



## SOFTWARE SOLUTION FOR TRACKING ACCOUNTABILITY FOR NON-GOVERNMENTAL ORGANIZATIONS (NGOs) IN NORTH-EASTERN NIGERIA

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**Abstract:** Often times, accountability is the main pressing issue when it comes to public assets implied for the overall population. These are required in a bid to foster the development of some sort of software solution for following the descending accountability of humanitarian dispensation in the North East of Nigeria. The review embraced a blended technique for a specialist to meet as the essential information assortment strategy while utilizing content investigation as an auxiliary information assortment strategy. For the design, it was carried out using Object- Oriented Analysis Design strategies. Microsoft SQL Server 2014, C#, HTML 5, and Bootstrap CSS were utilized to implement the improved model. Simulations based on the models demonstrated an improved correspondence interface among the donors, government agents, and the recipients. This shows improved descending accountability to the recipients, which reinforces the regulatory role of the public authority and increments trust in the benefactors. The aftereffects of this research have some significant administrative and strategy suggestions. In the first place, it shows that Data innovation (IT) can be utilized successfully to work on inner and outside accountability in NGOs tasks and operations. It additionally shows that data accessibility is efficient in addressing fraudulent tendencies and debasement related with NGOs instrumentality for transparency in operations. As a result, the research suggests that NGO chiefs and policymakers ought to take on the software solution in keeping track of major operations of in an effort to minimize fraud and which, through the use of IT services will advance an ever-evolving expansion in accountability in the public sector.

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### 1. Introduction

Insurgency attacks carried on civilians in the North-Eastern (N.E.) part of Nigeria has affected over 1.5 million people, and in excess of 20,000 individuals have been murdered as a result, while around 4,000 people, mostly women and young girls have been snatched [1]. The insurgency has also displaced about 1.7 million persons, which has limited land under cultivation, affecting about 3.7 million persons [1]. This has resulted in widespread forced displacement, acute insecurity of food and intense infringement of common freedoms laws, and drastically increased needs from the humanitarian angle [1]. The research also estimates that a population of 8.5 million individuals are in need of help from a humanitarian context. With the most exceedingly awful impacted provinces of Borno, Adamawa and Yobe.

[2], alluded to Non-Governmental Organizations (NGOs) collectively of associations particular from government establishments and business associations, the unmistakable element being that they are framed

to supplement, supplement and proposition choices philanthropic help to government advancement endeavors, Non-legislative associations are non-benefit in nature and as the name recommends, are not a piece of the public authority. NGOs are assuming a vital part in the conveyance of medical care, training, and other government assistance administrations in numerous non-industrial nations [3].

[4] Characterized NGOs as a subcomponent of a metro association, characterized by the way that they are enrolled with the public authority, get a critical extent of their pay from willful commitments as a rule close by awards from the public authority, and are administered by a leading group of trustees rather than the chosen delegates of a voting demography. The exploration contends that there is no reasonable meaning of NGO and for the motivation behind this investigation. [5] opined that the meaning of NGO was embraced as a non-benefit, non-state organization with operations are outfitted towards assuaging enduring, advancing the premium of poor people,

ensuring the climate, offering essential social types of assistance, handling local area advancement. NGOs get financing from donors without showing unmistakable worth consequently, and the majority of their operations include a scope of recipients in the general public. There are successive calls for NGOs to release responsibility in more designated ways and to more extensive arrangements of partners [6]; [7]. These NGOs funded by donors are involved in expanding advancement aid and more other services, for the most part focusing on the socio-economic transformation of communities [8]. The conviction among contributors that NGOs are more practical than the public authority in offering fundamental social types of assistance, reach the poor people and weak people than the government is the reason the donors diverted funds to this entity as contended by the research.

In its broadest sense, accountability alludes to the giving and requesting purposes behind such conduct [9]. [10] Characterized accountability concerning how people and organizations report to a recognized authority or specialists and are considered liable for their activities. [11] Characterized accountability as the obligation to give a report or account in no way, shape, or form fundamentally a monetary record or retribution of those activities for which one is considered responsible. Interests relating to accountability in NGOs have been becoming due principally to a progression of exceptionally promoted embarrassments that have dissolved public trust in non-profit associations [12]. The quick development of NGOs globally, which has necessitated the need for more data on their operations and progressively significant impact of NGOs [13].

The inadequacies of literature in the area of software solutions for tracking accountability of NGOs operations, hence the research leveraged on the application of information and communication technology to develop a software solution that has proven to minimize fraud and corruption in the activities of NGOs. Information Technology (IT) is a term with various implications and has been severally characterized. A few researchers consider it to be a term that envelops a ton of exercises, including acquiring, stockpiling, handling, and dispersal of data using fitting software and equipment planned facilities for such purposes [14], while [15] considers IT to be computer systems, telecom, networks and multi-media application that upgrades information for the execution of given tasks that involves abilities and cycles essential for completing operations in a given setting. The spread of new media, especially the authoritative site, has fundamentally expanded the capacity of government, NGOs to speak with and

deliberately Draw in recipients, and the local area in general [16]; [17]; [18].

In view of the literature reviewed, content analysis was conducted from accountability tools and records of some chosen NGOs working in the NE and interviews directed from specialists. The research contends that there is no software solution in place to limit corruption and fraud to ensure downward accountability to a recipient in the operations of NGOs in the NE, the issue of lack of accountability could proceed without a clear solution close by; thus, the research identifies the requirements of the software solution for tracking accountability, developed and simulated the software to identify the extent to which it can limit fraud and corruption of NGO operations in NE which the outcome demonstrated the model could limit frauds and corruption in the operations of NGOs in the NE since financial information and activities are made available to beneficiaries, donors through improved developed web cloud communication link.

## 2. Material and Methods

### Concept of accountability in NGO

Accountability in the humanitarian context in which the research focuses is concerned about the cycles and components through which establishments and people should deal with serious consequences regarding and bear ramifications for their activity or inaction. In the humanitarian domain, there is no all-around acknowledged meaning of accountability [19]. The accountability concepts in the humanitarian setting are driven from the framework which includes the Active Learning Network for Accountability and Performance in Humanitarian Action (ALNAP), the Sphere Project and the Red Cross code of conduct are notable humanitarian responsibility related initiatives, proposes that accountability is not principally about satisfying one's obligations: it is essentially focused on changing power what's more, data imbalances in relationships [20]. The Compassionate Responsibility Practices Standard in Responsibility and Quality Administration HAP (2010) [21] is a report that is planned to help associations that help or follow up for the benefit of individuals impacted by or inclined to catastrophes, struggle, neediness, or different emergencies to design, improve and perceive accountability programmes [21].

Goddard (2020) [22] conducted a study to contribute to the understanding of bookkeeping and accountability practices and perceptions in NGOs working in Africa. It takes into consideration an expansive arrangement of Bourdieu's ideas, involving field, capital, Doxa and habitus visa viz the utilization of grounded hypothesis techniques to code and

classify the exact information. Information was gathered from eleven NGOs, chosen to give a near set, enveloping national, NGO type and religious affinity. A context-oriented field examination uncovered the predominance of Northern NGOs, coming about because of their possession and control of the capital, in impacting responsibility insights and the significance of authenticity. An authoritative examination uncovered the significance of habitus and Doxa supporting originations and practices of responsibility and bookkeeping to arise. It additionally empowered identifying 'existential Doxa' and 'accountability Doxa, which gave the connection between the field and the accountability habitus to be perceived. The subsequent arrangement clarifies bookkeeping and accountability rehearses as coming about because of methodologies taken on in light of the responsibility fans, supported by Doxa, which themselves are reactions to the settings in which the NGOs work. The setting includes the field inside which NGOs battle for capital assets, close by existential decisions made by the actual NGOs.

Yasmin et al. (2019) [23] Seek to add to the arising stream of writing on NGO accountability by drawing on the hypothetical declarations of the problem of responsibility. It talks about how responsibility has become hazardous for NGOs by looking at how these issues are made and how NGOs in this way react. Drawing on inside and out talk with information supplemented by broad narrative examination, the exploration investigates the responsibility encounters of Muslim NGOs working in the UK and featured how explicit responsibility systems are impacted by the predominant political, social and monetary setting inside which they work. The review found commitment with optional responsibility strategies that permit the NGOs to acquire the trust of partners, while vital change processes assist the NGOs with expecting and arranging uplifted responsibility requests.

Cordery et al. (2019) [24] presented key topics of NGO bookkeeping and accountability and gave an outline of formal detailing issues identified with the administrative necessities just as different elective types of casual accountability systems which are more identified with the central social motivation behind the organization. The review revealed that NGO responsibility release is expanding to a more extensive scope of partners.

Anik et al. (2017) [25] determined the accountability issue of the non-government organization according to the point of view of the Partner hypothesis. They further deduced that accountability had a problem with its practice and hypothesis. The issues of accountability, practically speaking, are execution

appraisal and assessment, investment, self-guideline, and social review, and so forth. The problem of accountability on hypothesis cannot be applied effectively by Non-Governmental Organizations since they are social organizations. Accordingly, it is fascinating to know the practices and the responsibility of NGOs. The research utilized the interpretive existential phenomenology strategy to comprehend a peculiarity. Partner hypothesis is utilized to investigate issues with the Mission Based Management (MBM) organization action presumption, which is identified with the givers and local area. The outcomes of the research show that the issue of responsibility, depending on the partner viewpoint hypothesis, is an arrangement of control on the act of responsibility.

Michael (2004) [26] derived that straightforward administration is crucial to the drawn-out upkeep of worldwide life emotionally supportive networks by advancing responsibility, sufficiency, and authenticity in the dynamic cycles that straightforwardly and in indirect way impact those frameworks. After an underlying outline of straightforward administration and a study of its empowering forces and components, the emphasis is put on the Web and NGOs that are turning into the essential main impetuses for advancing straightforward administration all throughout the planet. Explicit Web-based straightforwardness systems are inspected, along with chosen Web-based means by which NGOs increment straightforwardness, promote beneficiary accountability.

Adams, (2004) [27] Demonstrated the requirement for an alternate conceptualization of responsibility for NGOs than the one utilized when calling for more noteworthy responsibility of partnerships, and exhibits the as of now exists compelling responsibility systems. A significant setback in the contention for a bigger NGO responsibility is that it is generally introduced according to the point of view that disregards the contention among control and the job that NGOs play in common society. The findings show that NGOs assume a significant part in the public eye, and without even a trace of thought processes in presence, for example, benefit or power, it is important to apply various standards when passing judgment on their viability.

Awuah-Werekoh, (2015) [28] inspected the elements of system accountability inside an NGO in Ghana. Expanding the new institutional human science hypothesis, especially the components of the regulating power to incorporate the media and the other distinguished bodies, the review took on an inside and out interpretive contextual analysis approach utilizing a solitary local area-based

organization in Ghana. The discoveries of the review are broken down and deciphered from the perspective of institutional hypothesis, especially the new institutional social science. It was tracked down that the predominant responsibility frameworks in the NGOs studied are vertically towards contributors. The research finds that descending responsibility is not given a lot of noticeable quality by NGOs in Ghana, mainly because of an absence of responsibility by benefactors, the study also discovers that institutional tensions shape the responsibility/accountability frameworks of NGOs in Ghana. The outcome has suggestions for understanding the tasks and detailing frameworks of NGOs, especially in non-industrial nations like Ghana.

Trivunovic, (2011) [29] revealed that benefactor offices are progressively careful with indications of defilement/corruption or different abuses in the tasks and projects they sponsor regardless of guide methodology that is being referred to or who the implementer or beneficiary of the assets might be. This incorporates NGOs, that are regularly considered to be favored execution accomplices in light of their nearer binds to networks, especially in settings where state foundation is missing, or because of the insight that they are less bad than the authorities of recipient nations. However, NGOs are not safe from fraudulent and other corrupt tendencies. While the review's absence of exact proof forestalls arriving at indisputable conclusions, the review draws on expert experience assembled through casual meetings and a broad common society responsibility talk to spread out the central points of contention that ought to be considered by contributors in surveying their NGO responsibility systems. The review recommends that Strategies can be established to forestall and recognize debasement being developed, including funds disbursement to and through NGO partners.

Unerman and O'Dwyer, (2010) [30] investigated NGO's responsibility and help conveyance. It identified responsibility rehearses in an example of NGOs in Ghana to bring up utilitarian responsibility measures and those that are not useful and to clarify why some were thought of as practical while others were not. The review utilized meetings and centered gathering conversations to acquire data. The discoveries of the review were that NGOs ought to include more partners, ought to be powerful in imparting to people in general, and should dispose of any accountability means that do not yield the expected outcomes.

Lewis and Kanji, (2009) [31] looks to address three inquiries: firstly, who are NGOs responsible to? Secondly, what straightforwardness Strategies are NGOs utilizing to exhibit responsibility or

accountability? At long last, how can the state co-select NGOs? What's more, how does this influence the job of NGOs and specifically their responsibility and tasks? The review interviewed four NGOs from around the globe to provide answers to a composed survey about responsibility and straightforwardness/transparency techniques inside their association. The examination of the survey uncovers an assortment of straightforwardness, further developing procedures relevant to little and huge associations that can go from exceptionally formal revealing strategies to up close and personal straightforwardness reporting. As well as illustrating these straightforwardness procedures, the outcomes uncover shifting degrees by Which NGOs and government cooperate? At long last, the review examined the job of large-scale level implicit rules associations in gathering a portion of the responsibility/accountability and straightforwardness/transparency needs of NGOs.

[43] look at the Bookkeeping and Exploring Authenticity of Tanzanian NGOs. The goal of the review was to research bookkeeping in Tanzanian NGOs. Primary and secondary data were made use of and an descriptive analysis was employed. The review set up that bookkeeping is significant to the extent issues of authenticity in NGOs are concerned. It identified two principle parts of authenticity in NGOs. These are building validity and upsetting for change.

[33] focused on NGOs and civil society accountability. The study used a literature base methodological approach which was a documentary for a secondary source of data-based. The findings placed a significant accentuation on the general public and partners in accountability and how they view NGOs.

A vital motivation behind NGO accountability instrumentality is to consider administrators of organizations responsible for the social, ecological, and monetary results or effects emerging from the activities like policies, practices, and operations of their organization [34]. Notwithstanding perceptible variety in what is the responsibility, it could be momentarily characterized as a satisfaction of a specific undertaking and announcing the results of it to another person who might incorporate Donors, Beneficiaries, and stakeholders [35].

[36] Looked at accountability as 'how people and organizations report to a perceived power/specialists and are considered answerable for their activity. Accountability is accordingly imagined as an indispensable instrument of control that enables clarity to the beforehand undetectable in this manner giving those partners possibly impacted by a person's or alternately association's activities with the data



expected to challenge and respond to these activities [37].

[38] Revealed that that at its central responsibility is a social affirmation and a demand that one's activities have an effect to both self and others," this injects responsibility with a moral or worth-based aspect privileging the interior inspiration of actors. As such, responsibility is a course of considering entertainers answerable for the activity [39]. To be responsible means to have a solution for one's activity or inaction, and relying upon the appropriate response, to be presented to expected assents, both positive and negative [40]. Accountability is a characteristic of a connection between no less than two actors, which can be characterized as 'how people and associations report to a perceived power, or specialists, and are considered liable for their activities' [36].

Hypothetical point of view reveals that the partners to whom an NGO may be considered responsible incorporate the gatherings, to whom an NGO offers types of assistance and additionally crusades in the interest of, and the people, networks or potential areas in a roundabout way affected by NGO exercises [41]; [42]; [43]. [44] claims that NGO's responsibility covers issues like organization's management, project execution, monetary administration, and data exposure. It is identified with issues like answerability, obligation, responsibility, steadfastness, dependability, reliability, authenticity, and straightforwardness.

### 3. Methodology

#### Analysis of the Existing NGO accountability model

This research led to a precise investigation of the current model of tasks and different operations of NGO activity in the North Eastern part of Nigeria. This was finished by actual appearance to a portion of the workplaces of those NGOs to have more comprehension of their method of activities and to meet the staff on every one of the methods for communications between the contributors, the NGO, the Public authority organizations, and the recipients.

The customary method for information assortments and examination were all the while being utilized by those NGO's the place where information is gathered utilizing structures given out to recipients prior to moving them to level records on PCs at times they are just documented physically. From the investigation completed, the analysts noticed the absence of correspondence or connection between the givers, legislatures organizations, and the recipients, the main connection existing is that of the contributors and the NGO. While the examination shows Worldwide NGOs have a component set up that advances responsibility, the Neighborhood NGOs have no responsibility instrument for advancing straightforwardness and answerability in their area. Worldwide associations like DRC, IRC, and NRC have responsibility instruments which are alluded to as Accountability Feedback Mechanism (AFM) and customer Responsiveness Component (CRM). While the nearby NGOs regularly have a joint gathering with the state arranging commission and local area advancement official at the Neighborhood Government level to show their project and reveal any data required.

**Table 1:** Content analysis table which shows the frequency at which various accountability wards appear in the related document of selected NGO's for the study.

Code Name	Definition	Scores
Accountability Mechanism	Text identifying the types accountability mechanism in place like Accountability feedback mechanism (AFM), Complaint Mechanism	25
How is accountability Report	Text detailing how INGOs and NGOs send a weekly report to donors	33
Stakeholders Role	Text detailing how accountability information is shared with stakeholders	23
Frequency of accountability	Text Detailing the frequency of accountability for INGOs is monthly while for LNGOs is weekly	20
Information Disclosure	The text identifies how INGOs share reports with Government Agencies and NGOs disseminate information during a joint meeting with the state planning commission and community development officer of the Local Government areas.	27
Coordination meeting	The text discussed coordination meetings with state actors (Government agencies, community leaders, partners organizations)	23

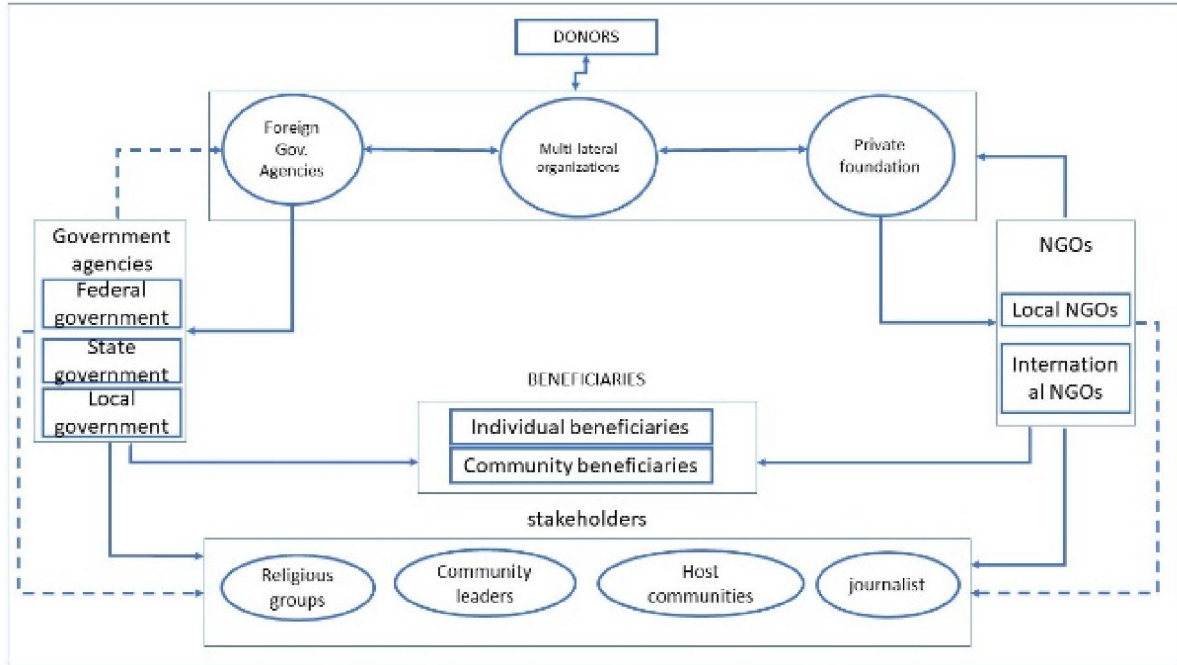
**Weakness of the existing Accountability System**

The examination led uncovered that the current responsibility framework has a shortcoming that restricts it from protecting responsibility in the activity of NGOs in the North East (NE). These shortcomings include:

- i. The support of misrepresentation and theft
- ii. Wrong information show
- iii. Possible Loss of responsibility record

iv. Cut off points recipient cooperation in an independent direction

The existing accountability system was analysed, problems and concrete shortcomings were identified and information obtained was used to design the new system using OOAD methodology by employing UML tools in the analysis and design, and to show the need for carrying out specifications for proposed software solution for tracking accountability.



**Figure 1:** Organizational Structure of the Existing Accountability system.

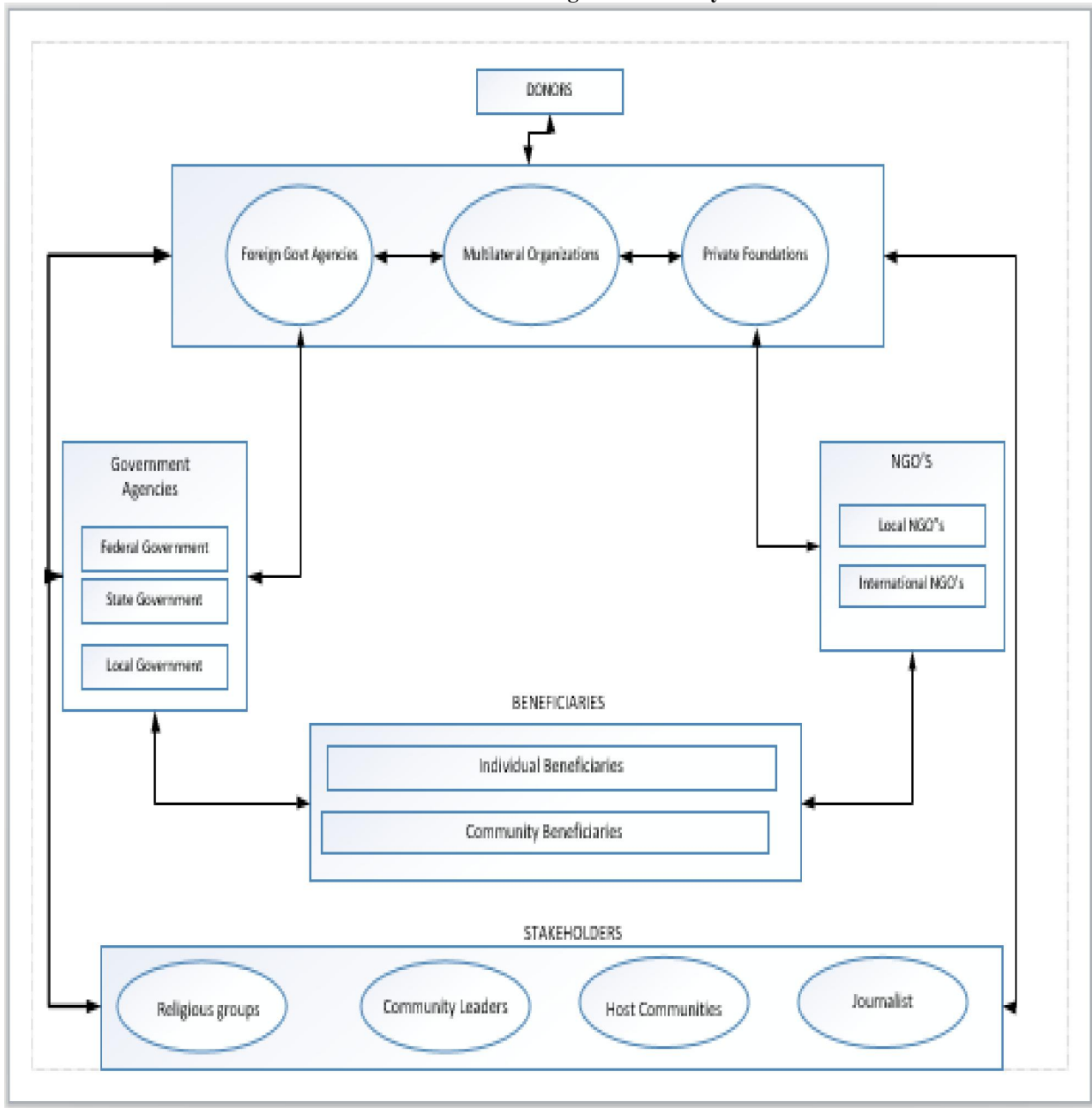
Figure 1 shows the currently existing structure of the NGOs Model in the North Eastern (NE) of Nigeria. The Donors provides funds to the NGOs who offer types of assistance to the beneficiaries, and the beneficiaries lack the communication channel to provide feedback to the Donor, and on the other hand there is a weak regulatory role of the government to supervise the implementation of the NGOs activities as the research argues. In Nigeria, the ministry of budget and national planning is currently responsible for the administrative granting, approval of NGOs operations while the SEMA/NEMA support camp management, the NEDC support the coordination of humanitarian activities of the NGOs in the North East (NE). The existing system shows that community stakeholders and community based organizations equally lack the means to communicate with the Donors and the government in their community. Most of the Donors are far away from the countries of

project implementation, as such, monitoring of NGOs activities become difficult thereby creating a gap. The current model shows that the foreign Government agencies (DFID, USAID, DANIDA, OFDA) and Multi-lateral organizations (UNHCR, UNICEF, OCHA) and private foundations (Dangote, Billgate, Otedola) who are the fund's providers for the NGOs that operate within international level like IRC, DRC, NRC, CRS, and national NGOs like AUN, CISCOPE, and local NGOs resembles ZSF, CPPLI, HARAF, AGUF who undertake interventions with the affected communities that includes individual beneficiaries and host community as a whole. The federal government agencies responsible for NGOs operation area (Federal Ministry of Interior, Ministry of Budget and National Planning, National Emergency Management Agencies, North-East Development Commission) while at the state government level, there are State planning Commission, State Emergency Management

agency. At the local government level. The community development officer represents the

government. The community stakeholders include community leaders, religious leaders and journalist.

**New Software Model for tracking accountability in NGOs**

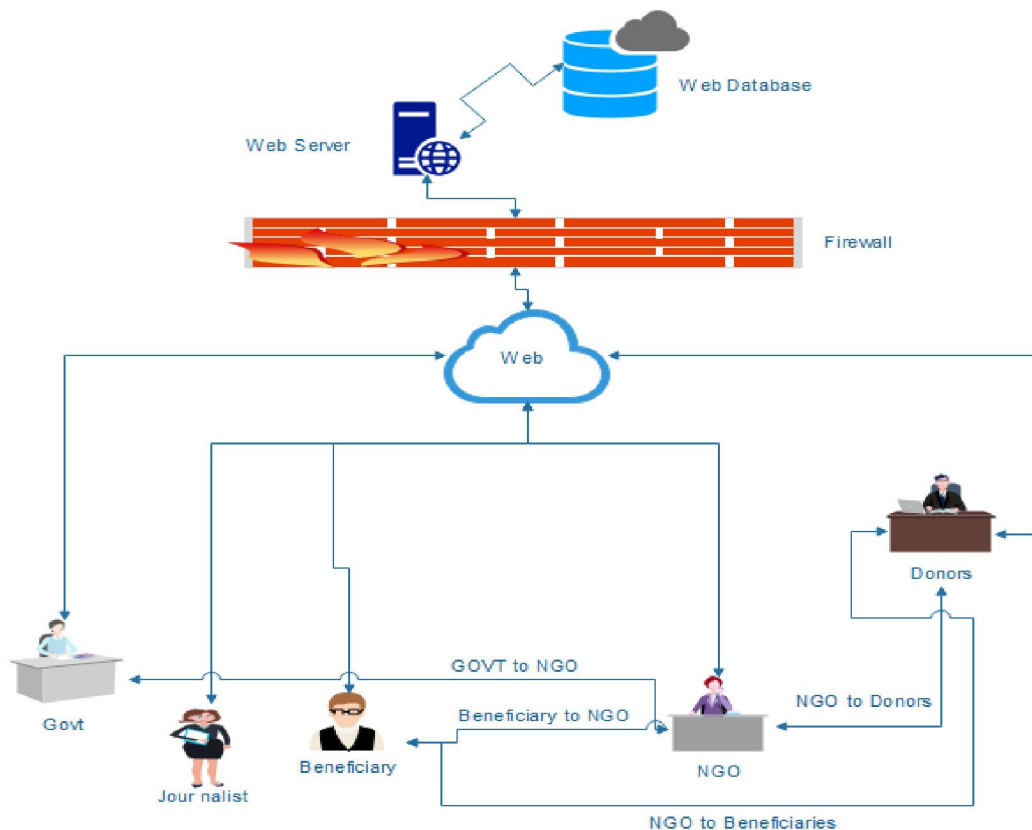


**Figure 2:** New software solution model for tracking accountability.

Figure 2 shows how the software components interact with one another from the Donors where funds are provided for the project, and to the NGOs that undertake project activities on behalf of the donor, while the government provide regulation and registration and oversight and the beneficiaries receive services provided by NGOs in form of cash assistance,

food, NFIs, health services, protection services, WASH services , child protection services, women protection services, shelter and nutrition services. This tends to provide an enhanced communication link where the beneficiary can communicate with the donor, raise concerns with NGOs services and activities and the government agencies can monitor to

ensure that concerns raised by beneficiaries are addressed.



**Figure 3:** Architectural Model of the Software solution.

Figure 3 shows the architectural model of the software, where all the actors that make up the model are connected and how access to data or information is monitored. The model has a web application server and a database server where all records are stored for data analysis and reporting. All the various actors access the system database and the system GUI via a web browser, each access is authenticated before access is granted to each actor. Figure 3 shows how each actor accesses the application.

#### **Benefits of the new software solution for tracking Accountability**

- i. The new Framework will settle on information promptly accessible for independent direction
- ii. Give a stage to recipient's input and responsibility to benefactors
- iii. Permit the public authority to adequately screen Non-Legislative Associations' exercises
- iv. Give a quicker method for correspondence among the entertainers

- v. Permit writers and someone else important to get to the stage for upgraded responsibility.
- vi. It will improve local area investment in navigation.
- vii. Limited misrepresentation and defilement in the Framework.

#### **Analysis of the Software solution for tracking Accountability**

The research did an extensive examination of the model utilizing the OOA&D approach, where the exploration had the option to draw out the necessary compositional models, information models, information types, and every one of the necessary substances that will help with planning the front end (GUI), the center end (Programming rationales) and the back end (Dataset) of the Framework.

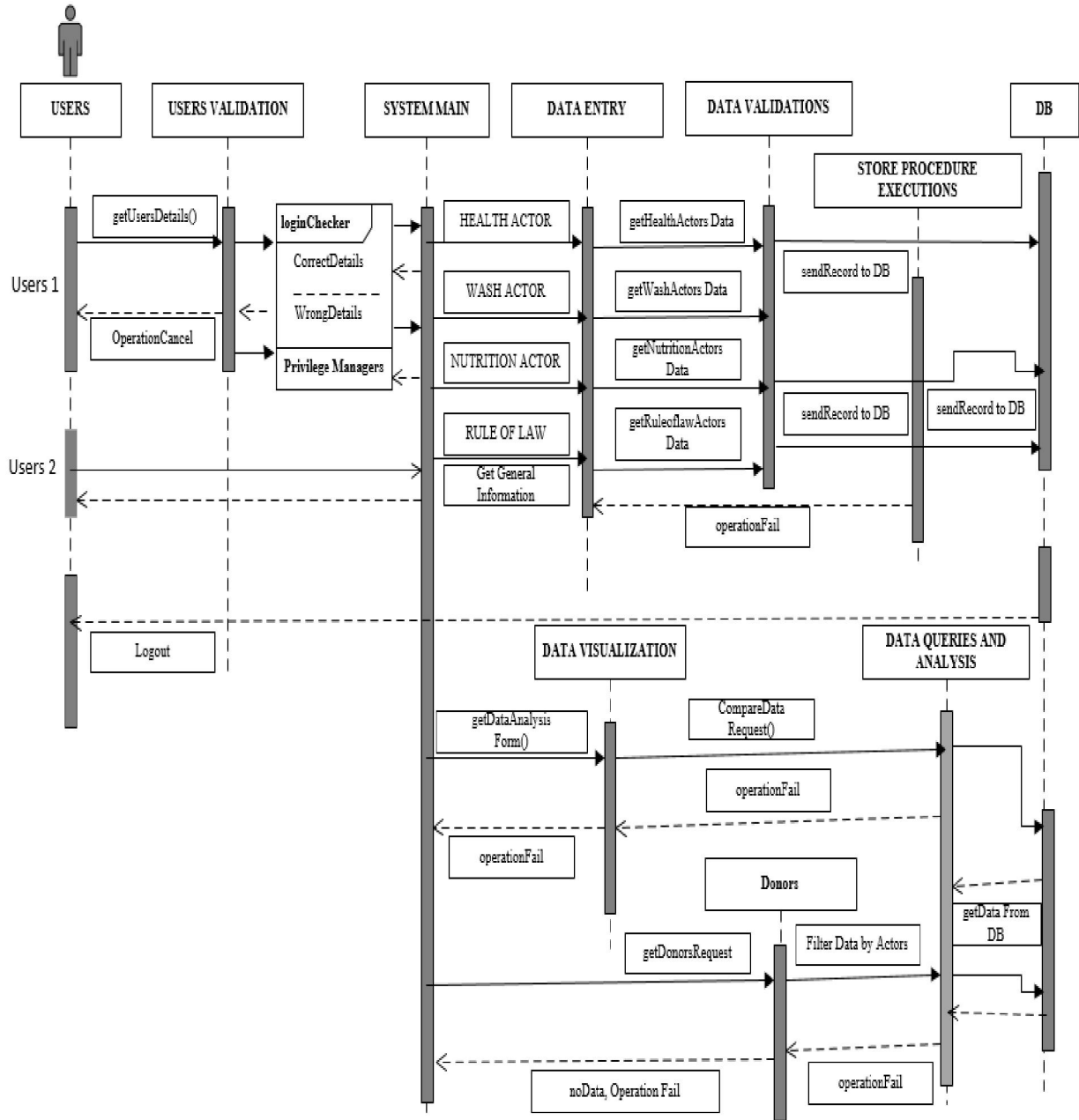
#### **Modeling Approach**

Unified Modelling Language (UML) models were used to model the operations of software solution for tracking accountability in NGOs operations. UML can be thought of as a diagrammatic tool for handling



object oriented analysis. It utilizes charts to capture the system functionalities required for the design and to show the cooperation between these objects and the dynamics of these objects. The components of UML

utilized in the study include Use Case, Activity diagram, and Sequence diagram.



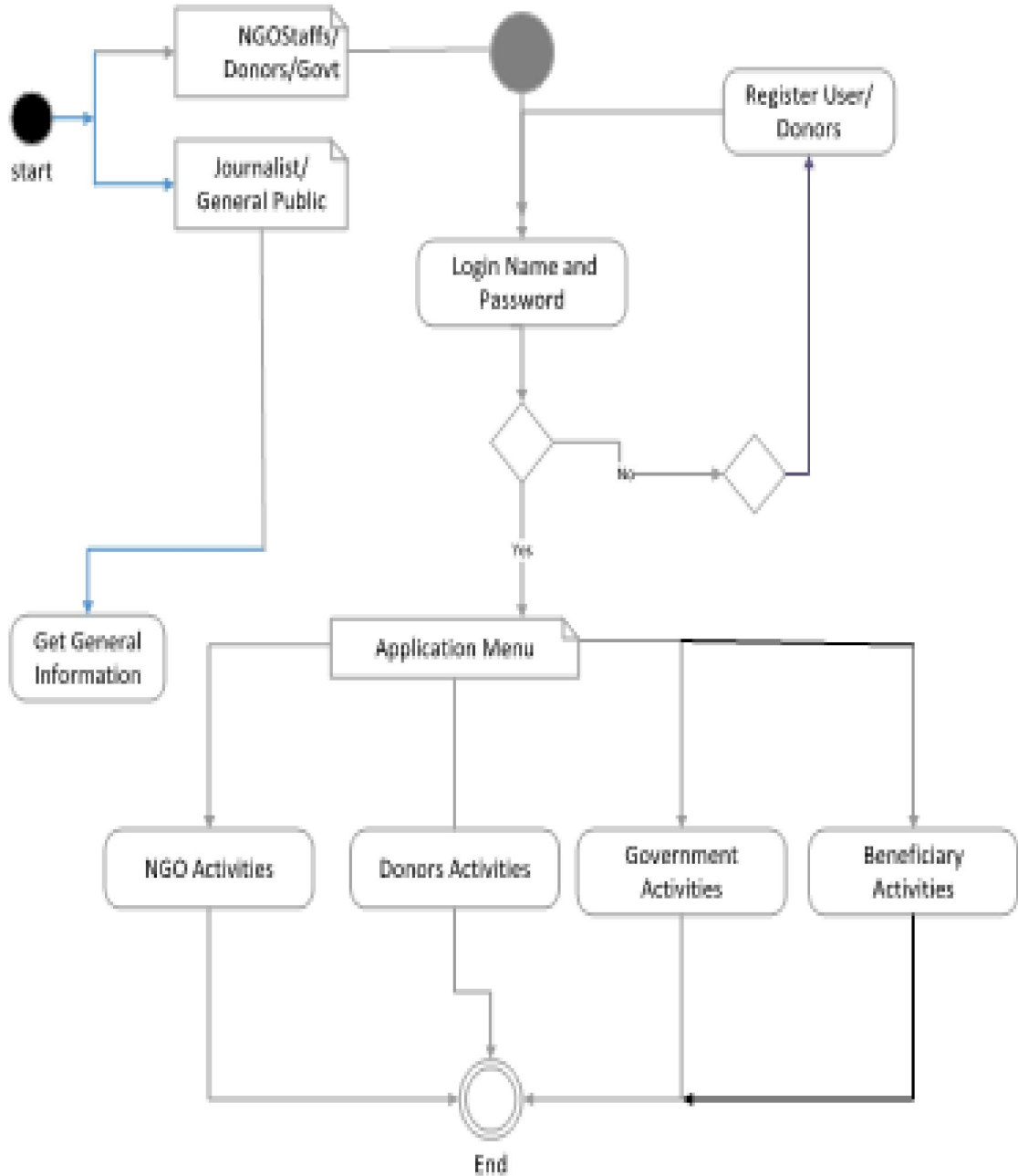
**Figure 4:** Sequence Diagram of the Software Solution.

Figure 4 shows the sequence diagram of the software where users are expected to log in to the system with their user’s credentials, access is granted to them if and only if the credentials they supplied are validated through the security validator. Once access is granted to the user, he or she will then be able to view activities relating to him. For this study, the user goes

to the main page and gets a login window, after adding a username and password, the system checks if the data provided is correct. If it is certified to be correct the user will be lead to the main page, where he can get project data by sector, add data entering page where the NGO can enter project information and send it to the database, the user moves to data

visualization and get data analysis form where the system will compare the analyzed data and System sends back a replay to the user, if the process is

successful then the user gets data from the database and then logs out.



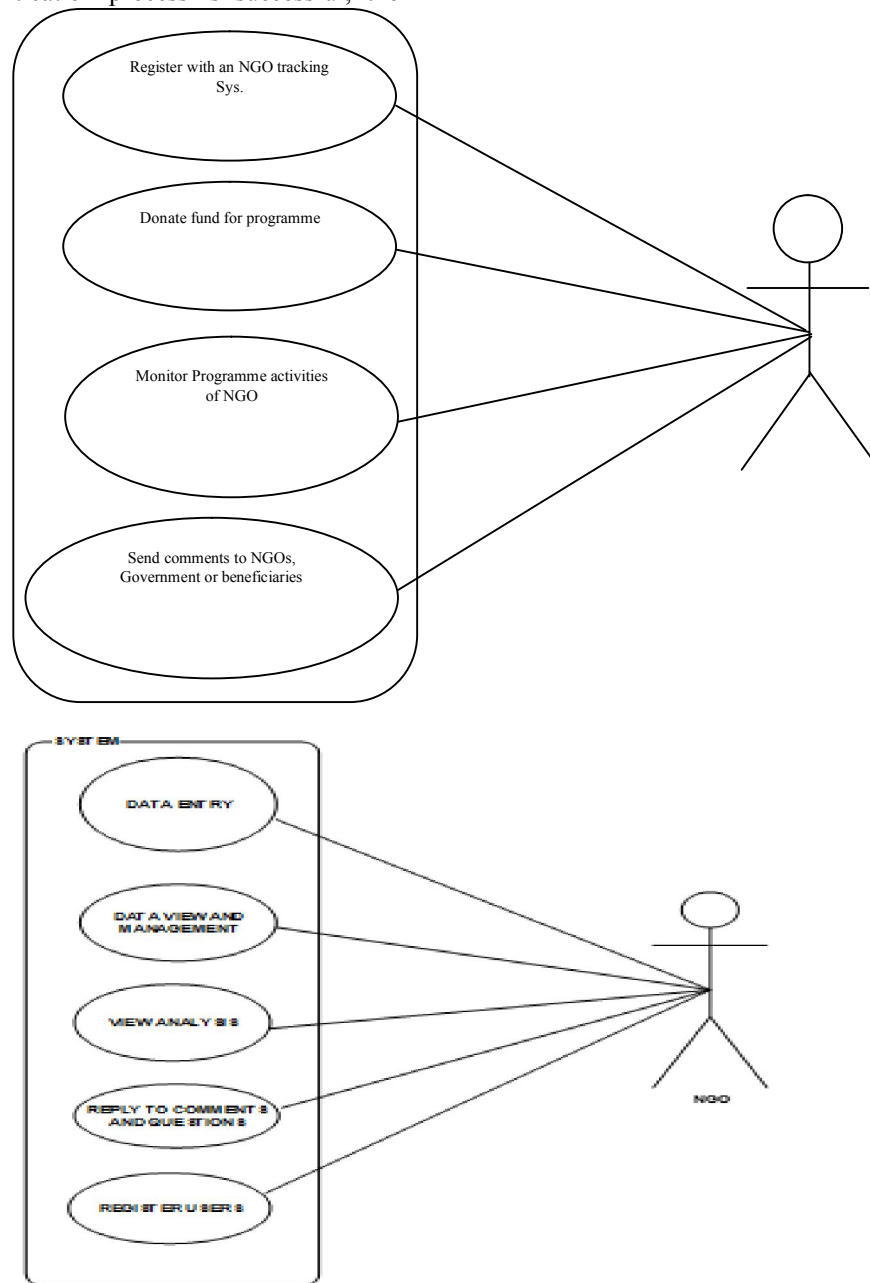
**Figure 5:** Activity Diagram of the Software Solution.

Figure 5 shows the Activity diagram where various activities can be performed by the system, once access is granted to the user, he or she will carry out any of

the activities as shown in the diagram. The activity diagram allows the actors (NGO staff, donors, government) to access the system which will

authenticate them by requesting username and password and if the authentication process fails, the user will be prompted to register the donor/other users and if the authentication process is successful, the

application will refer the user to the application menu which will allow the user access to his permitted domain.



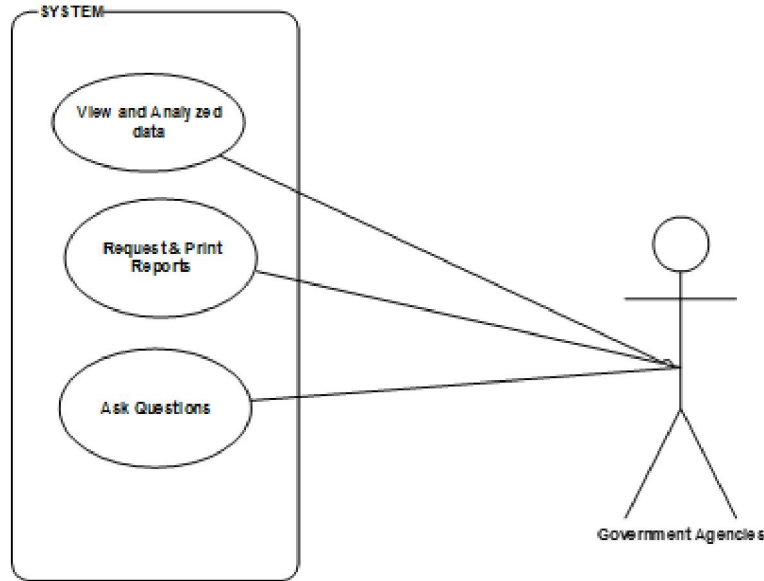
**Figure 6:** NGO and Donor use case of the Software solution.

Figure 6 shows the system use case diagram, which consists of all the required functionalities the users need to perform on the system, 3.5 shows the system will Allow Donors to register with the NGO accountability tracking system, donate funds for their operation or specific intervention area of interest, monitor the activities of the NGOs which have to deal

with expenditures, type of activities undertaken and the beneficiaries type and location where money is spent, the Donor can also send comments to NGOs, Government and the beneficiaries alike. The Donor can also view questions, and other concerns and issues raised by the beneficiaries or government to the NGO and also view the analysis and reports of activities.

While The system will Allow NGOs to enter operational data into the system, view and manage the entered data and make an analysis of the data, the system also allows the NGOs to reply to question and

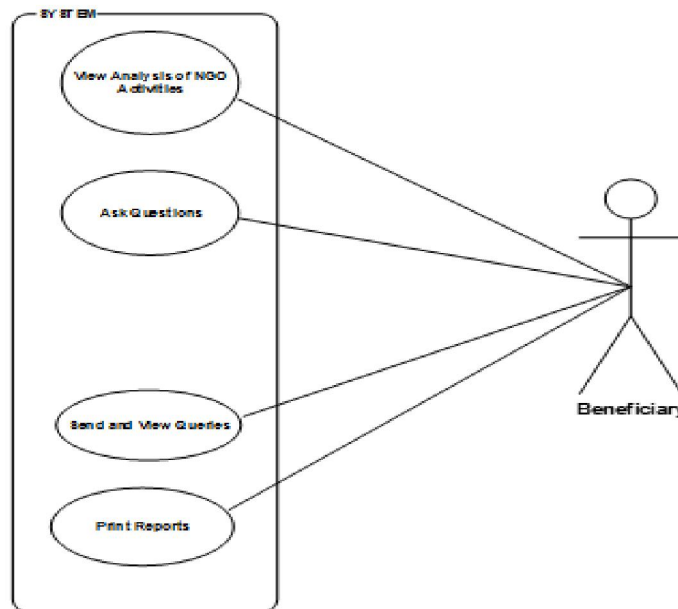
comments from the concerned actors, the system allows NGOs to register beneficiaries, government, and donors who meet their requirement for eligibility.



**Figure 7:** Government Agency Use case.

Figure 7 shows how the system allows Government agencies to view the NGOs analysis of activities and ask questions on concerns and disparity; the agencies

can request and print reports from the software the agencies can monitor the NGOs activities.



**Figure 8:** Beneficiary use case of the Software Solution.

Figure 8 shows the interaction between the beneficiary of the software and the software. The beneficiaries can view the analysis of activities

conducted by the NGOs, ask questions, send and view queries to the NGO, they can print reports from the software.

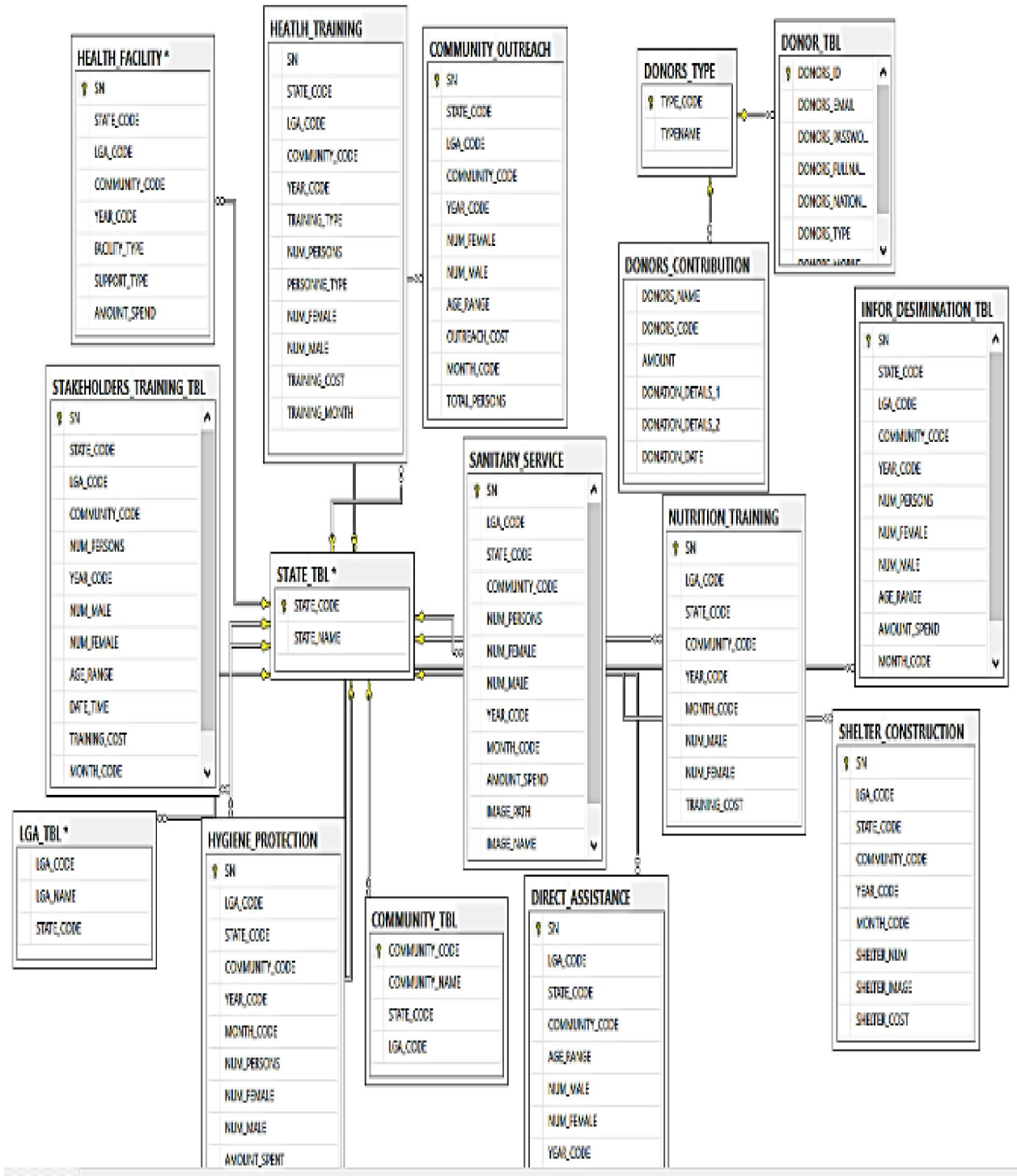


Figure 9: Entity-Relationship (ER) Diagram of the Software Solution.



Figure 9, the Entity-Relationship diagram shows the various database relations of the system, the relationship between each entity, and also, show all the attributes of the relations. As can be seen in figure 6, each entity is related to the other by a primary and a

foreign key, the primary key serves as a unique key to each entity. Most of the relationship is one to many relations between the entities. The system physical database design has a total of twenty tables, yet not all are utilized for the E-R diagrams.

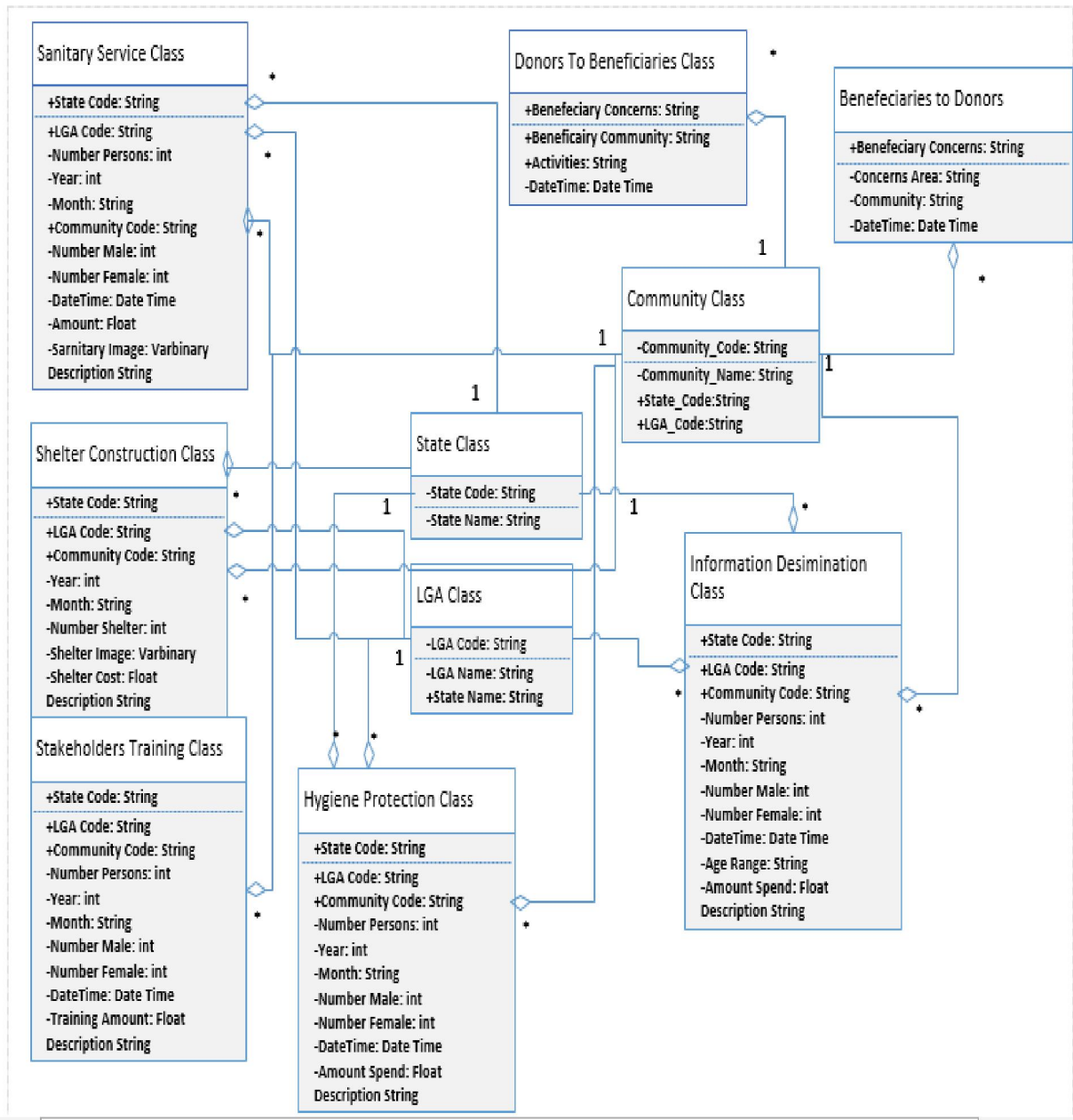


Figure 10: Class Diagram of the Software Solution

Figure 10 shows the class diagram as it portrays the design of the software solution for tracking accountability by displaying every object component as a member of a given class, their characteristics, activities, and the connections among the objects of each class. The above class incorporates community outreach class, stakeholders training class, community class, shelter construction class, individual assistance class, and Hygiene Promotion class, sanitary service class, government to donor class, information

dissemination class, donor class, donor to beneficiaries' class, State class, LGA class, beneficiaries to donor class, Users Bio-data class.

#### Database Schema of the system

The database schema shows the physical design of the system database tables, and it shows both the table fields' name and their data type. Figure 3.10 to 3.14 shows some of the designed database schemas from the system.

Name	Data Type	Allow Nulls	Default
STATE_CODE	varchar(10)	<input type="checkbox"/>	
STATE_NAME	varchar(20)	<input checked="" type="checkbox"/>	

**Keys (1)**  
PK\_STATE\_TBL (Primary Key)

**Check Constraints (0)**

**Indexes (0)**

**Foreign Keys (0)**

**Triggers (0)**

```

1 CREATE TABLE [dbo].[STATE_TBL] (
2     [STATE_CODE] VARCHAR (10) NOT NULL,
3     [STATE_NAME] VARCHAR (20) NULL,
4     CONSTRAINT [PK_STATE_TBL] PRIMARY KEY CLUSTERED ([STATE_CODE] ASC)
5 );

```

**Figure 11:** shows the software schema that captured the requirement for inclusion of the state in the software.

Name	Data Type	Allow Nulls	Default
SN	int	<input type="checkbox"/>	
LGA_CODE	varchar(10)	<input type="checkbox"/>	
STATE_CODE	varchar(10)	<input type="checkbox"/>	
COMMUNITY_CODE	varchar(10)	<input type="checkbox"/>	
YEAR_CODE	int	<input checked="" type="checkbox"/>	
MONTH_CODE	varchar(5)	<input checked="" type="checkbox"/>	
NUM_PERSONS	int	<input checked="" type="checkbox"/>	
NUM_FEMALE	int	<input checked="" type="checkbox"/>	
NUM_MALE	int	<input checked="" type="checkbox"/>	
AMOUNT_SPENT	float	<input checked="" type="checkbox"/>	
DESCRIPTION	varchar(MAX)	<input checked="" type="checkbox"/>	

```

1 CREATE TABLE [dbo].[HYGIENE_PROTECTION] (
2     [SN] INT IDENTITY (1, 1) NOT NULL,
3     [LGA_CODE] VARCHAR (10) NOT NULL,
4     [STATE_CODE] VARCHAR (10) NOT NULL,
5     [COMMUNITY_CODE] VARCHAR (10) NOT NULL,
6     [YEAR_CODE] INT NULL,
7     [MONTH_CODE] VARCHAR (5) NULL,
8     [NUM_PERSONS] INT NULL,
9     [NUM_FEMALE] INT NULL,
10    [NUM_MALE] INT NULL,
11    [AMOUNT_SPENT] FLOAT (53) NULL,
12    [DESCRIPTION] VARCHAR(MAX) NULL,

```

**Figure 12:** Hygiene Promotion database schema of the software solution.

Figure 12 shows the elements of entering hygiene promotion as a form of activities conducted by NGOs.

Name	Data Type	Allow Nulls	Default
SN	int	<input type="checkbox"/>	
LGA_CODE	varchar(10)	<input type="checkbox"/>	
STATE_CODE	varchar(10)	<input type="checkbox"/>	
COMMUNITY_CODE	varchar(10)	<input type="checkbox"/>	
YEAR_CODE	int	<input checked="" type="checkbox"/>	
MONTH_CODE	varchar(5)	<input checked="" type="checkbox"/>	
NUM_PERSONS	int	<input checked="" type="checkbox"/>	
NUM_FEMALE	int	<input checked="" type="checkbox"/>	
NUM_MALE	int	<input checked="" type="checkbox"/>	
AGE_RANG	varchar(10)	<input checked="" type="checkbox"/>	
ASSISTANCE_TYPE	varchar(50)	<input checked="" type="checkbox"/>	
ASSISTANCE_COST	float	<input checked="" type="checkbox"/>	

```

1 CREATE TABLE [dbo].[INDIVIDUAL_ASSISTANCE] (
2     [SN] INT IDENTITY (1, 1) NOT NULL,
3     [LGA_CODE] VARCHAR (10) NOT NULL,
4     [STATE_CODE] VARCHAR (10) NOT NULL,
5     [COMMUNITY_CODE] VARCHAR (10) NOT NULL,
6     [YEAR_CODE] INT NULL,
7     [MONTH_CODE] VARCHAR (5) NULL,
8     [NUM_PERSONS] INT NULL,
9     [NUM_FEMALE] INT NULL,
10    [NUM_MALE] INT NULL,
11    [AGE_RANG] VARCHAR (10) NULL,
12    [ASSISTANCE_TYPE] VARCHAR (50) NULL,

```

**Figure 13:** Individual Assistant database scheme of the Software Solution

Figure 13 shows the elements of individual assistance as a form of activities conducted by NGOs.

Name	Data Type	Allow Nulls	Defa
SN	int	<input type="checkbox"/>	
LGA_CODE	varchar(10)	<input type="checkbox"/>	
STATE_CODE	varchar(10)	<input type="checkbox"/>	
COMMUNITY_CODE	varchar(10)	<input type="checkbox"/>	
YEAR_CODE	int	<input checked="" type="checkbox"/>	
MONTH_CODE	varchar(5)	<input checked="" type="checkbox"/>	
NUM_MALE	int	<input checked="" type="checkbox"/>	
NUM_FEMALE	int	<input checked="" type="checkbox"/>	
TRAINING_COST	float	<input checked="" type="checkbox"/>	
Description	varchar(MAX)	<input checked="" type="checkbox"/>	

```

1 CREATE TABLE [dbo].[NUTRITION_TRAINING] (
2     [SN] INT IDENTITY (1, 1) NOT NULL,
3     [LGA_CODE] VARCHAR (10) NOT NULL,
4     [STATE_CODE] VARCHAR (10) NOT NULL,
5     [COMMUNITY_CODE] VARCHAR (10) NOT NULL,
6     [YEAR_CODE] INT NULL,
7     [MONTH_CODE] VARCHAR (5) NULL,
8     [NUM_MALE] INT NULL,
9     [NUM_FEMALE] INT NULL,
10    [TRAINING_COST] FLOAT (53) NULL,
11    [Description] VARCHAR(MAX) NULL,
12    CONSTRAINT [PK_NUTRITION_TRAINING] PRIMARY KEY CLUSTERED ([SN] ASC)
13 );

```

Figure 14: Nutrition database scheme of the Software Solution

Figure 14 shows the elements of nutrition as a form of activities conducted by NGOs



Name	Data Type	Allow Nulls	Default
SN	int	<input type="checkbox"/>	
STATE_CODE	varchar(10)	<input type="checkbox"/>	
LGA_CODE	varchar(10)	<input type="checkbox"/>	
COMMUNITY_CODE	varchar(10)	<input type="checkbox"/>	
NUM_PERSONS	int	<input checked="" type="checkbox"/>	
YEAR_CODE	int	<input checked="" type="checkbox"/>	
NUM_MALE	int	<input checked="" type="checkbox"/>	
NUM_FEMALE	int	<input checked="" type="checkbox"/>	
AGE_RANGE	varchar(10)	<input checked="" type="checkbox"/>	
DATE_TIME	varchar(15)	<input checked="" type="checkbox"/>	
TRAINING_COST	float	<input checked="" type="checkbox"/>	
MONTH_CODE	varchar(5)	<input checked="" type="checkbox"/>	
Description	varchar(MAX)	<input checked="" type="checkbox"/>	

```

1 CREATE TABLE [dbo].[STAKEHOLDERS_TRAINING_TBL] (
2     [SN] INT IDENTITY (1, 1) NOT NULL,
3     [STATE_CODE] VARCHAR (10) NOT NULL,
4     [LGA_CODE] VARCHAR (10) NOT NULL,
5     [COMMUNITY_CODE] VARCHAR (10) NOT NULL,
6     [NUM_PERSONS] INT NULL,
7     [YEAR_CODE] INT NULL,
8     [NUM_MALE] INT NULL,
9     [NUM_FEMALE] INT NULL,
10    [AGE_RANGE] VARCHAR (10) NULL,
11    [DATE_TIME] VARCHAR (15) NULL,

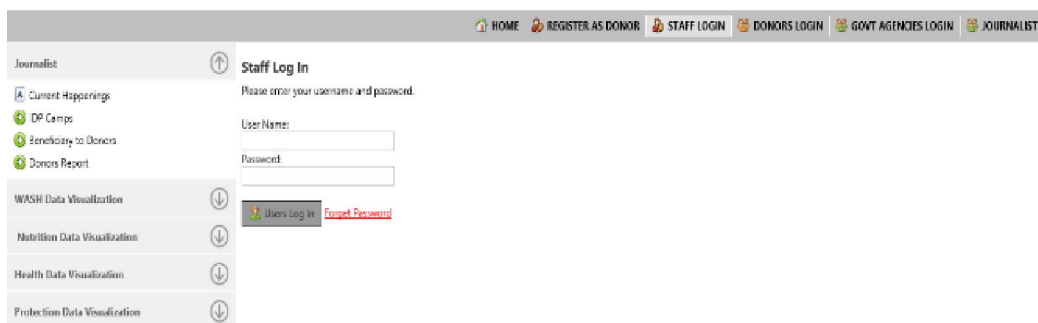
```

**Figure 15:** Stakeholders Training database schema of the software solution as a form of activities conducted by NGOs

#### 4. System Graphical User Interfaces

This research rolls out a demo application for the model to exhibit the working of the responsibility for the adjustment of accountability of NGOs tasks in North-East of Nigeria. This part presents the model execution of the application. The Interface configuration includes both information and yield plans.

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**Figure 16:** Staff Login Page of the software solution

Figure 16 shows the Login page where staff of the NGOs can use in other to have access into the application, and each user must supply his/her

username and password before accessing the entire application.

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**Figure 17:** Donor Login Page of the Software Solution.

Figure 17 shows the donor Login page is where donors use for gaining access into the application, and

each user must supply his/her username and password before accessing the entire application.

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**Figure 18:** Shelter Construction Data Entry Form of the Software Solution.

Figure 18 shows the WASH project shelter construction record entry form, all shelter constructions carried out by the NGO are captured via this form by the project supervisors. The user is

expected to supply the state, the LGA, the community, the number of shelters constructed, and the cost of constructing the shelter, the project description, and finally, the image of the project.

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**Figure 19:** Health facility support data entry form of the software solution.

Figure 19 shows the Health facility support data entry form; the form is used by NGO Health staff for capturing all the health facilities the NGO has provided to a community and the cost of supplying those facilities. the staff is required to supply all the

required fields on the form, which includes the state, LGA, and community where the activities were conducted, the year of the project, the project type, amount spent, and the project description

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**Figure 20:** Stakeholders Training Data Entry Form of the software solution

Figure 20 shows the stakeholder's training data entering form from the protection and the rule of the law department. The staff of the department use this form for capturing all the assistance carried out by the

department, and it captured the state, LGA, community, number of females, males, their age range, the captures date/year, and the amount they spent during the projects and the project description.

NO. PERSONS		STATE	LGA			AMOUNT USED				MONTH
YEAR	NO. FEMALE	NO. MALE	COMMUNITY	HYGIENE PROMOTION DESCRIPTION	APRIL	FEBRUARY	JANUARY	MARCH	Grand Total	
2018	5	2	JAMBUTU	Training of Health workers, Venue renting 50,000 Transportation 20,000 Feeding 20,000 Resource person 50,000			120000		120000	
	10	33	JIMETA COMMUNITY	Training of Local Government Health workers, Venue renting 50,000 Transportation 50,000 Feeding 50,000 Resource person 100,000		250000			250000	
2018 Total						250000	120000		370000	
2019	4	5	JIMETA COMMUNITY	Hygiene Promotion Mangement, Hall Renting, Feeding during training				20000	20000	
	15	10	DEMSSAWO	Transportation of 3 people to michika			4500		4500	
	23	17	JAMBUTU	International Hotel Accomodation 20000, Transport 10,000, Feeding 4500		34500			34500	
			LUGGERE	Training of 3 Staffs on Hygiene Protection, Transport 10000, Feeding 5000, Resource Person 20000				30500	30500	
	17 Total					34500		30500	65000	
31	12	JAMBUTU	Donation of toiletry, Omo 10,000, Cleaners 10,000	200000				200000		
2019 Total					200000	34500	4500	50500	289500	
Grand Total					200000	284500	124500	50500	659500	

**Figure 21:** Hygiene Promotion Cost Analysis of the software solution.

Figure 21 shows the data analysis of all the hygiene promotion training showing the community where the project is conducted, the number of males and females

that attended the training, the amount of money spent on training those staff, and description of activities.

SOFTWARE SOLUTION FOR TRACKING ACCOUNTABILITY FOR NON GOVERNMENTAL ORGANISATIONS IN NORTH-EAST NIGERIA

**Figure 20:** Stakeholders Training Data Entry Form of the software solution

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department, and it captured the state, LGA, community, number of females, males, their age range, the captures date/year, and the amount they spent during the projects and the project description.

NO. PERSONS ▼ STATE ▼ LGA ▼					AMOUNT USED					MONTH ▲ ▼
YEAR ▲ ▼	NO. FEMALE ▲ ▼	NO. MALE ▲ ▼	COMMUNITY ▲ ▼	HYGIENE PROMOTION DESCRIPTION ▲ ▼	APRIL	FEBRUARY	JANUARY	MARCH	Grand Total	
▼ 2018	▼ 5	▼ 2	▼ JAMBUTU	Traning of Health workers, Venue renting 50,000 Transportation 20,000 Feeding 20,000 Resource person 50,000			120000		120000	
	▼ 10	▼ 33	▼ JIMETA COMMUNITY	Traning of Local Government Health workers, Venue renting 50,000 Transportation 50,000 Feeding 50,000 Resource person 100,000		250000			250000	
2018 Total						250000	120000		370000	
▼ 2019	▼ 4	▼ 5	▼ JIMETA COMMUNITY	Hygiene Promotion Mangement, Hall Renting, Feeding during training				20000	20000	
	▼ 15	▼ 10	▼ DEMSSAWO	Transportation of 3 people to michika			4500		4500	
	▼ 23	▼ 17	▼ JAMBUTU	International Hotel Accomodation 20000, Transport 10,000, Feeding 4500		34500			34500	
			▼ LUGGERE	Training of 3 Staffs on Hygiene Protection, Transport 10000, Feeding 5000, Resource Person 20000				30500	30500	
	17 Total					34500		30500	65000	
▼ 31	▼ 12	▼ JAMBUTU	Donation of toiletry, Omo 10,000, Cleaners 10,000	200000				200000		
2019 Total					200000	34500	4500	50500	289500	
Grand Total					200000	284500	124500	50500	659500	

**Figure 21:** Hygiene Promotion Cost Analysis of the software solution.

Figure 21 shows the data analysis of all the hygiene promotion training showing the community where the project is conducted, the number of males and females

that attended the training, the amount of money spent on training those staff, and description of activities.



STATE		LGA		TOTAL NO. PERSONS		AGE RANGE		AMOUNT					MONTH
COMMUNITY	YEAR	NO. FEMALE	NO. MALE	COMMUNITY OUTREACH DESCRIPTION				APRIL	FEBRUARY	JANUARY	MARCH	Grand Total	
GELLA	2019	15	13	Development of Shelter for Internally displace persons at Gella					170000			170000	
JIMETA COMMUNITY	2018	4	6	Community Development Project, Construction of two class room ate Capital School Yola					20000			20000	
KAGI	2019	15	19	Development of Shelter for Internally displace persons at Mubi-South							235000	235000	
KUBRUSHOSHO	2019	10	18	Development of Shelter for Internally displace persons at Kubrushosho						170000		170000	
LAMURDE	2019	5	7	Development of Shelter for Internally displace persons at Lamurde Community of Mubi South					1200000			1200000	
MAIHA-GARI	2019	15	18	Development of Shelter for Internally displace persons at Mayo-Nguli					120000			120000	
MAYO-NGULI	2019	31	24	Development of Shelter for Internally displace persons at Mayo-Nguli				1200000				1200000	
MUCHALA	2019	16	18	Development of Shelter for Internally displace persons at Muchala Community of Mubi-North				235000				235000	
TSUKUMU	2019	21	23	Development of Shelter for Internally displace persons at Tsukumu				235000				235000	
VINTIM	2019	10	18	Development of Shelter for Internally displace persons at Maia-Gari						170000		170000	
Grand Total							1670000	1510000	340000	235000	3755000		

**Figure 22:** Community outreach cost analysis of the software solution.

Figure 22 shows the Community outreach project data analysis, and it gives detailed information on the community outreach that was carried out, the number of persons who attended based on their gender, the projects year, and the amount spent on the project, and the description of what was spent on.

#### **Discussion of the software solution for accountability tracking**

This research provides an effective channel for reporting administrative abuses and corruption. It also provides an avenue for the host community and the IDPs to forward complaints. This can be done via the web portal for the government, donors, and NGOs to take necessary actions and respond. The software solution enhances access to information, where beneficiaries request information from NGOs, and the software facilitates the correspondences with relevant parties and keeps track of all requests and responses for reference purposes. In addition to real-time online reporting, the software collects and aggregates data to make certain decisions on the activities conducted, the amount of money spent, and the location where the activities were conducted.

Unlike the software developed by [45], [46], this software promotes direct interactions among NGOs, donors, governments, and beneficiaries. The designed model can prevent fraud and corruption in the operation of N.G.O.s activities and can also empower beneficiaries to hold NGOs accountable for their activities in their community. Contrary to the traditional accountability system, the model incorporates additional features such as accessibility and engagement, which are peculiar to ICT and online Accountability, with the accessibility measuring the ease with which information can be found on the model, and while engagement is the use of Web technologies by the humanitarian actors.

The research findings further indicate that fraud and corruption in the operations of NGOs would continue to rise if no efficient accountability mechanism that is accessible, reliable, and engaging is in place to minimize it. Given the above claim, the research argues that there is the need to leverage the power and application of ICT to design a software solution for tracking Accountability in NGOs operations which is proof to minimize fraud and corruption, therefore,

enhancing efficiency and performance of NGOs. From the expert interview and content analysis, the research was able to identify and develop the current model used by NGOs in the North East, which inherently gives room to frauds due to inaccessibility of the system by beneficiaries. However, the researchers developed an improved model for the NGOs operating in the North East.

The research adopted the stakeholder theory, given the important role stakeholders play in the implementation of an effective accountability system which the research is keen to ensure participation and accessibility of the model to all stakeholders through the design of the Software solution. The research adopted the Humanitarian Accountability Project (HAP) as a conceptual framework to have an understanding of how the accountability system can be designed in line with industry usage and acceptability. The research demonstrated that the main forces affecting NGOs Accountability are NGOs, government, and beneficiaries. Government agencies require detailed information on the allocation of public funding. Therefore, this research shows that federal and state government institutions do not make regulatory demands concerning an NGOs accountability policy.

### 5. Conclusion

The Software solution for tracking accountability in NGOs is a remarkable example of leveraging an ICT solution to enhanced accountability in the public sector in general and NGOs in particular. The software will be hosted online which can improve communication between NGOs and

project stakeholders, make projection information available. The software has shown the promise of minimizing fraud, corruption and providing timely and accurate activities updates to the stakeholders. With the utilization of graphical user interface capabilities, the software can enhance the relationship between beneficiaries, donors, government and NGOs which will restore public trust and confidence in the operation of NGOs in the North-East. The research argues that the aim for the research and the objectives proposed were all achieved. The outcomes of this research have some significant administrative and policy implications. Firstly, it indicates that ICTs can be utilized to effectively improve internal and external accountability in NGOs. And also data accessibility which is effective in minimizing fraud and corruption associated with NGOs accountability. Given the above result, the research recommends that NGO managers and policymakers adopt the improved IT-based accountability model and cycles, that, through the

application of ICTs, can promote a progressive expansion in accountability and straightforwardness.

### COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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