

Czech University of Life Sciences Prague

Faculty of Economics and Management

Department of Information Engineering



Bachelor Thesis

**Open data in Nigeria: A Prototype Application
Development**

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CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Faculty of Economics and Management

BACHELOR THESIS ASSIGNMENT

Femi Micheal Awolesi

Systems Engineering and Informatics
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Open data in Nigeria: A Prototype Application Development

Objectives of thesis

The aim of this thesis is to study the current state of the use and development of open data in Nigeria. Based on these findings the main problems and barriers that prevent the public from accessing and taking advantage of open data will be identified. The final objective is to develop a model application which will facilitate access to government data.

Methodology

The methodology of the thesis is based on analysis of technical and scientific sources focusing on principles of open data, and specifically open data in Nigeria. Based on the synthesis of the gained knowledge the main problems and barriers that prevent the public from accessing and taking advantage of open data will be identified. As a possible solution to these problems a prototype software tool will be developed and evaluated. Possible recommendation for Open Government Data implementation in Nigeria will be described.

The proposed extent of the thesis

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Open data, Data, Prototype, Nigeria, Policy, Development, Data types, Government, Internet, Application, Eco-system

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- BudgIT empowers Nigerian citizens through open data. (2019). Retrieved from https://www.sdsn-trends.org/research/2018/9/27/case-study-open-data-budgit-nigeria?fbclid=IwAR3ZF7jX09N5i6-b8AEMV5SbKSb48jFVA53_gYFBAqdMQO4hLYRDotmgO6Y
- Laura James (2013) "Defining Open Data" available on: <https://blog.okfn.org/2013/10/03/defining-open-data/?fbclid=IwAR2jeX9Y5ipMRvMILPX3PbM5OOiP1LhGRVgOQMA28UYKfLD91znkaIDwk7E>
- Vetrò, A., Canova, L., Torchiano, M., Minotas, C. O., Iemma, R., & Morando, F. (2016). Open data quality measurement framework: Definition and application to Open Government Data. *Government Information Quarterly*, 33(2), 325-337.
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Declaration

I declare that I have worked on my bachelor thesis titled "Open data in Nigeria: A Prototype Application Development" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the bachelor thesis, I declare that the thesis does not break copyrights of any their person.

In Prague on .../03/2020

Awolesi Femi Micheal

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Open data in Nigeria: A Prototype Application Development

Abstract

This thesis focuses on open data, their history, benefits, impact on economy and barriers for their broader use. Special attention is paid towards open government data and their role in society. The current state of open government data in Nigeria is explained and some of the most projects that have played an important role in recent years are described.

Based on the gathered knowledge, a web application prototype that can be used for facilitating access to governmental data is designed and implemented. This prototype is based on similar projects, like data.gov and data.gov.uk. The research that has been made on this thesis might help the government in Nigeria to provide better access to important open government data and support transparent democratic government.

Keywords: Open data, Data, Prototype, Nigeria, Policy, Development, Data types, Government, Internet, Application, Eco-system

Otevřena data v Nigérii: Vývoj prototype aplikace

Abstrakt

Tato práce se zaměřuje na otevřená data, jejich historii, přínosy, dopad na ekonomiku a překážky pro jejich širší využití. Zvláštní pozornost je věnována otevřeným vládním údajům a jejich úloze ve společnosti. Je vysvětlen současný stav otevřených vládních dat v Nigérii a popsány některé z projektů, které hrály důležitou roli v posledních letech. Na základě shromážděných znalostí je navržen a implementován prototyp webové aplikace, kterou lze použít pro usnadnění přístupu k vládním datům. Tento prototyp je založen na podobných projektech, jako jsou data.gov a data.gov.uk. Výzkum, který byl v této práci proveden by mohl pomoci nigerijské vládě poskytnout lepší přístup k důležitým otevřeným vládním datům a podporovat transparentní demokratickou vládu

Klíčová slova: Otevřená data, Data, Prototyp, Nigérie, Politika, Vývoj, Datové typy, Vláda, Internet, Aplikace, Eko-systém

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List of abbreviations

OGD open government data

MDAs Ministries, departments, and Agencies

GIS Geographical information system

ICT information communication technology

OGP Open Government Partnership

NAP National Action Plans

FOI Freedom of Information

BPSR bureau of public service Reform

GIFMIS Government Integrated Financial Management Information
System

IPPIS Integrated Payroll and Personal Information System

BVN Bank Verification Number

HTML Hyper Text Markup Language

IP Internet Protocol

1 Introduction

Open data is referred to as the data that is freely open, accessed, exchanged, and updated for use allowing third parties like the citizens and business personnel to utilize the data. When we talk about data being open, what comes to mind is the data not having any form of restriction or authentication preventing the data from being seen by the public, we expected the data to be free for use. We go back to when the importance of open data was revealed by Robert King Merton in 1942, before it appeared officially in 1995, making its way into the system of the Government, thereby creating open government data (OGD).

After the open data engagement, the open government data (OGD) initiative came in place, which is referred to as the data government make available for citizens and business owners use and exchanged. Part of the goals in making the data accessible, is to encourage citizens development, improving the innovation service and increasing transparency between the government and the public with the data provided.

As we get more understanding on open data, we are going to look at open data Nigeria, as the initiative is still relatively new and developing in Nigeria. Although the engagement has made some impact in the economy especially in the agricultural field enabling data to be stored relating to on farming activities. In 2014 the open government data development began, and official joining the OGP movement in 2016, which would allow citizens of Nigeria to have access to government data creating transparency among them. The OGD initiative was adopted by Obama administration when he came into office in 2009, allowing the creation of *data.gov* holding government dataset which third parties can have access and make use of it.

We innovate as the engagement in OGD takes place in Nigeria, a prototype web application *data.gov.ng* would be developed enabling dataset to be available on the platform for citizens of Nigeria to use, allowing transparency and accountability. This is inspired by several platforms currently functioning in other countries e.g. *data.gov* United States and *data.gov.uk* United Kingdom.

2 Objectives and Methodology

2.1 Objectives

The main aim of this thesis is to study the current state of the use and development of open data in Nigeria, making open government data accessible to the public in Nigeria by designing a prototype application.

Other aims of this thesis include the following:

- To conduct an analysis on the recent state of open data in Nigeria.
- Make research about the barriers and opportunities.
- The problem and barriers that prevent the public from accessing open data in Nigeria would be identified.
- To design and develop a prototype application based on open data in Nigeria.
- Facilitate accessibility to open government data in Nigeria
- Creating a platform where the general public and business personnel would be able to get access to useful information from the data provided.

2.2 Methodology

The methodology of this thesis begins with the introduction of open data with its History, which will also be based on the analysis of technical and scientific sources focusing on open data with its principles, and open data in Nigeria. The literature review would be done based on the open data, Open Government Data, uses and development. Based on the synthesis of the gained knowledge the main problems and barriers that prevent the public from accessing and taking advantage of open data in Nigeria and open Government data would be identified. As a possible solution to these problems a prototype using a software tool will be developed and evaluated. A possible recommendation for Open Government Data implementation in Nigeria will be describe.

3 Literature Review

In this section we will review open data, and how it is related to open government data. It will try to identify the principles of open data, the benefit of open government data and how it contributes to good governance to society in general, and the barriers that must be overcome. Description of open data in Nigeria and how it impacts the economy in Nigeria will be made, too.

3.1 Definition of open data

Open data is known to be the kind of data that is meant to be accessible, exchangeable, and updated freely by the public or business personnel, so in other words all the data that are published for third parties to use are meant to be free for use with out any restrictions. Open data are data required to be machine readable and licensed openly. This enables users to be able to get or download any data from the internet freely without any problems or prevention whatsoever in terms of sharing the data later. *“Open data are data that can be freely used, modified, and shared by anyone for any purpose (Web ref. 1). Compared to proprietary frameworks, digital commons such as open data are characterized — from both a legal and a technical point of view — by lower restrictions applied to their circulation and reuse.”*. (The Internet commons: toward an eclectic theoretical framework, 2010)

The word Open means free access so data should be in a format where it is machine – readable legally, with the aim of its be used, re-used or utilized by anyone with the intention of using it to work. Open data has made some impact in the economic and public in terms of allowing data accessible freely. By law open data are not meant to be hidden or confidential to the public or even charged on any cost, in order for transparency to be in the society and to evite the dangers of project incorporation and group separation, data has to be accessible freely without any restrictions.

3.2 History

Open data has been reviewed for a while by scientists and was officially known by the term “OPEN DATA” in 1995 according to an American scientific agency, as it was part of their documents. It dealt with the unveiling of environment and geophysical data. The benefit of sharing or making data open was first noticed by the scientific community and researchers before it was even seen as a major object or a

political movement. It was revealed as early as 1942 by Robert King Merton, he was known as one of the fathers of sociologies of science. Merton made it clear on how important it is for the outcome of research to be accessible or open freely to anyone. In order for knowledge to go forward every researcher has to contribute and intellectual property rights has to be given up.

In December 2007 a group of campaigners and pioneers of the internet assembled, thirty of them, and a meeting was held in Sebastopol Calif, with the aim to explain the concept of open public data with an agenda to make the US Presidential candidates adopt this system. Among this group were two well-known people - Tim O Reilly and Lawrence Lessig, who were among the creators of several vanguard internet and computer movement. Most of the pioneers who participated in the Sebastopol meeting came from a free software and culture movement. During this meeting a set of eight principle on open government data were pointed out that introduced a new age of democratic improvement and opportunities in the economy. These eight principles were stated for data to be complete, primary, machine-readable, timely, accessible, license free, non-proprietary and non-discriminatory as it still serves as a major movement in open data.

Ever since those principles were released, the open data activities have been approved by most of the governments around the world, starting a platform which strengthens the journalist, entrepreneurs and the research groups to discover and find new opportunities and take advantage of this new materials and maximize their potential. Open data has brought challenges and contests around the world, concentrated on issues identified in the health, energy and transportation sector. It was stated that *“openness will strengthen our democracy and promote efficiency and effectiveness in government”* (Fretwell, 2014).

3.3 Principles of Open Data

In order to understand how the principles of open data was formed, we go back to the meeting held in Sebastopol, California in December 2007 were 30 open governments supporters gathered. During the meeting of the Open Government Working Group the 8 key foundations supporting the idea of open data was formed. The aim of this group was to develop a high understand on why open government data is important to democracy. The eight principles of open data were required to be machine readable and be in a complete

format. Among the people who participated were Carl Malamud and Tim O'Reilly leading the event. The eight principles were open data being complete, primary, timely, accessible, machine processible, Non-discriminatory, Non-proprietary, and license-free.

1. Complete

The public data that are collected or released by the government are to be made available and accessible to the general public. By doing this good intention are being met, making the right decision for the general reuse of the data by the third parties. Knowing we have the right to reuse the content of the government data since the resources comes from the people's taxes.

2. Primary

This implies that data released by the government must be presented exactly how it appeared from the initial source. So, the validity of the data can be confirmed with its origin and references available.

3. Timely

For the government data to still have its value, the data must be published on time making available for use and updated periodically. With this initiative the preservation of the data value would remain.

4. Accessible

Open data need to be able to exchange and make use of information, has to be available irrespective of the software and equipment it us viewed through. It must be written in compliance with the industry standard and protocol, as well as in alternate formats where reuse is necessary.

5. Machine Processable

When data is being published, it must be in machine readable formats allowing automatic processing. The formats has to be documented properly, avoiding JPG or PNG. Correct format should be in PDF format or DOC which are easy to read and reuse.

6. Non-discriminatory

In order for the data set to be open, it must be accessible without any form of restrictions due to authentications such as username and password. Because through these, the point of having free data would not be expressed if the data set are hidden.

7. Non-owners

It is important that data published in an open format should facilitate free access to all that wants to make use of the data, without any it being exclusively controlled by any entity.

8. License Free

For reuse, redistribution, and commercialization of data to be allowed, an open license has to be seen or shown. As the data was not copyrighted, patents, and regulated.

3.4 Open Government Data

Since the Open data initiative, the governments all over the world took interest in open data, which allowed the creation of open government data with the agenda to make government data more available and to be used, re-used by the public. Janssen et al. (2012) define the open government data (OGD) as “non-privacy-restricted and non-confidential data, produced with public money and made available without any restrictions on their usage or distribution.” The aim was to create an environment in the society where there would be more transparency, participation, and citizen alliance which would stimulate creativity, motivated by the OGD movement. According to Chan, (2013) or Janssen et al. (2012) “The fundamental assumption is that once data are more descriptive, usable, available in alternative formats required by any number of users and with licensing schemes allowing for free reuse, various stakeholders can create creative data applications.” Another definition on open government data by Janssen et al., (2012) is: “*Open government data (OGD) are non-privacy-restricted and non-confidential data, produced with public money and made available without any restrictions on their usage or distribution.*” *Open government data is viewed as open data which is defined as the data the public or companies can get access to e.g. taxes or rate of population growth without any restrictions in order for transparency to be present in the society*” (Benefits, adoption barriers and myths of open data and open government, 2012).

Based on this OGD initiative engaged by the government, data availability would create innovations that would contribute positively in the increase of economic growth. The fact that data from the government can be used by foreign or local investors to make positive changes in certain areas around the country, for example the health, agricultural, and

marketing sector etc. would allow growth in the economy based on the data released by the government. It indicates that the availability of data set and important information resources will definitely make the OGD progress and continue.

This research comes in play with the data.gov.ng WEB APP prototype application because it is related to open government data in Nigeria, and it's going to focus on data from the government being available to the public, creating an interaction between the public and the government, in order for the public to participate. The application concept is going to be explained in the practical part of this paper.

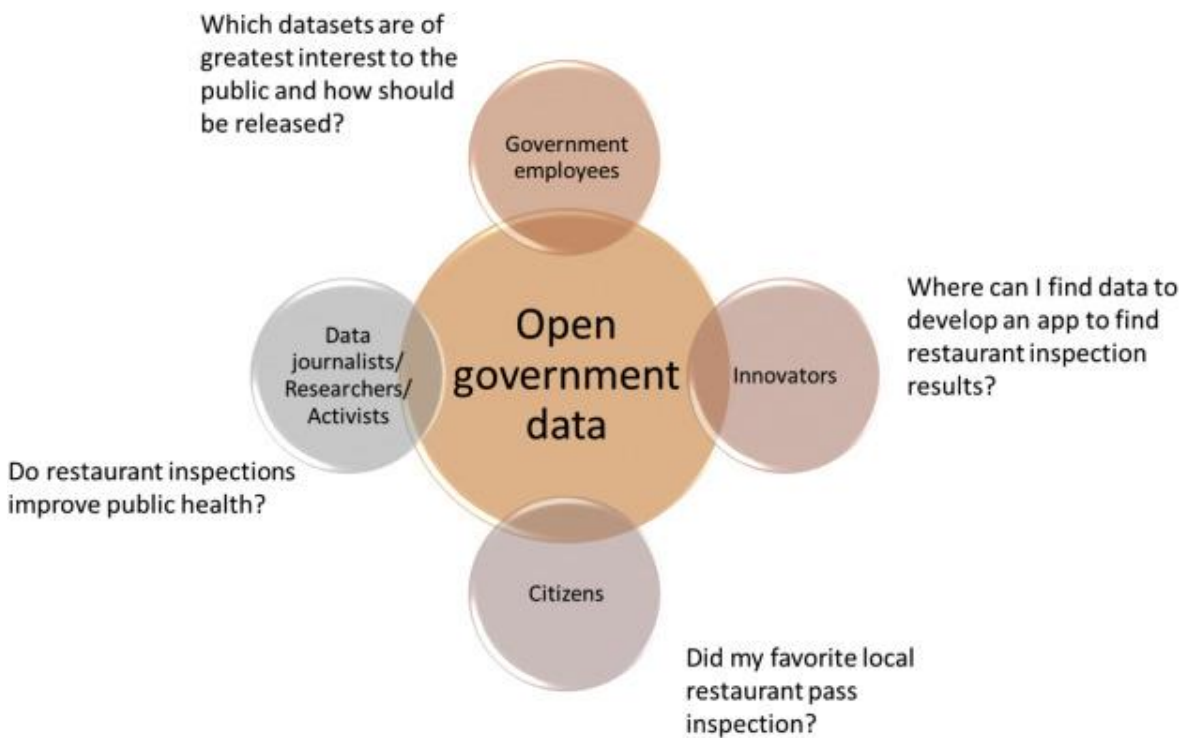


Figure 1 Open government data and uses Begany & Martin, 2017

3.4.1 Open data impact on Good Governance

There has been a lot of connection between open data and governance whereby open data paved the way for OGD which drives accountability and transparency. This improves delivery of public services in a way where citizens are given the opportunity to freely explore confidential government data. It has been made possible for activist and some organisation to get access to some data sets, like how money is being spent, and it is thus possible to monitoring the activities of the government.

The UK government also adopted this method and allowed publishes every spending transaction that is over 500 pounds to be published following the open data policy.

Journalists, including the citizens, have taken this opportunity to use these data sets frequently, to follow up how much is spent by the government.

A further step was taken when openspending.org was made in order for data accessibility in the case of national budgets. It shows the spending's of government, and also contains the budgets of countries like Nigeria, India, Kenya, UK and south Africa through graphs and database.

Ever since the Obama's signature on open government memorandum in 2009 which lead to the creation of data.gov holding a large amount of federal data sets that the public and organisation can have access to it. This creation was also followed by UK early in 2010 creating data.gov.uk, world bank in mid 2010, Kenya in 2011 lunching opendata.go.ke and India with their data.gov.in version, integrating this open government into the democracy system. This would come in play in the practical section of my thesis with web application prototype data.gov.ng. for open Government data Nigeria.

3.5 Benefits of Open Government Data

One of the important benefits of open data is its ability to enable key information on problems to be handed to those with the technical skills and idea required to solve them. This is very crucial because in order for some situations to be tackled the data as to be seen and used by the public, allowing a solution to come through.

Open data has the benefits of being cost free with no limits to usage rights, eliminating to major barriers which are cost and limit. It leads to new innovations supported by big data analysis enabling better transparency and integrity in the public area. Tracking public money flows has being made possible, and allowing inefficient and ineffective to be identified easily, increasing performance via monitoring processes and services. Collaboration between individuals, organisation, and government are enabled if government data are made accessible.

Benefits of open data include:

- **Transparency** - The supervision of the government by the public is supported by open data and assist in reducing corruption by activating better transparency. Government activities are being monitored that is made easy by open data, ensuring public expenses are being tracked. Citizens engaging in government affairs are encouraged by voting and participating in elections, getting information on procedures, location and ballot boxes.

- **Public services improvement** – open data enables public services by allowing the citizens to use open data to add to public planning or give a report on service quality to the government ministries.
- **Innovation and economic value** – The re-use of public data is major resource for innovation and economy growth. New opportunities are provided with open data for government to collaborate with citizens and giving citizens access to data on those services by evaluating public services. The potential market is understood by businesses and entrepreneurs using open data, building new product driven by data.
- **Efficiency** – Government are able to discover and access their data from other ministries easily and less expensive which is made possible with open data. Open data can strengthen the citizens with the capacity to tell governments to breakdown public datasets and more accurate information would be provided.

This benefit would lead to economy preservation, with economic revenue being increased and newly generated. One of the benefits also is the ability of tapping on public mutual knowledge if the system is open. Taking advantage of the benefits of open data can directly improve city planning and job creation, modernizing education and the health care system, while investors and companies being able to use open data to illustrate the potential of investment. Sharing data freely and open can be seen as a way of advancing transparency, that will strengthen accountability, trust built, and improving satisfaction of the citizens.

3.5.1 Barriers of Open Government data

Recent experiences show that the OGD movement actually encounters some challenges that are related to the process of how data is being published, which revealed organisational activities that prevent data from being open, due to the legal and regulatory issues relating with security and privacy. Some technical challenges were identified such as the unavailability of infrastructure to the lack of skill to support OGD. According to Sussha *“Although challenges in the publication process constitute key factors to resolve in order to make data available, important difficulties are also experienced on the side of data users inside and outside government. (Driving factors of service innovation using open government data: An exploratory study of entrepreneurs in two countries, 2015)“*. One of the challenges identified facing OGD initiative for data availability are Insufficient dataset sources that are meant to be made available for publishing. It was discovered that some new

users may not know how to make use of the data that is open due to the lack of technical skills, limiting them from taking advantage of OGD benefits.

In Fig.2, The barriers types that prevent the research on OGD from being done was explained through the diagram below, identifying some of this barrier types which were technical, organisational, legal barriers. The barriers types were found in 34 articles on barriers of OGD. This revealed how this barrier type affected OGD barrier research, resulting to low rate of published data or article relating to OGD barriers. The two groups used to when studying the barrier types are specific and general article.

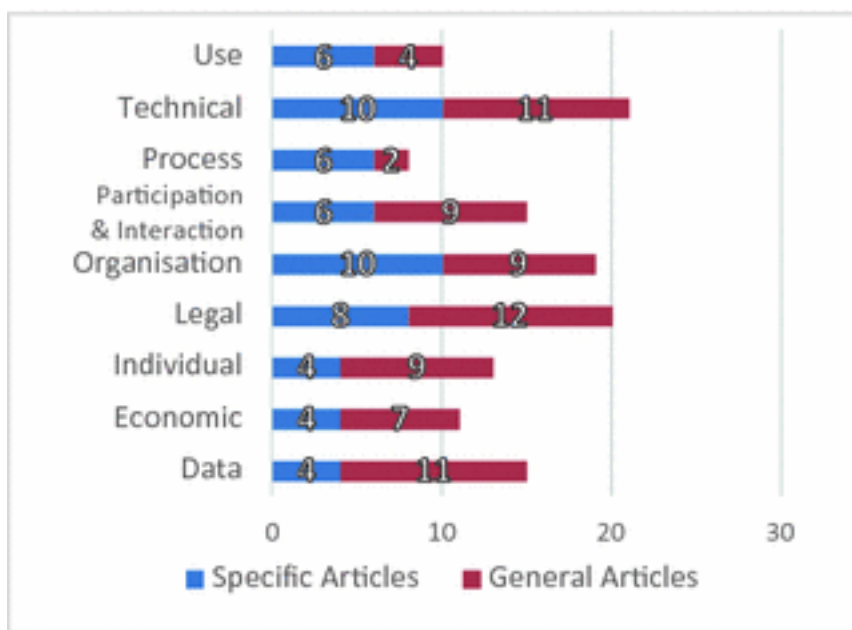


Figure 2 Barriers types (Jonathan Crusoe, 2018)

A decision has to be made between data being closed and open for it to be released as we look at obstacles behind publication. According to Conradie, P., Choenni, “*Open data originates from an organisation where it starts as closed, which means that the data has an organisational context, before and after publication.*” (On the barriers for local government releasing open data, 2014). With these five similar barrier processes were identified:

- identifying data’s suitability for publishing
- publishing the data
- someone using the data
- deciding to release
- evaluating the impact and collective feedback.

3.6 Open data Nigeria

The realization of open data impact on innovation, and world economy made the federal government of Nigeria take a step forward and launched the open data initiative with the aim to support innovation, economic growth and investment. Federal ministry of Information & Culture started the open government data development in 2014. This process would allow dataset with high value from the ministries to be available freely to citizens of Nigeria, businesses and the world. It was stated in an article by Mrs Omobola Johnso that data is becoming really essential in every area of our lives, with the importance of data making decisions which yields value. According to Emeka: *“We would like to ensure that our open data initiative is driven by demand. We will be guided by the practical needs of Nigerians to ensure that open data fuel innovation and grows the Nigerian economy.”* (Aginam, 2014). The open data initiative brought together more than 120 representatives from the MDAs.

As it just started not too long ago, the open data movement is still growing and relatively new in Nigeria. It's just started not long ago. It's a country that is still developing in the tech field but has had a growth of 5% in the Information Communication Technology (ICT) sector from 2012 to 2016. Compare to other developed communities, it's still has some area that needs improvement in ICT sector. Apart from the country still growing when it comes to innovation, some of the challenges which prevent the full potential and use of open data, actually come from the government's inability to use data, because the government doesn't have a vast understanding of the value and how data is to be utilized in order for economic growth, and transparency in the community. Some of the organizations don't make their datasets open for use, which is also one of the challenges the public faces because these datasets are needed by researchers. A group of innovators in Nigeria came with an idea powered by open data and created a web application called “cMapIT”. It is a mapping platform, which enables users to capture dataset via mobile phones: by doing that data taken is stored at the core server.

3.6.1.1 Open data economic Impact in Nigeria

Over the year's agriculture has been very successful in contributing to the country's economic growth. Nigeria, due to its warm climate and fertile land makes it excellent for farming, producing a large number of agricultural products for public consumption and

export. Nigeria has the highest farmers located in the south part of Edo state, which has adopted the open data initiative by making use of free data. Policies that would strengthen and grow that sector to improve the economic welfare of its people, data on the activities of the farmers wasn't collected, kept or stored, making it hard for the government to improve the agricultural sector. So, a solution was provided with portal created by the ICT agency called "EdoAgriHub" (EDAH) with the possibility to collect data via mobile device. It's a portal that holds data on crop location, farmers, products, farm market and other information connected to the agricultural sector. It is also supported by the Ministry of Agriculture, state bureau of statistics, farmers, and community representatives.

3.6.2 Open Data Nigeria: Follow the Money Initiative

An action organization was formed called "Follow the money" a team who took advantage of the open budget and aid spending data from the Nigerian government. This initiative was created in order to get the government's attention towards problems that needed resources (money), and for action to take place immediately. Officials of *the follow the money* initiative retrieve, show, and publish data, while connecting it to the social media platform, with an agenda of making the government aware of crises happening so the government can direct funds there. However, the main focus of the team at the moment was the crises going on in Bagega, Zamfara due to the case of lead poisoning causing suffering and death in the community. The team made it public by collecting data such as photos, video and survey report and published it via mobile phone online to draw the government's attention.

So, the agenda of this organization was to make sure that funds that were meant to aid the communities in desperate need were actually being spent on that community. It was discovered that reports about urgent matters were not seen by the government to solve those crises going on around the various communities. A data management system is used called "Ushahidi" to store and convert the data in a structured format via sms, although a research is being done by the team in order to make the data an open.

3.6.3 Open Government Data Nigeria

Nigeria is known to have the largest economy in Africa overtaking South Africa in terms of economy growth. But the political system still faces some challenges while maturing, gradually leading the Nigerian government into taking part in the OGP – Open Government

Partnership. The OGP initiative was adopted by the Nigerian government in July 2016 making us the 70th country to join and with the aim of using this initiative to fight corruption which has been a major hindrance when it comes to the development of the country. OGP initiative comes with another agenda to make the Nigerian governance transparent, accountable, responsive to citizens through innovation and enable citizen's participation.

Several open government and anti-corruption reforms are already being implemented in Nigeria, and the OGP initiative reveals a platform for global participation to increase, main components of the reformed initiative are:

Government Integrity

The public officers are now meant to declare their assets or property quickly and that the asset should be recorded in agreement with the law.

Access to Information

The passage of FOI – Freedom of Information in 2011 has enabled the free access to public records and information for citizens of Nigeria, The Bureau of Public service Reform – BPSR has taken a step in making a different electronic FOI platform on their webpage that provides real information for the citizens.

Extractive Resources Transparency

A public register of profitable shareholders of all the businesses working in the Nigerian Extractive industry is being developed by the NEITI – Nigerian Extractive Industries Transparency Initiative, with the aim of disclosing beneficial owners or making it public.

Public Participation

The electoral reform presents us with the effort and goal to improve the political participation in terms of election, for citizens to be able to participate in a free and fair election encouraging a peaceful democratic culture in Nigeria.

Open Data

As official government statistics of data is being released by the National Bureau of statistics – NBS and budget prepared by the Budget office, it has been made available online for the public to see, ensuring data continuity and creating a format for easy access to information.

Fiscal Transparency

A large and better form of transparency has been introduced to the public financial management system and it was made possible by the GIFMIS and IPPIS. In this case, the allocation of federation income to all levels of government is published regularly by the Federal Ministry of Finance, budget office and office of accountant general, disclosing

information on budget allocation and execution. For the financial activities of MDAs to be supervised, Treasury Single Account (TSA) was implemented by the government. By doing this there was a reduction in the amount the government lost in borrowing from commercial banks, saving billions of naira.

The Bank Verification Number (BVN) deployment enabled a biometric identification system for the financial system, which would cause reduction in fraudulent activities making it possible to track money while bringing back assurance to our banking system.

The Public Procurement process is being implemented by the Bureau for Public Procurement with the goal to pursue automation of public purchasing processes in all governing bodies before 2019.

4 Practical Part

In this section of the thesis the practical is going to have a description of the frontend and backend for prototype web application *data.gov.ng* which would be explained, showing how the users interacts with the interface and how the application works. The frontend is going to be based on how the web design interface is which is the web page, also describing the codes used, while the backend is going to be based on how the application functions, the server with the codes behind the entire process described.

4.1 Frontend Design

For this project with regards to frontend development HTML and CSS were the scripting languages used for the web design or web development which would enable users to see and interact with the web page running on the browser.

4.1.1 User Interface Design

In this section, how the user interface is designed would be shown and explained, with how the user interacts with interface.

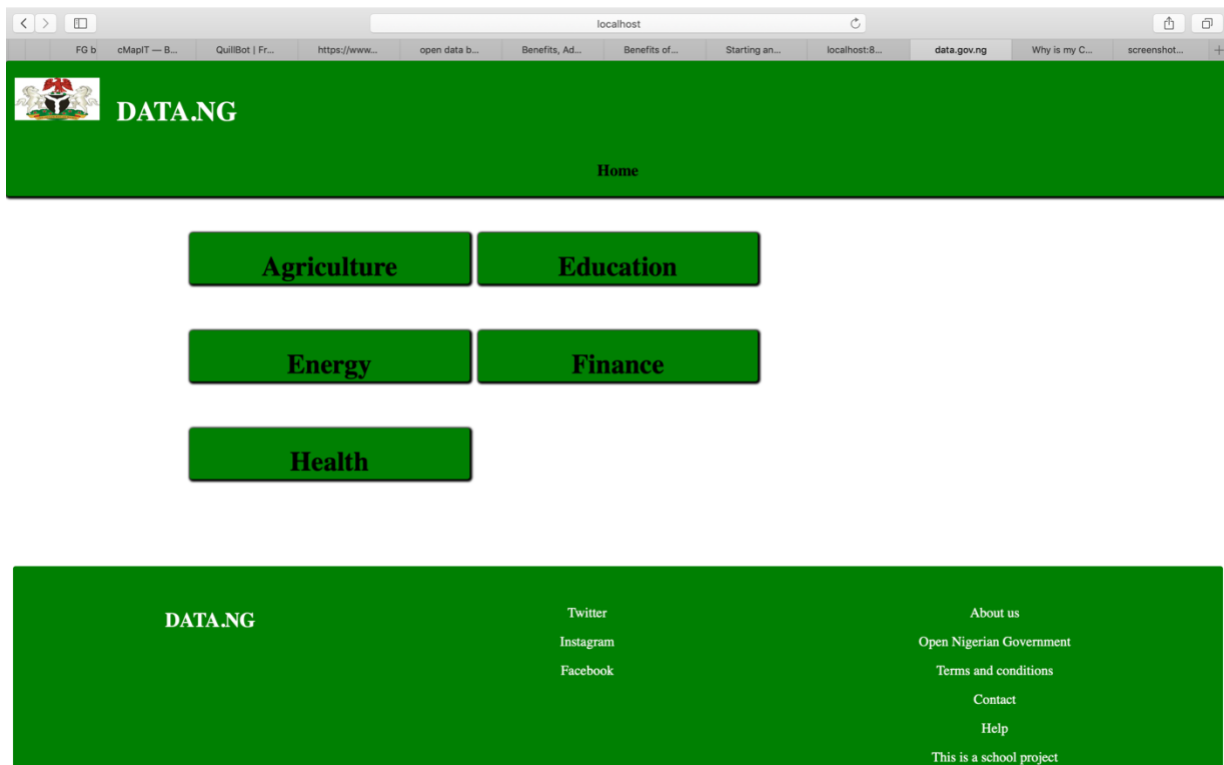


Figure 3 home page of *data.gov.ng*

- In Fig.3, a display of the *data.gov.ng* home page is presented with the navigation bar home and logo that serves as a link for the home page and all the topics on specific data relating to them e.g. agriculture, education, energy, finance, and health. Below we have information on how to connect with us via social media e.g. twitter, Instagram and Facebook and also a demo information about us, with terms and conditions, contact, and help. When the user uses the link *data.gov.ng*, the display with all the topics appears on the web page, given the users different options to choose from depending on what data he/she wants to use. The colour used for the web page is an inspiration gotten from the national colours of the federal republic of Nigeria. Each colour holds a sentimental value with classifications as follows:

- Green representing Agriculture

- White representing Peace

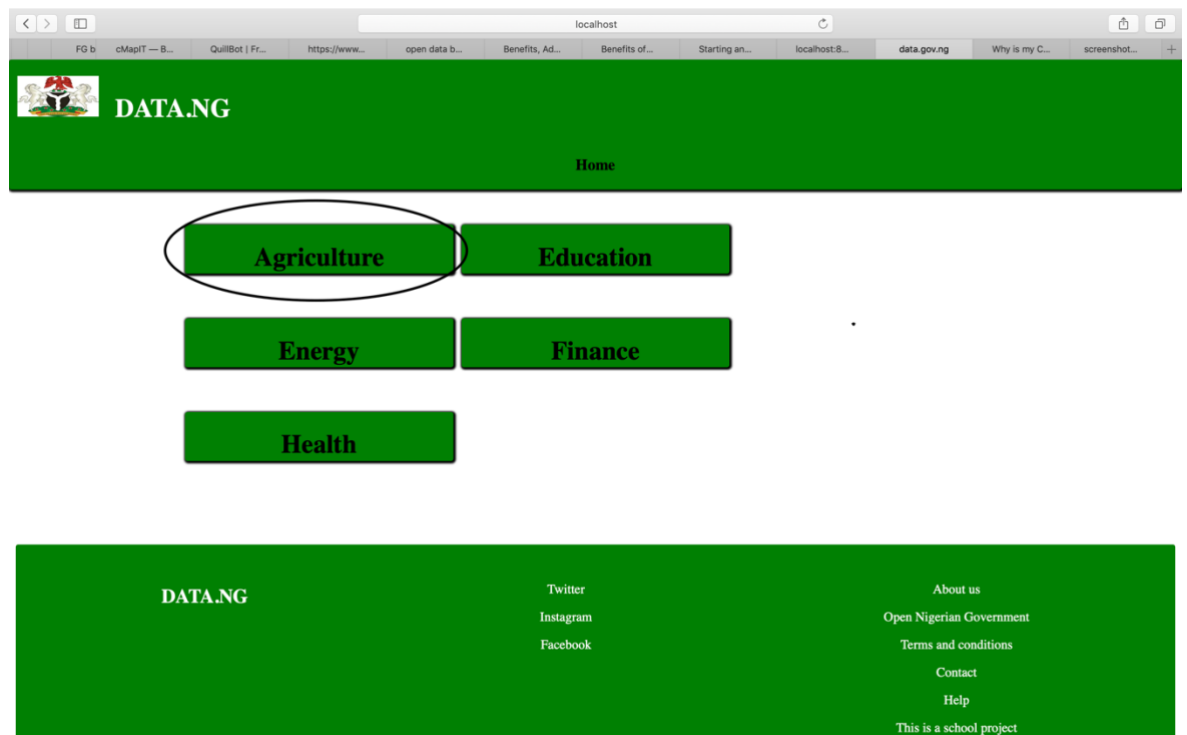


Figure 4 Home page of data explained

In Fig.4, when the user clicks on agriculture a new page appears with the overview explaining what kind of agricultural data are made open. On that same page there is going to be a navigation bar with “article” and “data” that serves as links to different web pages, when the user clicks on “data” it takes the user to a different web page due to its link.

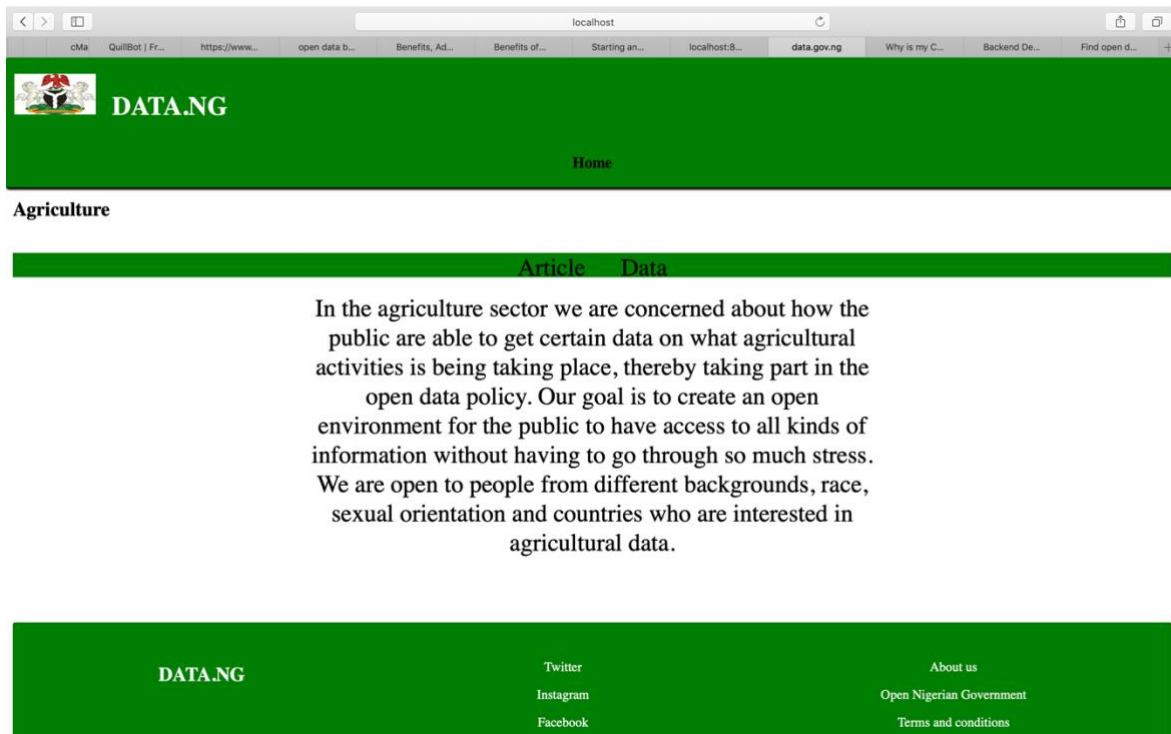


Figure 5 Agricultural page of *data.gov.ng*

In Fig.5, after the user clicks on the agriculture, the display above appears with a few changes showing the overview on what kind data would be available. It's still has that navigation menu with home, article and data links, the article is the overview page while the home and logo take the user back to the home page. Below the main article, the information on how to connect via social media is still present and will be on every web page of this web site as a footer that would be explained in chapter 4.1.2.

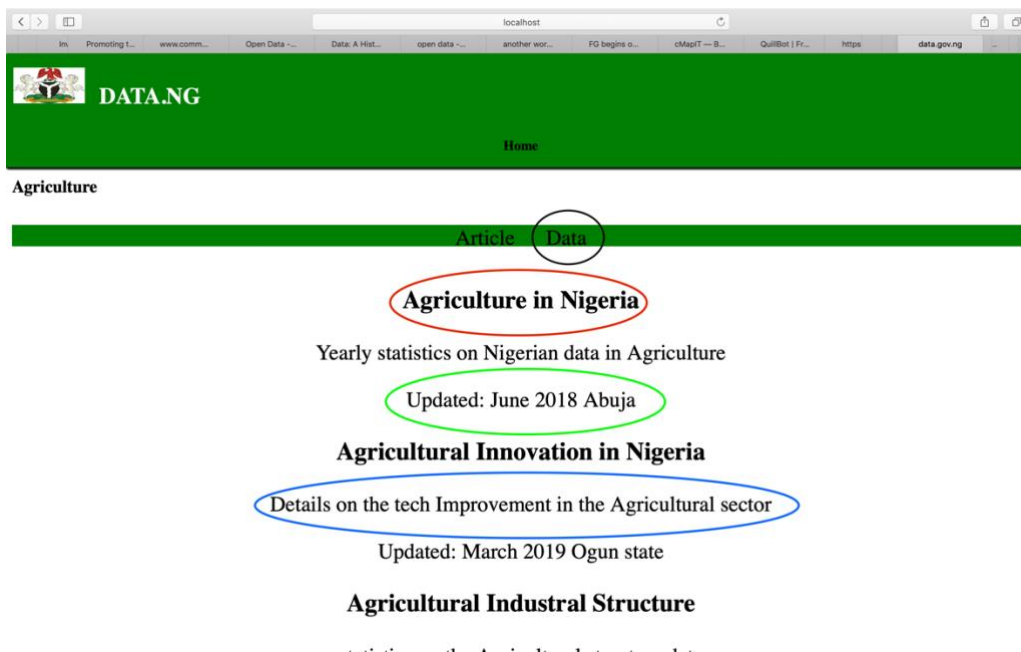


Figure 6 Data page of *data.gov.ng*

In Fig.6, when the user clicks on data which is circled black, the web page changes and a demo data which the one circled red and file circled blue will appear, also showing when last the data was updated with its region which is also circled green in the display shown above. It is going to be in a tabular format shown below:

ID	Region	Article
2	Abuja	Topic: Agriculture in Nigeria Author: James Brown Date: 03/03/2020
3	Lagos	Topic: School Admission Author: John Kennedy Date: 03/03/2020
2	Kano	Topic: Agriculture innovation Author: Micheal hunter Date: 03/03/2020

Figure 7 Structure of data

4.1.2 User Computer Interaction.

In the section the interaction between the user and the interface would be described, thereby using persona and use case to explain how the interaction is done.

4.1.2.1 Persona

Persona A: Michael Jacob

Age: 22

Gender: Male

Hobby: Playing Football

Location: Prague

Micheal is young software developer building his career in Prague, recently graduating from Czech university of life sciences. Michael's family stays in the united states of America, where he grew up before deciding to move to Czech Republic to study and stay. Being a software developer, he does a lot of coding which he enjoys doing most of the time with the aim of becoming a master programmer in the future. Micheal also has other things he loves doing which is taking photographs and editing this photo. Currently he is doing a lot of research on government data meant for work purpose, thus making him an ideal user of *data.gov.ng* and other data portals too.

A typical day: He wakes up usually at 07:00 am for work, taking his morning break usually cheese sandwich before leaving for work. He works 7 to 8 hours during week day and usually off on the weekends. After work he goes to the gym before going back home. When gets home takes dinner, then while resting he does research on data, he would to make use for the work project.

Computational Usability: Professional

Persona B: Mary Connell

Age: 30

Gender: Female

Hobby: Swimming

Location: London

Mary grew up in the busy streets of London, working as a database administrator, having a well-paying job, allowing her leave very comfortable. Mary's relative all stay in the United Kingdom except her older brother who moved to Australia for business purposes. She is the kind of who loves doing sport activities in order to stay fit and being productive aside her daily work. As a database administrator she works with a lot of data, therefore bringing her to our web site *data.gov.ng*, because she collects data from different regions and compare them to the United Kingdom's dataset.

A typical Day: Mary spends most of her time doing work and some sport activities. When she wakes up at 06:00 am, she gets ready for work, and drives to work avoiding morning traffic reason she wakes up so early. At work she does her normal task for that day which is get dataset and maintain the system which is usually for 7 hours then a one-hour break. After work she goes home then goes for an evening Jug, having dinner before going to bed.

Computational Usability: Expert

4.1.2.2 Use Cases

Use Case 1

If the user is new, he/she can search the web address *data.gov.ng* which takes the user to the home page of the web site, enabling the user view different topic relating to government data. When the user clicks on topics e.g. Agriculture, it takes them to a different page enabling to see information like an article on the topic. Also, at the same page there is a

navigation menu, where the user has an option to check the data and flies. When the user clicks on “Data” at the navigation menu, it enables them to view different data and flies if flies are available.

Scenario 1

If the user is unable to go back to the previous page when he/she clicks any dataset in agriculture, the problem is solved after the user clicks “Data” at the navigation menu enabling the user to go back to the previous page with different dataset. If the user also wants to go back to the home page, after he/she clicks home at the navigation menu or the logo at top, it takes them back to the home page enabling to choose another topic.

Use Case 2

If the user does a search on our web site, the title data.gov.ng would show on the browser, enabling the user to access our web page freely. If the user is on the web page, he/she can get to know more something about us enabling the user have a good understanding on our purpose and goals as a platform, when the user clicks on “About Us” at the bottom of the web page. In case any case of problem the platform provides contact via social media which would enable the user to reach us.

Scenario 2

If the user want wants to see more data on health, after the user clicks on health button, user would be taken to a new page where the user would be seeing an article on health, then at the navigation menu, user would see Data. By clicking on data, user is taken to another page again with all the dataset on health. After user clicks on any dataset, the user would set the data available depending on what he/she want.

4.1.3 HTML and CSS Codes

In this section the HTML and CSS codes used for the web application would be explained, showing how they work with its contribution to the functionality and design of the web site.

```

5 </html>
6 <head>
7 <meta charset="UTF-8">
8 <title>data.gov.ng</title>
9 <link href="style.css?ts=<?=time()?>" type="text/css" rel="stylesheet">
10 </head>
11 <div class="header">
12 <div class="heading">
13 
16 <a href="index.php"><h1>DATA.NG</h1></a>
17 </div>
18 <nav class="navigation">
19 <div class="menu">
20 <a href="index.php" class="Inav"><h3>Home</h3></a>
21 </div>
22 </nav>
23 </div>
24 <main class="main">
25 <div class="agriculture">
26 <h1><a href="agriculture.php">Agriculture</a></h1>
27 </div>
28 <div class="education">
29 <h1><a href="education.php">Education</a></h1>
30 </div>
31 <div class="energy">
32 <h1><a href="energy.php">Energy</a></h1>
33 </div>
34 <div class="finance">
35 <h1><a href="finance.php">Finance</a></h1>
36 </div>
37 <div class="health">
38 <h1><a href="health.php">Health</a></h1>
39 </div>
40 </main>
41 <div class="footer">
42 <div class="heading2">
43 <h2>DATA.NG</h2>
44 </div>
45 <div class="socialmedia">
46 <p><a href="https://twitter.com/datagovng">Twitter</a></p>
47 <p><a href="https://www.instagram.com/datagovng">Instagram</a></p>
48 <p><a href="https://www.facebook.com/datagovng">Facebook</a></p>
49 </div>
50 <div class="About">
51 <p><a href="#">About us</a></p>
52 <p><a href="#">Open Nigerian Government</a></p>
53 <p><a href="#">Terms and conditions</a></p>
54 <p><a href="#">Contact</a></p>
55 <p><a href="#">Help</a></p>
56 <p><a href="#">This is a school project</a></p>
57 </div>
58 </div>
59 </body>

```

Figure 7 Html code for home page of *data.gov.ng*

In Fig.8, is the html code for the home page of *data.gov.ng* that has tags which is part of the main structure of the web page. Within the html tag we have head tags holding the syntax that has the ability to encode all characters on the web, it also holds the syntax title to enable the identification for the web page, and also holds the link which was used to link the html and css together.

In the html tag we also have the syntax body tag that covers the rest of web page, within the body tag the header tag that can have a class which would be used to identify and design the characters. The header tag has syntax div that serves as a container which is used to identify classes. The body tag also has within it the tag `<main></main>` used to hold the main content e.g. agriculture, education etc., and finally the tag `<footer></footer>` is used to keep information below the web page showing social media platforms and other information.


```

index.php x  agriculture.php x  dataset.php x  dataset1.php x  dataset2.php x
5  <html>
6  <head>
7  <meta charset="UTF-8">
8  <title>data.gov.ng</title>
9  <link href="style2.css?ts=<?=time()?>" type="text/css" rel="stylesheet">
10 </head>
11 <body>
12 <header>
13 <div class="heading">
14 
15 <a href="index.php"><h1>DATA.NG</h1></a>
16 </div>
17 <nav class="navigation">
18 <div class="menu">
19 <a href="index.php" class="Inav"><h3>Home</h3></a>
20 </div>
21 </nav>
22 </header><hr>
23 <div class="background">
24 <div class="heading2">
25 <h2>Agriculture</h2>
26 </div>
27 </div>
28 <nav class="navigation2">
29 <div class="menu2">
30 <a href="agriculture.php" class="nav">Article</a>
31 <a href="dataset.php" class="dnav">Data </a>
32 </div>
33 </nav>
34 <main>
35 <div class="intro">
36 <articles>
37 In the agriculture sector we are concerned about how the public are
able to get certain data on what agricultural activities is being
taking place, thereby taking part in the open data policy. Our goal
is to create an open environment for the public to have access to
all kinds of information without having to go through so much
stress. We are open to people from different backgrounds, race,
sexual orientation and countries who are interested in agricultural
data.
38 </articles>
39 </div>
40 </main>
41 <Footer>
42 <div class="heading3">
43 <h3>DATA.NG</h3>
44 </div>
45 <div class="socialmedia">
46 <p>Twitter</p>
47 <p>Instagram</p>
48 <p>Facebook</p>
49 </div>
50 <div class="About">
51 <p>About us</p>

```

Figure 8 Html code for agriculture page of Data.gov.ng

In Fig.9, we have the html code for the agriculture page of *data.gov.ng*, which has all the tags explained in the previous paragraph, identifying Agriculture as heading 2. A new tag was added to the html code which is the article tag that holds characters signifying it as an article on the web site.

```

5 <html>
6 <head>
7 <meta charset="UTF-8">
8 <title>data.gov.ng</title>
9 <link href="style2.css?ts=<?=time()?>" type="text/css" rel="stylesheet">
10 </head>
11 <body>
12 <header>
13 <div class="heading">
14 
15 <a href="index.php"></a>DATA.NG</a></div>
16 </div>
17 <nav class="navigation">
18 <div class="menu">
19 <a href="index.php" class="inav"></a>Home</a></div>
20 </div>
21 </nav>
22 </header></div>
23 <div class="background">
24 <div class="heading2">
25 <h2>Agricultures</h2>
26 </div>
27 </div>
28 <nav class="navigation2">
29 <div class="menu2">
30 <a href="agriculture.php" class="nav">Article</a>
31 <a href="dataset.php" class="dnav">Data</a>
32 </div>
33 </nav>
34 <main>
35 <div class="agric1">
36 <h3>Agriculture in Nigeria</h3>
37 <p></p>Yearly statistics on Nigerian data in Agriculture</p>
38 <p></p>Updated: June 2018 Abuja</p>
39 </div>
40 <div class="agric2">
41 <h3>Agricultural Innovation in Nigeria</h3>
42 <p></p>Details on the tech Improvement in the Agricultural sector </p>
43 <p></p>Updated: March 2019 Ogun state</p>
44 </div>
45 <div class="agric3">
46 <h3>Agricultural Industrial Structures</h3>
47 <p></p>statistics on the Agricultural structure data </p>
48 <p></p>Updated: August 2019 Lagos state</p>
49 </div>
50 <div class="agric4">
51 <h3>Agricultural climate in Nigeria</h3>
52 <p></p>The change in the Agricultural sector</p>
53 <p></p>Updated: January 2020 Jos state</p>
54 </div>
55 <div class="agric5">
56 <h3>Agricultural Lands forms</h3>
57 <p></p>Forms connecting to the agricultural lands</p>
58 <p></p>Updated: september 2019 Zamfara state</p>
59 </div>
60 <div class="agric6">
61 <h3>Agriculture Policy on goods</h3>
62 <p></p>Information on the licencing, security, and registration of agricultural
63 good gain in and out of Nigeria</p>
64 <p></p>Updated: March 2020 Lagos state</p>
65 </div>
66 <div class="agric7">
67 <h3>Agricultural Industrial Productivity</h3>
68 <p></p>Productivity in the Agriculture sector in Nigeria</p>
69 <p></p>Updated: December 2019 Ogun state</p>
70 </div>
71 <div class="agric8">
72 <h3>Agricultural Price Indices</h3>
73 <p></p>Monthly Price Index in Nigeria Agriculture</p>
74 <p></p>Updated: February 2020 Lagos state</p>
75 </div>
76 </main>
77 <div class="heading3">
78 <h3>DATA.NG</h3>
79 </div>
80 <div class="socialmedia">
81 <a href="https://twitter.com/data.ng"></a>Twitter</a>
82 <a href="https://www.instagram.com/data.ng"></a> Instagram</a>
83 <a href="https://www.facebook.com/data.ng"></a> Facebook</a>
84 </div>
85 <div class="About">
86 <p></p>About us</p>
87 <p></p>Open Nigerian Government</p>
88 <p></p>Terms and conditions</p>
89 <p></p>Contact</p>
90 <p></p>Help</p>
91 </div>
92 </div>
93 </body>
94 </html>

```

Figure 9 Html code for agriculture data page of *data.gov.ng*

In Fig.10, we have the Html code used for the demo data in agriculture, viewed on the web site *data.gov.ng*, added a new paragraph tag converting the characters to a paragraph form on the web site. The paragraph tag was used for the demo files and demo updates while the heading 2 tag `<h2></h2>` was used for the demo data on the web site.

```

style2.css
1 header{
2   display: flex;
3   position: fixed;
4   top: 0;
5   left: 0;
6   z-index: 2;
7   flex-direction: column;
8   text-align: center;
9   background: green;
10  border-radius: 3px;
11  box-shadow: 1px 1px 2px 2px;
12  width: 100%;
13 }
14 .background{
15   display: flex;
16   flex-direction: row;
17 }
18 .heading{
19   display: flex;
20   flex-direction: row;
21   padding-top: 20px;
22   padding-left: 10px;
23 }
24 .heading a{
25   text-decoration: none;
26   padding-left: 20px;
27   color: white;
28 }
29 nav .navigation{
30   display: block;
31   text-align: right;
32 }
33 .menu a{
34   text-decoration: none;
35   color: black;
36 }
37 .menu a:hover{
38   color: white;
39 }
40 main{
41   text-align: center;
42   margin: auto;
43   padding-bottom: 20px;
44   padding-top: 20px;
45   margin-top: 150px;
46 }
47 .main{
48   display: grid;
49   grid-template-columns: 1fr 1fr 1fr;
50   grid-template-rows: 1fr 1fr 1fr;
51   grid-gap: 10px;
52   width: 70vw;
53   height: 40vh;
54   text-align: center;
55   align-items: center;
56   z-index: 1;
57 }
58 .agriculture{
59   display: grid;
60   grid-column: 1/2;
61   grid-row: 1/2;
62   height: 60px;
63   background: green;
64   border-radius: 3px;
65   box-shadow: 1px 1px 2px 2px;
66 }
67 .agriculture h1 a{
68   text-decoration: none;
69   color: black;
70 }
71 .agriculture h1 a:hover{
72   color: white;
73 }
74 .education{
75   display: grid;
76   grid-column: 2/3;
77   grid-row: 1/2;
78   height: 60px;
79   background: green;
80   border-radius: 3px;
81   box-shadow: 1px 1px 2px 2px;
82 }
83 .education h1 a{
84   text-decoration: none;
85   color: black;
86 }
87 .education h1 a:hover{
88   color: white;
89 }
90 .energy{
91   display: grid;
92   grid-column: 1/2;
93   grid-row: 2/3;
94   height: 60px;
95   background: green;
96   border-radius: 3px;
97   box-shadow: 1px 1px 2px 2px;
98 }
99 .energy h1 a{
100  text-decoration: none;
101  color: black;
102 }
103 .energy h1 a:hover{
104  color: white;
105 }
106 .finance{
107   display: grid;
108   grid-column: 2/3;
109   grid-row: 2/3;
110   height: 60px;
111   background: green;
112   border-radius: 3px;
113   box-shadow: 1px 1px 2px 2px;

```

Figure 10 Css code style 1 for home page design

In Fig.11, we have the css code for the styling of the web page specifically for the home page on the web site. The classes created in the html tags are connected to the css styling, which would be used to design specific areas in the web page

```

.finance h1 a:hover{
  color: white;
}
.health{
  display: grid;
  grid-column: 1/2;
  grid-row: 3/4;
  height: 60px;
  background: green;
  border-radius: 3px;
  box-shadow: 1px 1px 2px 2px;
}
.health h1 a{
  text-decoration: none;
  color: black;
}
.health h1 a:hover{
  color: white;
}
footer{
  display: flex;
  flex-direction: row;
  text-align: center;
  justify-content: space-around;
  margin-top: 60px;
  padding-top: 30px;
  background: green;
  border-radius: 3px;
  box-shadow: 1px 1px 2px 2px;
  color: white;
}
/*media for the responsive web design*/
@media(max-width: 800px){
  header{
    justify-content: space-around;
    align-items: center;
  }
}

```

Figure 11 Css code showing snippet of responsive web design

In Fig.12, the css code circled above is the responsive web design which is used to enable web pages to viewed on various devices and screen sizes e.g. phones, computers, and iPad, with the aim to ensure satisfaction and usability.

```

1  header{
2    display: flex;
3    position:fixed;
4    top: 0;
5    left: 0;
6    z-index: 2;
7    flex-direction: column;
8    text-align: center;
9    background: green;
10   border-radius: 3px;
11   box-shadow: 1px 1px 2px 2px;
12   width:100%;
13 }
14 .background{
15   display: flex;
16   flex-direction: row;
17   text-align: center;
18   margin-top:10%;
19 }
20 .heading{
21   display: flex;
22   flex-direction:row;
23   padding-top: 20px;
24   padding-left: 10px;
25 }
26 .heading a{
27   text-decoration: none;
28   padding-left: 20px;
29   color: white;
30 }
31 nav .navigation{
32   display:block;
33   text-align: right;
34 }
35 .menu a{
36   text-decoration: none;
37   color: black;
38 }
39 .menu a:hover{
40   color: white;
41 }
42 .navigation2{
43   height: 30px;
44   width: 100%;
45   background: green;
46   margin-top: 20px;
47   text-align: center;
48 }
49 .navigation2 .menu2{
50   display: block;
51 }
52 .navigation2 .menu2 a{
53   width: 60px;
54   text-decoration: none;
55   color: black;
56   font: bold;
57 }
58
59 .nav{
60   width: 10px;
61   padding: 20px;
62 }
63 .dnav{
64   width: 10px;
65   padding: 20px;
66 }
67 .navigation2 .menu2 a:hover{
68   padding:20px;
69   color: white;
70 }
71 main{
72   text-align: center;
73   margin: auto;
74   padding-bottom: 20px;
75   padding-top: 20px;
76   font-size: 30px;
77   width: 50%;
78   z-index: 1;
79 }
80 .main{
81   display: block;
82   width: 70vw;
83   height: 40vh;
84   text-align: center;
85   align-items: center
86 }
87 footer{
88   display: flex;
89   flex-direction: row;
90   text-align: center;
91   justify-content: space-around;
92   margin-top: 60px;
93   padding-top: 30px;
94   background: green;
95   border-radius: 3px;
96   box-shadow: 1px 1px 2px 2px;
97   color: white;
98 }
99 /*code for the responsive web design*/
100 @media(max-width: 800px){
101
102   header{
103     justify-content: space-around;
104     align-items: center;
105   }
106   .background{
107     margin-top:170px;
108   }
109 }
110 @media(max-height: 800px){
111
112   .background{
113     margin-top:170px;
114   }
115 }

```

Figure 12 Css code style 2 for other pages design

In Fig.13, in css style 2, all the classes with the display of grid box were removed because the corresponding html file doesn't have the appropriate tags to match them. This is the one of the differences between style 1 css and style 2 css. Another difference is an added responsive web design css code which is highlighted with the yellow circle, indicating the maximum height for the web page to reach before the changes in the class background takes effect.



Figure 13 Responsive web design for the mobile phone and iPad screen

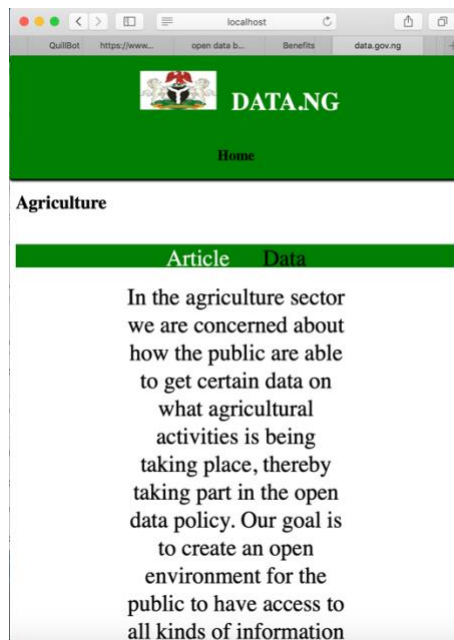


Figure 14 Responsive web site display in mobile phone and tab screen

4.2 Backend Design

The backend scripting language is used for maintaining the functionality of the web application behind the scene. This includes the database which are stored in the server keeping all the data relating to the web site or web page, creating a connection between the web and the database.

4.2.1 Data & Data sources

Data is a unique piece of information, numbers, and characters that is processed in a special way. Data sources can be one of the first locations where data is created or gotten from. The data sources could be in form of database, file, scraped web data, and live measurement from physical devices which are present over the internet. We have two types of data sources which are machine data sources and file data sources. According to Stacey.M, (2019) *“Machine data sources have names defined by users, must ride on the machine that is ingesting data, and cannot be easily shared, while File data sources contain all of the connection information inside a single, shareable, computer file.”*. The transportation of data can be done due the different network protocols available from websites and other services e.g. File Transfer Protocol (FTP) and Hyper Text Transfer Protocol (HTTP).

In this project the sources of data for the different categories outline in the home page of data.gov.ng web application is as follows:

- Agriculture - <https://fmard.gov.ng>
- Education - <http://education.gov.ng>
- Finance - <https://knoema.com/atlas/sources/FMFNG?topic=Nigeria>
- Health - <http://ghdx.healthdata.org/organizations/federal-ministry-health-nigeria>
- Power - <http://www.power.gov.ng>

4.2.2 Database ER Diagram

In this section the database ER (entity-relationship) diagram would be explained and displayed, specifying relationships which exist among entities and the composition of entity types.

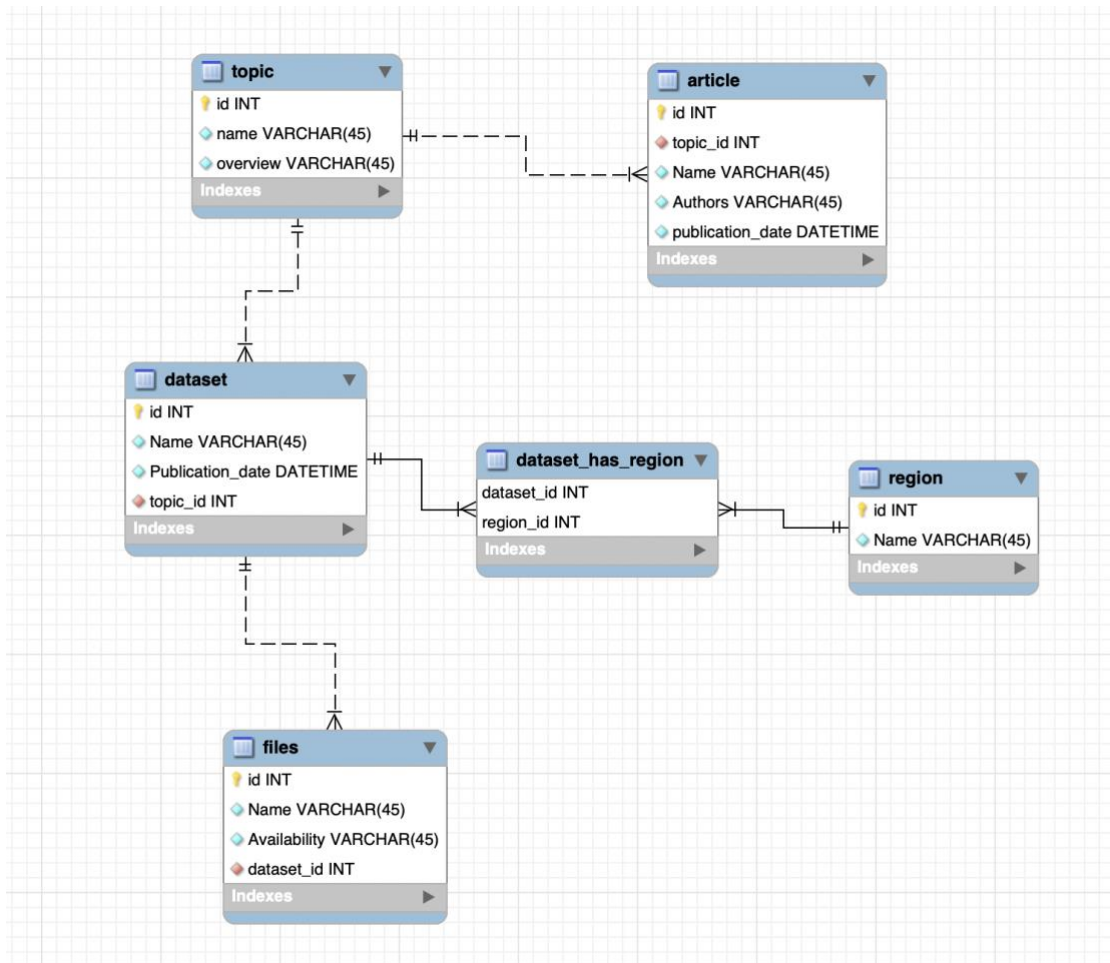


Figure 15 data.gov.ng database ER diagram

Use Tool: MySQL Workbench

In Fig.16, the diagram above shows different entities that are connected with each other creating relationships between them. The entities described are topic, article, dataset, dataset_has_region, region, and files, within this entity are foreign keys which relate them together. The foreign key is identified through the primary key of one entity table used in another entity table causing the relationship between those tables to be established. Within these entities we have attributes such as id, the primary key, name with data types and length “varchar (45)”, and data with the data type “DATE”, all this make up the database ER diagram for *data.gov.ng*.

4.2.3 Server – Xampp 7.4 & phpMyAdmin

In this section the offline server xampp 7.4 which is used to test and deploy web sites under development and phpMyAdmin which is used to create and administrate a database

and its tables using MySQL were the leading tools used.

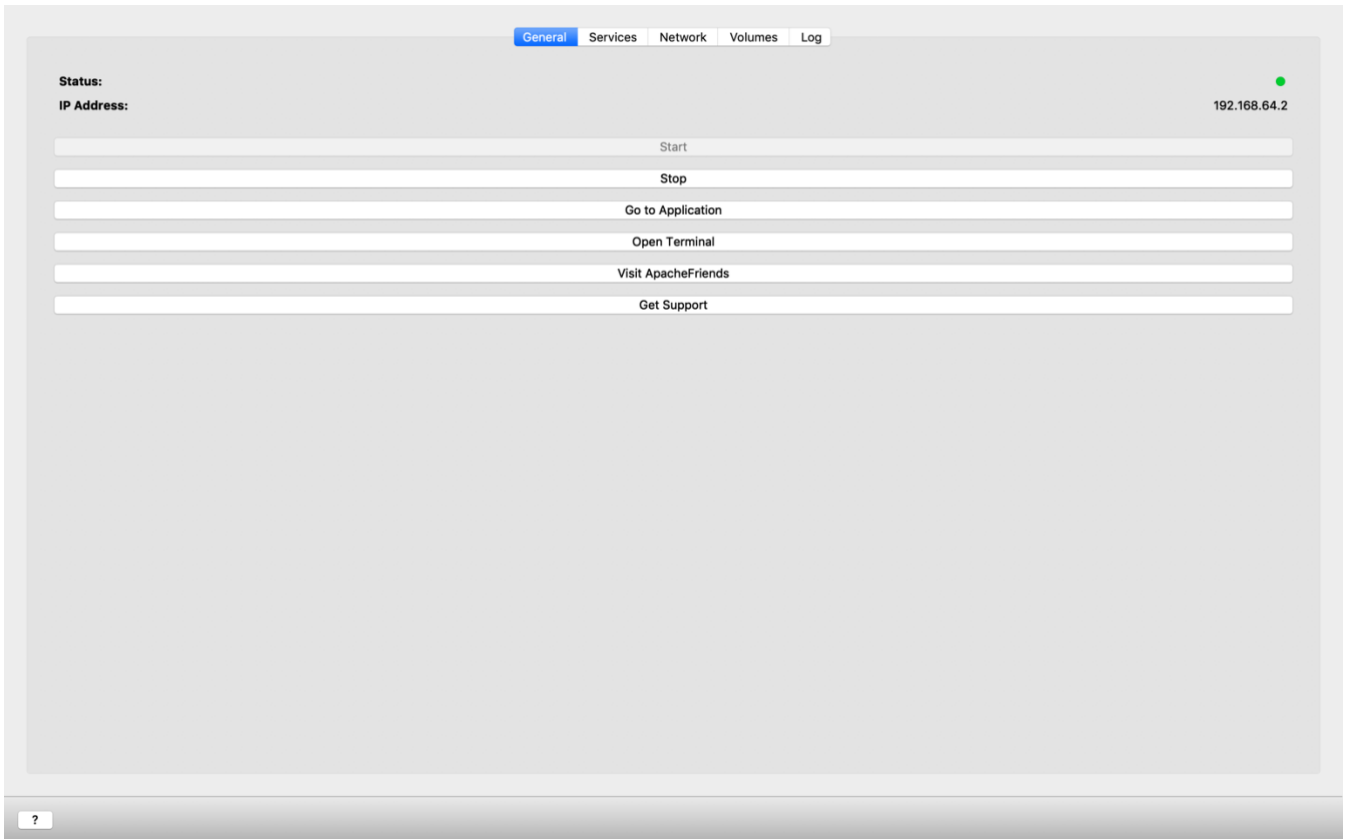


Figure 16 Default page of Xampp 7.4

In Fig.17, the default page of xampp 7.4 shown indicate how the server is being operated, showing its current status to know if its running or not, with its IP (Internet protocol) address identified. On the default page we are able to start and stop the server from running; enabling us as administrators to control what happens on the server while access to the application is granted which enables the testing and deployment web sites under development.

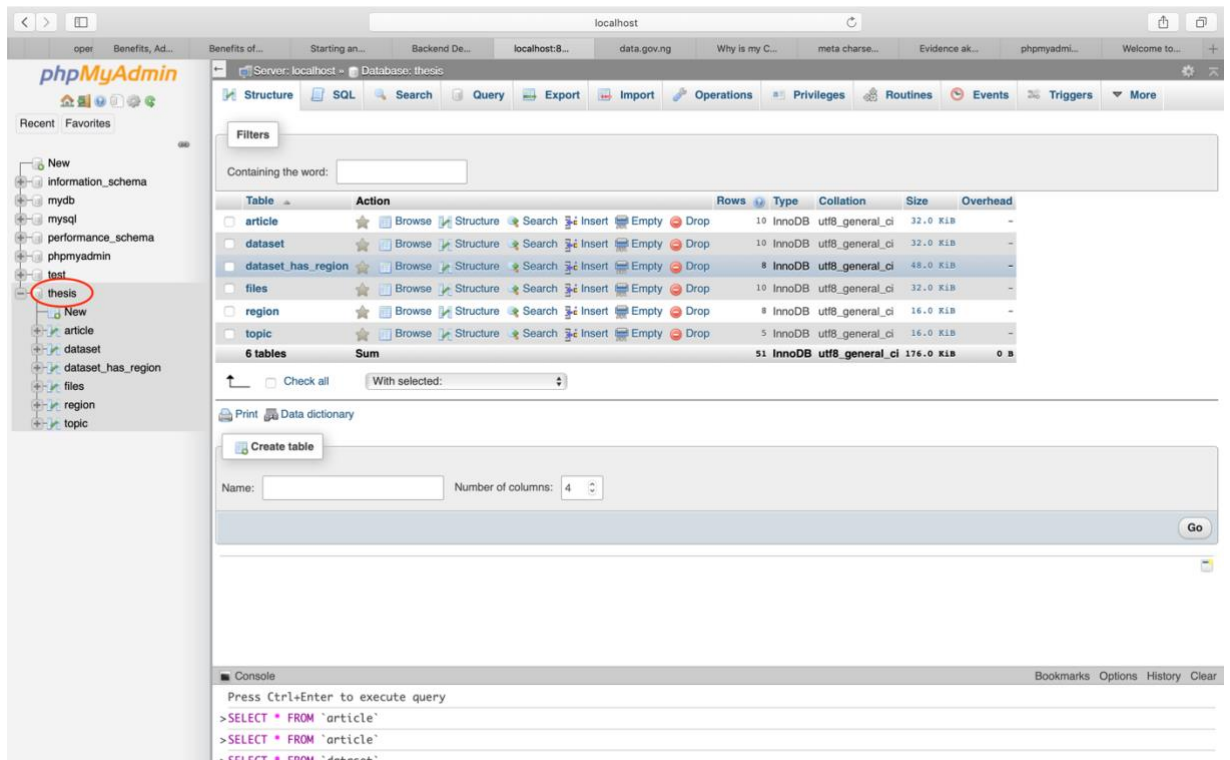


Figure 17 phpMyAdmin tool (thesis)

In Fig.18, the phpMyAdmin software tool is used to create and administrate a database and its tables using MySQL. The thesis highlighted in red is the database and within it we have all the tables listed which is the manifestation of the relationships and the connection shown on the database ER diagram.

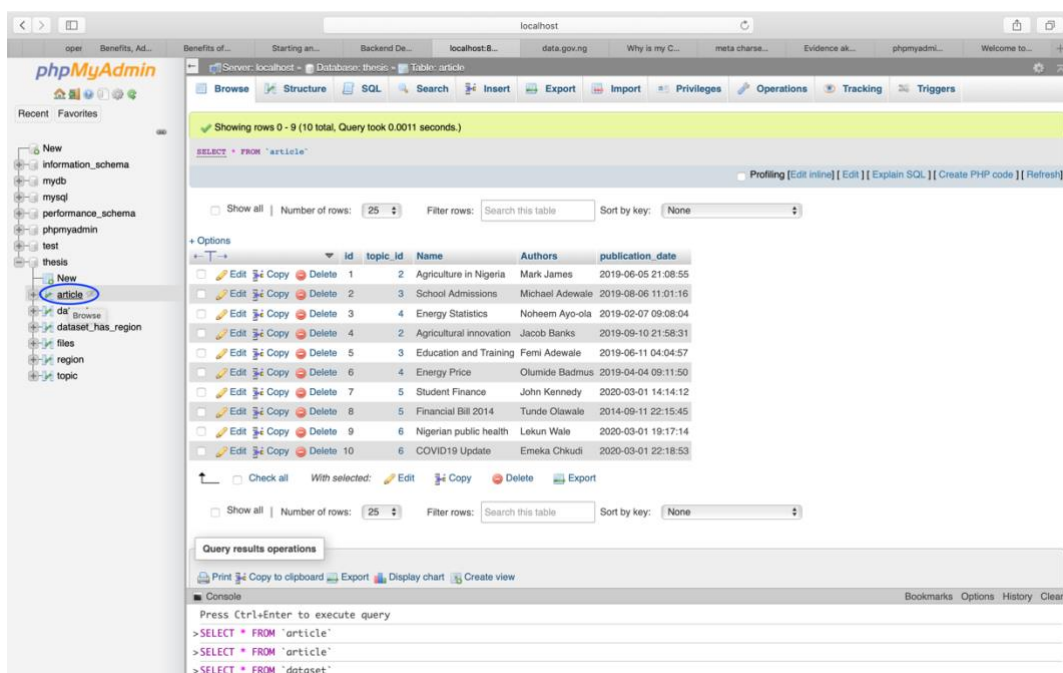


Figure 18 phpMyAdmin too (article)

In Fig.19, in phpMyAdmin the article highlighted in blue circle, is a table within the thesis database, same apply to the rest of the tables topic, region, flies, dataset_has_region, dataset and article. Each of these tables have data assigned to them which would reflect on the web site allowing the administrator to manage the data in the database.

4.2.4 PHP Codes

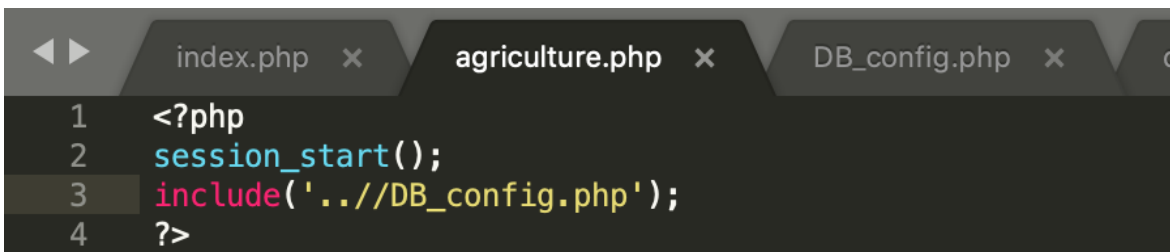
In this section, the PHP codes would be displayed showing its connection to both the html and database.



```
1 <?php
2
3 $db = mysqli_connect("localhost", "root", "", "thesis") or die(mysqli_error($db));
4
5 ?>
```

Figure 19 PHP script to connect to the database named thesis

In Fig.20, the PHP script is connected to the database named thesis located in phpMyAdmin software tool used to manage the data in the database.



```
1 <?php
2 session_start();
3 include('../DB_config.php');
4 ?>
```

Figure 20 PHP code connecting to the database

In Fig.21, the PHP code at the beginning of the html is connected to the database using db_config.php script.

4.3 Use case diagram

Use case diagram is a UML-type functional type model that is mostly used to evaluate various processes. Its helps users to show different categories of functions in the system and how those functions interact with the system. The used case diagram is used to collect a usage condition of a system, and one of them is recognizing functions and how they interact with roles. The use diagram is made up of 4 different types identified as actor, use case, system, and package.

For the *data.gov.ng* web application which was developed, actor and use case are going to be main use case diagram, used to describe the how the web application functions. Actor is known as any entity performing a role while Use case is known as an action in the system. The use case diagram shows how the data is collected through research done mostly from government agencies. Data collected would then be taken by the administrator to analyse, maintain the server before uploading the data.

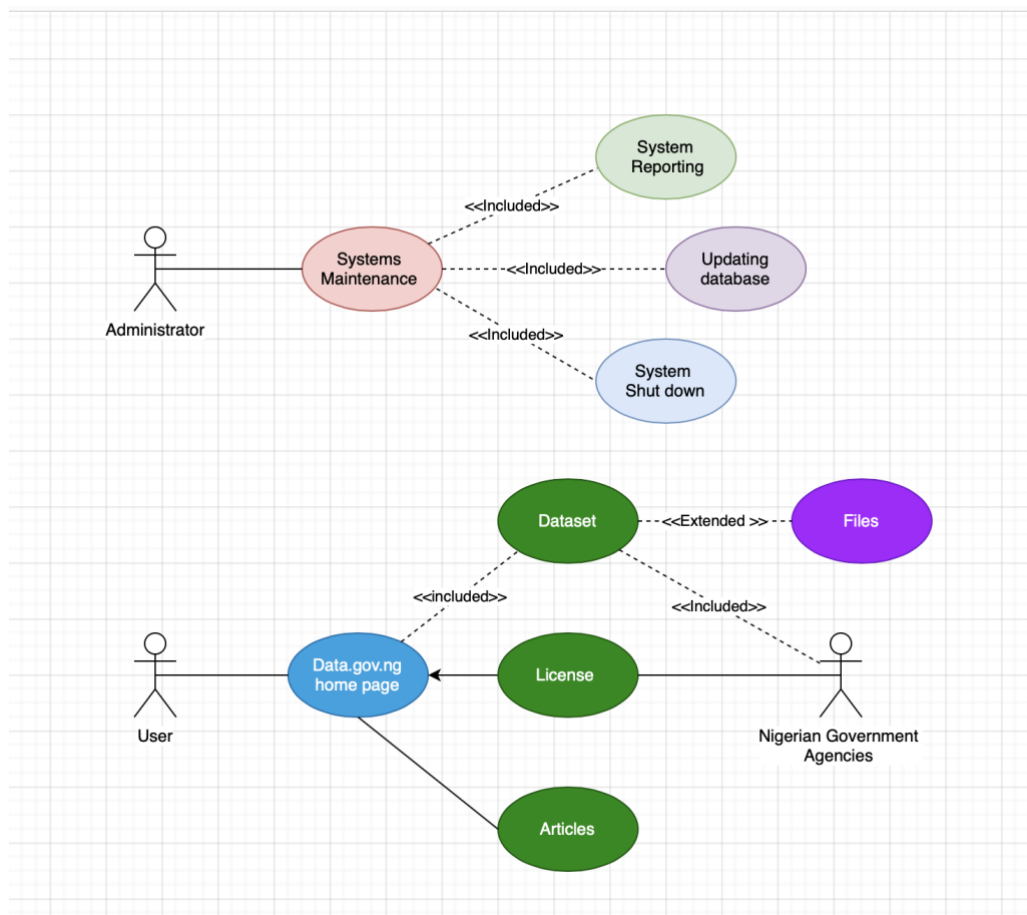


Figure 21 Data.gov.ng Use Case Diagram

Use tools: DrawIO

5 Results and Discussion

In this thesis the overview of open data in Nigeria was provided, focusing on how it was being implemented in Nigeria. The review on open government in Nigeria was done, allowing concept to be known on how the government manages and makes data available. Additionally, the impact and usefulness of open government data in our present day, mainly the political system will be explained using the example of the web application, as it serves as an open platform holding data. Open government is viewed as an opportunity to engage the public in political activities. With the current rate at which open data is being implemented around the world aligning with the system, it is likely to have a continuous growth as the world changes leading to greater innovations and a better relationship between the citizens and the government.

5.1 Web Application Comparison

Data.gov.ng is a web application that allows the access to certain dataset on different sectors controlled by the government. This is a national web application for the Nigerian government where third parties e.g. citizens and business personnel can use datasets on agriculture, education, finance, health, and power from one platform. Unlike other dataset platforms in Nigeria having dataset on different platform, this is the only National web application which has all dataset of each sector in one platform. Although compared to web application like *data.gov*, and *data.gov.uk* it still has a lot of improvement needed as it is still a prototype. The SWOT analysis would be used to elaborate the comparison done based on the research.

5.1.1 SWOT Analysis

The SWOT analysis will be used in this thesis for *data.gov.ng*, explaining its strength (S) and weakness(W) dealing with internal issues of the web application and opportunities (O) and threats (T) dealing with external issues of the web application. When building an application, it is best advised to study issues affecting any application being developed, as it is going to be utilized by many users.

Strength

- First National web application with all dataset of each sector
- Open Data support from Government

- Platform availability on web browser
- Accurate datasets from the Government

Weakness

- Not able to search for data with a search bar
- Not available on for mobile application
- Unable to display database content presently

Opportunities

- Opens an avenue for researchers to benefit helping in providing readily available data
- Business owners can have accessing to information regards their respective field of interest
- Ability to create data management roles as the database grows
- Smoothing's the relationship between the government and the public

Threats

- Cyber security breach
- Change in government policy
- Data uncertainties, which would question on the dataset by the users

6 Conclusion

The research made in this study was focused open data, open data Nigeria and open government data Nigeria leading to the development of a prototype application which would consist of open dataset from the Nigerian open government. The application developed is very useful and helpful enabling users to have access to some dataset available. Users have the chance to explore and interact with web application, there by viewing different data analysis or updates on serval sectors in the application. The inspiration was gotten from the United States and United Kingdom's open government data portal which are *data.gov*, and *data.gov.uk*.

Regarding the weakness of the web application, it recommended that future work on this topic should be focused on eliminating the identified weakness of this prototype web application in order to improve and better the users experience. We also recommend that government should improve data collection, so as to make dataset more available for third parties to exchange and use for their various purposes.

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