually coded or programmed without having to be concerned with how this smaller segment of the problem will fit into the total solution.

3. It serves as a means of communicating between the revenue officer and the programmer. The revenue officer for example does not have to be familiar with computer codes if he or she is able to understand the flowchart. From flowchart, it can be easily and quickly determined if the proposed computer program solution is logically correct and contains all necessary considerations and limitations

The program flowchart is depicted in Figure 1
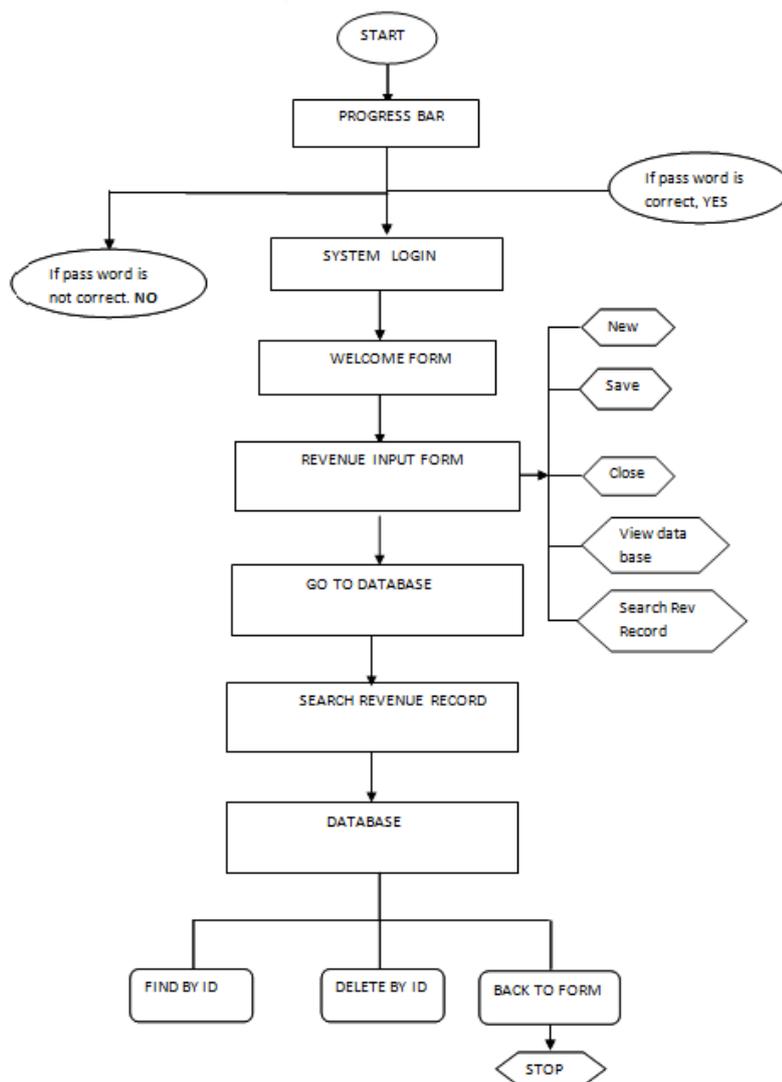
Figure 1. The program flowchart

Table 1. Revenue Code and Revenue Type

CODE	TYPE OF REVENUE
1001	TAXES
1002	RATES
1003	LOCAL LICENSE
1004	MARKET CHARGES
1005	RENT
1006	INTEREST
1007	REINBURSEMENT
1008	MISCELLANEOUS
1009	STATUTORY ALLOCATION
OK	CANCEL

3.7. Choice of Programming Language

The programming language for the development of the program is Visual Basic 6 and MS Access (VB 6). Due to the simple nature of the programming, VB6 is a rapid application Development (RAD) tool that allows programmers to create windows applications in a very little time.

4. SYSTEM DESIGN

Is the systematic process of formulating the suitable objectives for the final system. It involves working

from the requirement specification to produce system specification. A system specification provides detailed documentation of the new system. System design usually comes after the information about the system are collected, i.e. the shortcomings and problems are identified, the mode of operation and also the personnel and entities involved.

4.1. System Design

The proposed computer-based system is a revenue generation database System, which is specifically designed for the finance Department of Danko/Wasagu local Government Area of Kebbi State. Having established what the objectives of the proposed system are, the system was designed so as to achieve these objectives. In designing this system, the system was specified in detail. This involves identification of inputs, files, processing, output, hardware, costs, accuracy, response times and controls.

The proposed system however has the following features:

- It provides reliable security measures, which protect the data and the package from accidental of deliberate threats that could cause unauthorized modifications, disclosures of destruction of the data and protection of the information system by the use of password.
- It provides an automated revenue records thus, storing information on the system rather than using bulky files.
- It provides input of data at any time with the ability to update records in the system.
- It allows automatic and manual record of data
- It provides efficient and effective means of producing hard copies of information by generating reports on different types of revenue collected
- It provides a database for storing all the revenue collected.

4.2. System Flow Chart

Is a graphical representation of the system showing the overall flow of control in processing at the job level; specifies what activities must be done to convert from a physical to logical model. Unified Modeling Language (UML) is a standardized general-purpose modeling language in the field of object-oriented software engineering. The standard is managed, and was created, by the Object Management Group.

4.3. Use Case Diagram

Use case diagram is a diagram that shows the interaction between user and system to capture the user's goals.

4.4. Class Diagram

Is a collection of static elements such as classes and their relationships connected as a graph to each other.

4.5. Sequence Diagram

Shows an interaction arranged in a time sequence. It is alternative way to understand the overall flow of the control of the system program.

4.6. Collaboration Diagram

Enters revenue records.

4.7. State Diagram

State diagram describe the behavior of a system as seen in Figure 6.

4.8. Activity Diagram

It describes the sequence of activity seen in Figure 7.

4.9. Revenue Input Diagram

4.10. Output Design

Is the output result generated, by the database. The system automatically updates the records whenever entries are made.

4.11. File Design
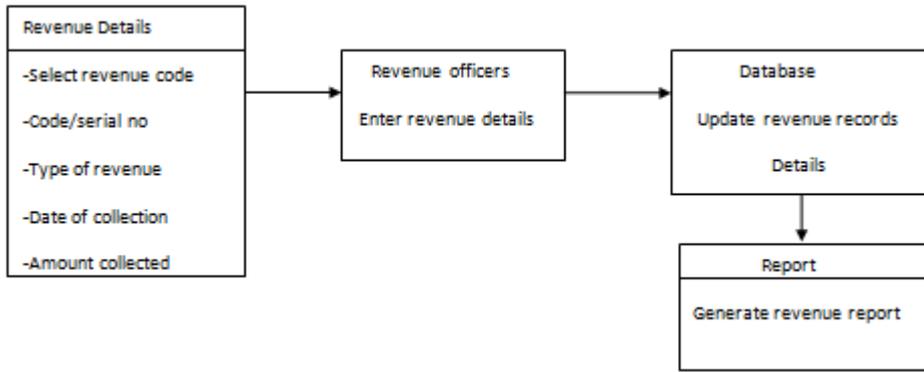
The File Design is presented in Table 2.

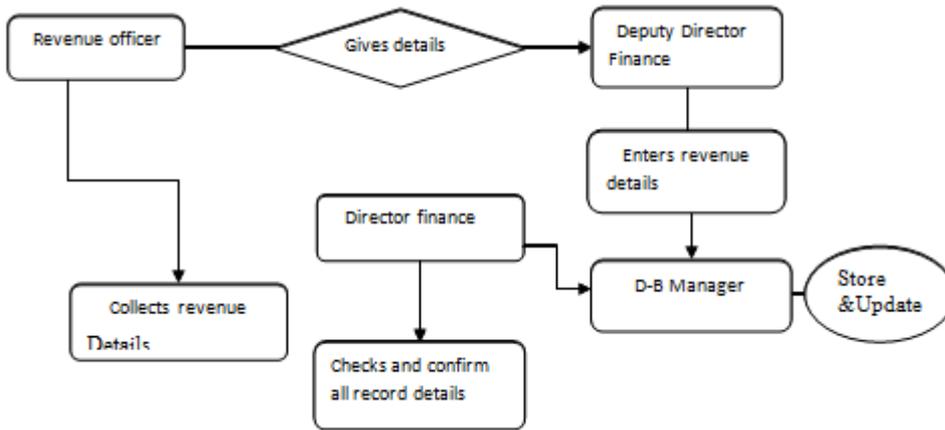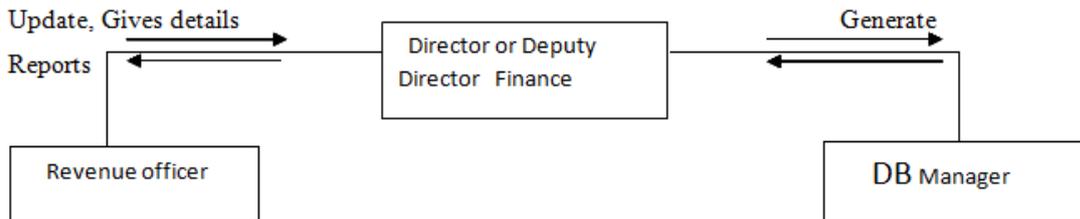**Figure 2. Use Case Diagram**

Figure 3. Class diagram

Figure 4. Sequence Diagram

Figure 5. Collaboration Diagram
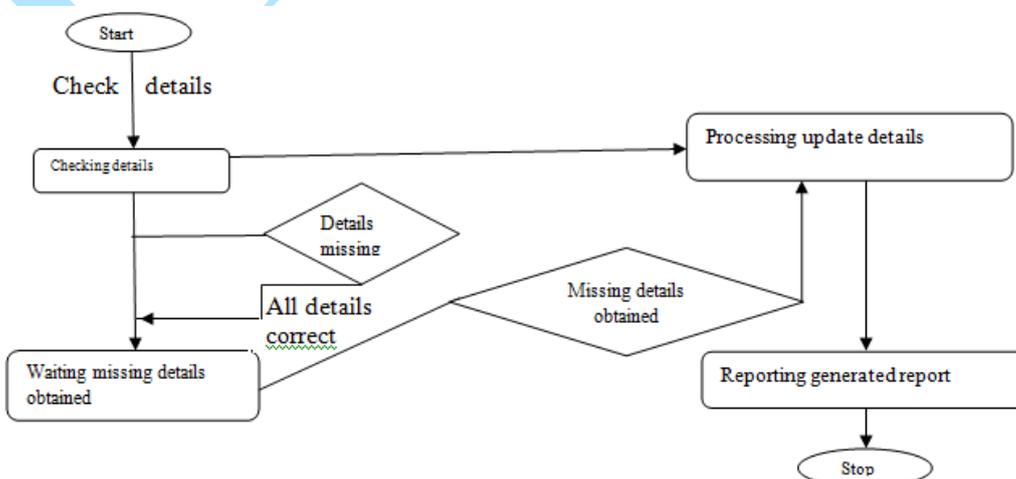
Figure 6. State Diagram
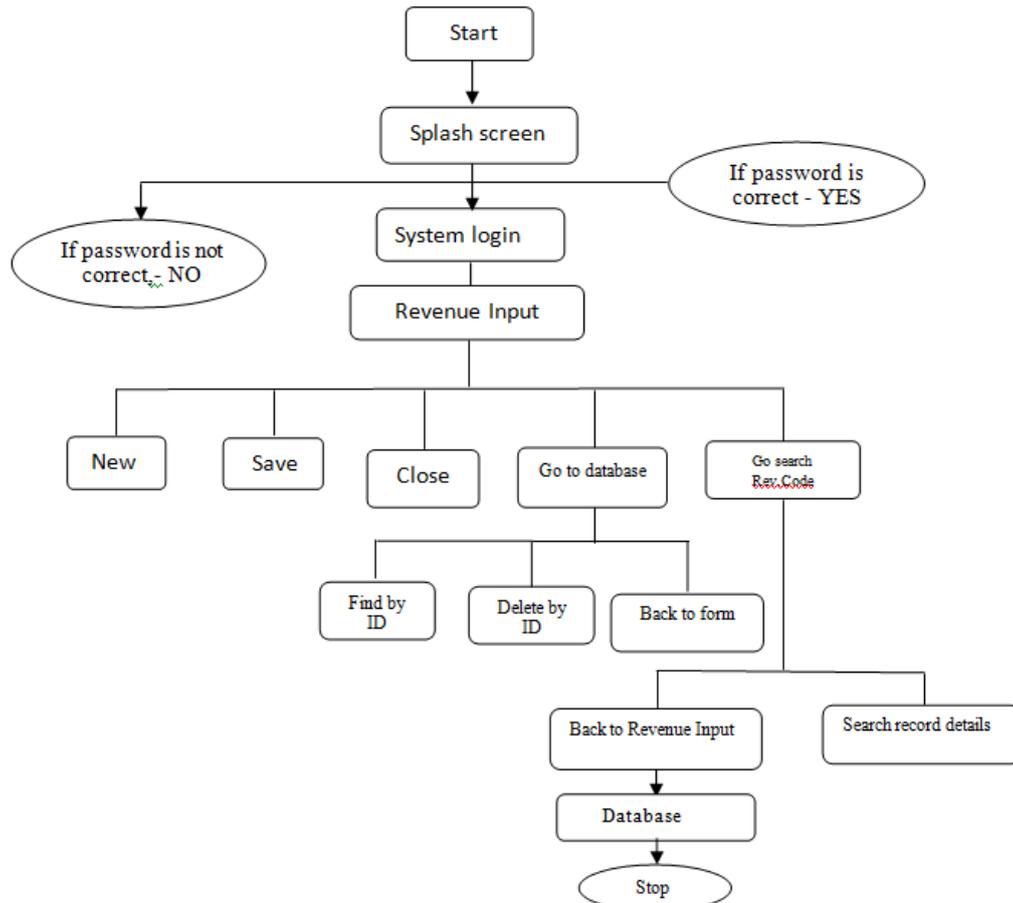
Figure 7. Activity Diagram

Figure 8. The Revenue Input Diagram

Figure 9. The Output Design

Table 2. The File Design

ID	Revenue Code	Code/Serial No	Revenue Type	Date Of Collection	Amount Collected
1	001	RCOO1/SO1	TAXES	01/10/2012	40,000
2	002	RCOO2/SO2	RATE	12/10/2012	43,325
3	009	RCOO9/SO9	STARTURY ALLOCATON	14/10/2012	3,000,000
4	003	RCOO3/SO3	LOCAL LICENSE	18/10/2012	100,000
5	004	RCOO4/SO4	MARKET CHARGES	18/10/2012	100,000
6	005	RCOO5/SO5	RENT	19/10/2012	30,000
7	006	RCOO5/SO5	INTEREST	19/10/2012	7,000
8	007	RCOO6/SO6	REIBURSEMENT	20/10/2012	7,000
9	008	RCOO8/SO8	MISCELLANEOUS	22/10/2012	2,000

4.12. Splashform and Loginform
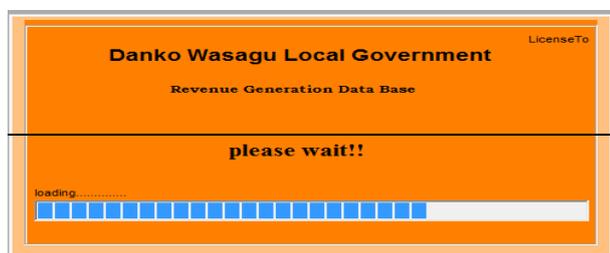
Figure 10. The application loading

This is a splash screen form that is first loaded when the application is loaded. It displays the title.

Figure 11. The login form

This is a login form that requests the user to enter his/her password and username for validation. It reads its data from the table "users" The user is allowed to load the application successfully if and only if he is an authorized user of the application. It is the surety measure placed on the application.

5. SYSTEM IMPLEMENTATION AND UNIT TESTING

System implementation and delivery of the entire system into production that is the day to day operation in the local government. This involves the co-coordinating of the effort of the user department and the data processing department in getting the system into operation. Indeed, the main aims of the system implementation are as follows, **1**. To check whether the system's goal and objective have been achieved or not, **2.** To determine whether user service requirement have been met, while reducing costs and errors, **3.** To determine whether personal procedure, operating activities and other control have been confirmed, **4.** To check whether known and unexpected limitations of the system need attention.

5.1. Program Interface and Documentation

The system is designed to work on suite of programs develop in modules. It involves the physical construction of the design. The procedures define the program specification for output, input, file and processing into computer software. Therefore, the program interface and documentation are specified accordingly: **1**. start the computer, **2**. click on a folder named revenue database system, **3.** Double click on the folder; a page of red coloration appears, **4**.Click on file at the top left corner of the page, the main menu appears as shown in figures bellow.

5.2. Result and Discussion

According to the test carried out, different data values were used to test the program; the values of revenue code/serial number, revenue type, and amount collected and dates were entered, while the program generated an expected result. This implies that the program worked the way it is commanded to. The program is better compared to the manual record that is done in the local government.

5.3. Program Output

The Figure 12 shows the option to select a revenue type, revenue code/serial number, date of collection and the amount collected. The button "new" allows you to make new entry of the revenue collected, the save button allow you to save it, the Go to Database button takes you directly to the data base, and the close button allows you to close the table. The table that follows also performs similar tasks.

Select revenue code, it will generate automatically a serial number and enter the amount and click on save and the Figure 13 will be displayed.

Select for local license, the program will generate an automatic serial number for local license code, Enter the Amount and click on Save. The Figure 14 will be displayed.

Select code for market charges, the program will generate an automatic serial number for the market charges, enter the amount collected and click on save. The Figure 15 will be displayed.

Select the code for Rent, the program will generate an automatic serial number for Rents, Enter the amount and click on save. The figure 16 will be displayed.

Select code for the interest, the program will generate an automatic serial number for interest,

Enter the amount and click on save. The Figure 17 will be displayed.

Select Reimbursement, the program will generate an automatic serial number for Reimbursements, Enter the amount and click on save. The Figure 18 will be displayed.

Select miscellaneous, the program will generate an automatic serial number for miscellaneous, Enter the amount and click on save. The Figure 19 will be displayed.

Select Statuary allocation, the program will generate an automatic serial number for statuary allocation. Enter the amount and click on save. The Figure 20 will be displayed.

Security: involves taking the necessary measure in other to avoid any hazards.

Figure 12. Shows Output for Taxes collections

Figure 13. Shows Output for Rates Collections

Figure 14. Shows Output for Local License Collections

Figure 15. Shows Output for Market Charges Collections

Figure 16. Shows Output for Rent Collections

Figure 17. Shows Output for Interest Collections

Figure 18. Shows Output for Reinbursement Collections

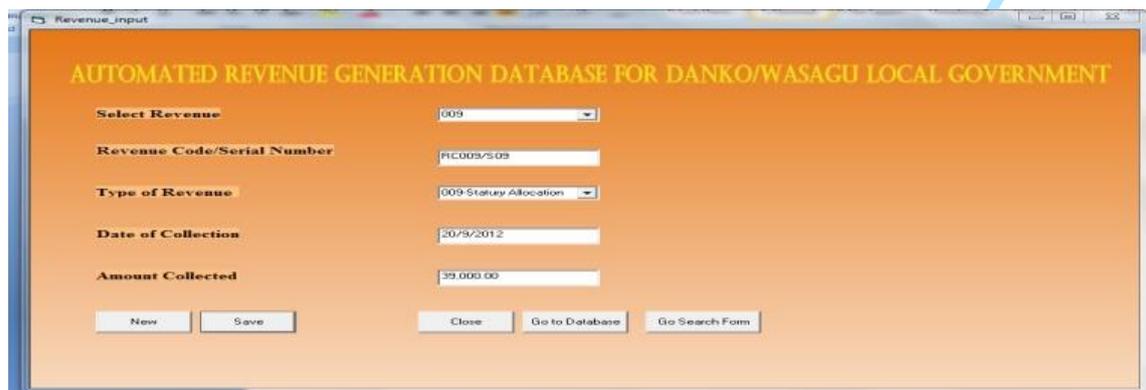**Figure 19. Shows Output for Miscellaneous Collections**

Figure 20. Shows Output for Statutory Allocation Collections

6. SECURITY AND MAINTENANCE, OBSERVATIONS, CONCLUSION & RECOMMENDATIONS

6.1. Maintenance

Is the minor enhancements or corrections to problems that surfaces in the system's operation. Maintenance is also done based on fixing the problems reported, changing the interface with other software or hardware enhancing the software. Any system developed should be secured and protected against possible hazards. Security measures are provided to prevent unauthorized access of the database at various levels. An uninterrupted power supply should be so that the power failure or voltage fluctuations will not erase the data in the files. Password protection and simple procedures to prevent the unauthorized access are provided to the users .The system allows the user to enter the system only through proper user name and password.

6.2. Observation and Recommendations

1. The major shortcoming that have been Observed is inadequate and unreliable data.
2. Poor accountability and haphazard implementation of money projects.
3. The local government should exploit and encourage other sources of revenue generations

internally instead of relying mainly on the statuary allocation from federal government.
4. It is also recommended that the staff involve in the manual revenue generation should be sent on training on how to operate the new automated system.
5. The new system is design because of its efficiency and will drastically reduce embezzlement and fraudulent practice.

6.3. Documentation Requirement

You need an IBM compatible computer at least 4MB of RAM, and color VGA, and monitor, MS DOS 5 (or above) operating system, a white or colored printer. To run package, insert the CD RW provided, which contain the program package. Double click on the folder "review database" click on file on the left top corner of the screen, this will display a page that allow you to enter, revenue code/serial number, revenue type, date and amount. You are provided with five option i.e new, save, close, go to Database, back to form, find by ID, delete by ID, buttons, these buttons allow you to perform the function they are meant for. E.g to find the amount collected on a particular type of revenue, enter the revenue code, and date. The system will display the amount allocated. Other options i.e new, save and close also perform the function they are meant for.

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7 CONCLUSIONS

This research has addressed the problems of missing records, redundancy, inaccurate revenue records by appropriately managing records, and eliminating the problems of manual method. The software is designed in other to maintain accurate and all relevant revenue generated records. The implementation and resultant output of the proposed software have highlighted the advantages and need to formalize and standardize the input activities and outputs of revenue generation process in general. By establishing a good user-oriented data bank, designed suitable database, procuring and installing the necessary database, communication and application software and developed a detailed documentation of all details including revenue allocated, which further enhance accountability and transparency.

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