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Final Project Report (FRP)

Developing an Online Shopping Site Using WordPress Content Management System

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DECLARATION

This report is submitted as part of the requirement for the degree of Information Technology at the University of Hertfordshire (UH). It is my own work except where indicated in the report.

I do not use human participants in my project.

I hereby give permission for the report may be made available on the university website provided the source is acknowledged.

ABSTRACT

In today's era, websites are one of the most convenient ways in which organizations and businesses present and share information to a large number of people all around the world and facilitate the process of buying and selling products and services online. However, there are little or no such online platforms in Sierra Leone and as such, the project idea came to mind to develop one.

The main aim of the project is to develop a website that can facilitate the buying and selling of grocery products and toiletries online aiming at the populace of Sierra Leone. The research was undertaken on various software and applications that are used to develop a website. A decision was reached to develop a site using a Content Management System application (WordPress). The website is powered by WordPress using Deli theme and WooCommerce plugins and other related plugins. Most of the system's requirement functionalities were developed and work out successfully as planned even though some functionality requirements were not fully met but there are plans for future development where all necessary actions will be undertaken to improve on the work that has been done so far.

ACKNOWLEDGEMENT

To the glory of God Almighty who gave me the strength and wisdom to undertake this project and the entire program. Thanks and appreciation to Mr. Eric Jukes, to my supervisor, for his support and guidance throughout the process. Thanks to my darling wife Mrs. Kadijah Adebowale John and our beloved daughter Mariam John and Son Desmond Israel Brian John for their support in making this study reality and success. I am also extending thanks and appreciation to the rest of my family and friends for their support.

CONTENTS

LIST OF FIGURES

LIST OF TABLES

1.0 INTRODUCTION AND BACKGROUND

1.1 Chapter Overview

The main aim of the project is to develop a website that facilitates the buying and selling of grocery products in Sierra Leone. This chapter introduces the dissertation, provides the project objective, a brief background on the project idea. The chapter also discusses the history of the development of the internet and the World Wide Web, highlights the emergence and roles of information technology in African particularly in the Sierra Leonean context, the emergence of E-commerce and online shopping, challenges faced with E-commerce. Key software required to develop the intended website was also introduced in this chapter. This introductory chapter also provides an outline of the other chapters that make up the whole report.

1.2 Project Background

Over the last few decades, there has been an enormous rise in the use of the World Wide Web for several reasons. This also comes with vast growth in its applications making users of the internet realize the benefit gained and the importance of a globally interconnected world bringing businesses closer to the people, making the world seem like a global village.

In today's era, websites are one of the most convenient ways in which organizations and businesses present and share information with a large number of people all around the world. The Web through web-browsers is mostly the means used to pass on this information on a webpage. Nowadays, almost all organizations and businesses have their website with their mission, objectives, and the types of services and products they offer.
Electronic commerce is a process of buying and selling goods and services online or via the internet can easily be done through a website making website development an important driver to fast-track e-commerce processes.

1.3 Project Aim

The overall aim of this project is to develop and create an E-Commerce website that sells grocery products online targeting the population of Sierra Leone. Sierra Leone is a small developing country that is situated in the western region of Africa and it capital city is Freetown (See appendix 1 and 2 for map) The website to be developed is intended to enable users or customers to make orders online and pay online using debit or credit card and also with an option to pay cash on delivery. The project will be a pilot which will serve as a base for the development of a sophisticated site that will be hosted externally and large ranges of products that will cater for other countries within the West African Region that have similar cultural background and economic attribute such as The Gambia, Guinea, and Liberia. The specific aims of this project are listed below.

- Create a website that will enable customers to order and make payment online
- Find suitable software and applications to run the site
- Secure account creation for users
- Allow users to place orders or save items in Cart

1.4 Evolution of the World Wide Web

The World Wide Web was introduced by Tim Berners-Lee in 1989 and immense progress has been made since then with massive technological advancement (Khanzode, A and Sarode, D, 2016). Today, the web through website creation has become a portal through which most electronic transactions are done (Kowtha, N.R and Choon, T.W, 2001).

The development of the web has played a significant role in the creation of innovative technologies and redefining how individuals, organizations and society organize, communicate and collaborate with one another (Khanzode, A and Sarode, D, 2016).

Information and Communication Technology (ICT) plays an important role in enabling the achievement of developmental objectives of nations most especially developing nations. Over the past decade, many developing African nations have taken advantage of the opportunities and prospects provided by ICT and are putting in place ICT-enabled implementation strategies

to support socio-economic development efforts. Sierra Leone is no exception to this. Sierra Leone is a developing country that is located in West Africa and is among the countries that are recently exposed to advanced technologies.

Information and communication technology advancement and the emergence of the internet brought changes in the way businesses conduct their activities significantly, enabling new ways of conducting business through the web often referred to as Electronic Commerce (Zwass, 2003). Electronic Commerce involves buying and selling goods and services through an electronic system such as the internet or other networks. Business activities are triggered through this mode by electronic funds transfer, data interchange, online transaction processing, etc. Complete online shopping transactions involve several actions such as customers searching for desired products online, choosing and placing orders online, undertaking online payment and finally product delivery (Gabriel et al., 2016). Online suppliers, therefore, have the responsibility to ensure that the above processes operate smoothly.

While online retailers in developed countries have gone a long way to establish well-organized E-Commerce systems, those in developing countries are faced with technological challenges, Sierra Leone is among them. At the moment, there are little or no online retailers in Sierra Leone due to these challenges and as such, there is a gap (This is further discussed in section 2.7 of this report).

This project shall fill in the gap and serve as a motivating factor for retailers in Sierra Leone to take up this challenge. An online shopping website shall be developed that offers grocery products, toiletries and locally made food recipes. The initial phase of the website is to cater to customers in Sierra Leone and further roll out to more countries. After several pieces researches, it was realized that upon successful completion of this project, it will be one of the few online websites that offers the above range of products and shall be welcomed by many potential customers.

1.5 Software and hardware

WordPress content management system is the application that is going to be used to create this website. WordPress is written in PHP programing language and as such, no coding is going to be required in creating the site. A suitable theme and plugins shall be downloaded and installed to enable key functions to come alive.

The only hardware that is needed for this project is a Personal Computer and an external drive to back up files.

1.6 Outline of upcoming chapters in the Report

Chapter 2: Research Literature

This chapter focuses on the discussion of secondary research conducted to gain full knowledge of the problem. The knowledge gained will help in defining the methodology and approach to be used. A review of various literatures surrounding the internet, the World Wide Web, E-commerce and online shopping, software, ICT infrastructural challenges in Sierra Leone and other related areas are highlighted in this chapter.

Chapter 3: Legal, Ethical, Social, Professional (LESP) and Risk Issues

Chapter 3 discusses the LESP issues including risk and risk management of the project.

Chapter 4: Project Methodology and Requirement Analysis

Basically, this chapter discussed the project methodology used, and gives an analysis of the project requirements and specification. The chapter serves as a basis of the design and blueprint for the project.

Chapter 5: Project Design

This chapter gives an account of the project design, methodology used and their justifications. The chapter also looked at the HCI issues and how they influenced the project design.

Chapter 6: Software Development Implementation and Testing

This chapter discusses the development and implementation phase of the project.

Chapter 7: Conclusion and Evaluation

This chapter gives an account of the project evaluation of the whole project, draws conclusions and highlight key lessons learned and further development. This is followed by the reference list and appendices that back up this research.

2.0 Research Literature

2.1 Overview

This chapter focused on the discussion of secondary research conducted to gain full knowledge of the problem. The knowledge gained helped in defining the methodology and approach used. A review of various literature surrounding the internet, the World Wide Web, E-commerce and online shopping, software, ICT infrastructural challenges in Sierra Leone and other related areas were undertaken and these are highlighted in the sections below. Information and data presented in the literature review were gathered through secondary research from scholarly articles, journals, published books, and reports and official websites, etc.

2.2 The World Wide Web and the Internet

The Information and Communication Technology world has been revolutionized with the advent of the internet. It is no denying that the invention of the telegraph, radio, computers, telephones etc. played a great role in setting the pace towards this unprecedented integration of capabilities. The internet serves as a mechanism through which information is disseminated, a medium of interaction and collaboration between individuals, organizations and the society at large irrespective of the location (Leiner, 2009).

The World Wide Web which was introduced by Tim Berners-Lee in 1989 has played a significant role in today's technology and since its invention immense progress has been made with massive technological advancement (Khanzode and Sarode, 2016). Today, the web through website creation has become a portal through which most electronic transactions are done (Kowtha, N.R and Choon, T.W, 2001).

2.3 Web Development

As the name implies, this is the process involved in developing and creating a website that can be used through the internet or intranet. This process can range from developing a simple static page to a complex and sophisticated website. Web design and development processes range from simple to complex depending on the desired requirement and objective, and it involves working in stages to make it work effectively (Panta, 2009).

A web browser is a means of disseminating information on a webpage and serves as a static building block of website whose basic architecture is written in programming languages.

Web technologies are evolving extremely fast creating room for sophisticated tools and software to be deployed and facilitate simple to complex interactions between humans, computers or networks. The cycle of life of a website also is extremely fast, requiring the maintenance rate to be higher when compared with other software products, more time and

resources needed to be deployed in ensuring that the site's quality does not reduce (Hussain, 2014).

The huge growth and technological advancement of World Wide Web applications, their multimedia facets such as text combination, hypertext, animations, images, sounds, videos all have brought about the necessity for various methodologies for developing such applications.
The first impression indeed goes a long way and as such website being a communication medium with the web must be compelling, efficient and effective online application system (Jarrar, 2002). It is therefore important to note that a clear understanding of what contributes to an efficient and effective online presence which aligns with the appropriate methodological design and technical functionality is key. The design and methodological aspect of the website is discussed in chapter four.
During the design phase and throughout the development cycle, it is important to take cognizance of certain characteristics which without might be difficult to drive effectiveness, reliability, trust, or confidence among users (Wang & Emurian, 2005).

2.4 Website Characteristics Trust and Distrust

The characteristics of websites are very important determinant factors for website reliability, trust and confidence (Shankar et., al 2002). Seckler et al (2015) suggested that upon visitation of a website, most users explore the site first before undertaking any transaction. Website characteristics such as customer reviews, content management play a critical role in this. Users' perception of the quality of a website can be driven by varieties of technological issues including easy navigation, user-friendliness, user customization, easy accessibility, Technological third-party confidentiality, security etc. these have been found to be important characteristic that can influence trust or distrust, reliability and confidence among users (Perdue, 2002).

Lack of trust issues has been identified repeatedly as one of the major barriers for people to engage in E-commerce or online shopping which may involve transactions where personal and financial information might be submitted thus the future of online shopping and E-commerce is tenuous without a general trust environment (Wang and Emurian, 2005).

2.5 Some useful Web Applications and Technologies

In as much as there have been some enormous developments in technological advancement, the fundamental principles on which the World Wide Web anchors remains unchanged. Fundamentally, the WWW is based on client-server computing. Additional concepts were introduced; the URL, HTML, HTTP, and DHTML etc. these have proven to be powerful tools in web development and implementation (Jazayeri, 2007). Each of the aforementioned

applications will be briefly discussed. Additionally, there are whole lots of programming to write codes which can be executed by the web browser such as JavaScript and PHP etc.

2.5.1 Uniform Resource Locator (URL): is the unique address of a particular resource on the web (resources are not only limited to documents)

2.5.2 HyperText Markup Language (HTML): Web documents are written in HTML which can also be supported through applications such as cascading style sheets and scripting languages. HTML is a mark-up language used for identifying and describing various components of web documents such as lists, headings and paragraphs etc. thus indicating the document's underlying structure, HTML5 being the latest version (J. N Robbins, 2012).

2.5.3 Dynamic HyperText Markup Language (DHTML): Having gone through a series of revolutionary stages, the transformational improvement of simple web pages showing just simple text documents, allowing limited user interactive capabilities, the introduction of the DHMTL brings with it graphic support which makes it now possible create large interactive web pages with advanced graphics and animations (Mikkonen and Taivalsaari, 2007).

2.5.4 Hypertext Preprocessor (PHP): PHP is one of the popularly used programming languages for web development, it language is highly dynamic giving programmers and developers a vast amount of flexibility (Hills et al., 2013).PHP can be used to connect web pages with database and performs lots of functions; phpMyAdmin used to perform most administrative task like creating a database, adding and editing account users, restricting users on-site, counts site visitors, and running queries etc. (phpMyAdmin 5.2.0, 2021). The latest version of PHP is version 8.0.3 released in early March 2021.

2.5.5 Cascading Style Sheet (CSS): the CSS describes how website content should look like meaning that the font size, page layout, colors, background images line spacing etc. are controlled by CSS. It allows web developers to specify the visual styling and web presentation and generally defines how web pages are displayed (Wolf and Henley, 2017).

2.5.6 Structured Query Language (SQL): is a software tool used to communicate with databases, is a standard language for a relational database management system, MySQL is used to perform tasks such as retrieving and updating data from a database.

2.5.7 Java: This is a programming language that is widely used by web developers as a client-side and as a server-side programing language to create web applications. Java programing is well secure and architecturally neutral, can be used and run in any operating system (Farrell, 2016).

2.6 E-Commerce and Online Shopping

The level of internet usage and connectivity has been on the dramatic increase for so many years now bringing with it the convenience of obtaining information, engaging in economic and social activities and online communities. Online shopping is one of the most popular internet activities that people embark on. For example, people buy and sell online, make reservations for hotel, flight even to book for the gym can be done online.
The introduction of E-Commerce paves way for people to participate in online shopping activities, through the business to Consumer (B2C) level of e-commerce buyers or consumers uses the internet to search, review prices of products, select, place orders and make payment for product and services. All this may happen in their comfort zone (Sinha, 2010).

However, in as much as the idea of online shopping brings with it numerous advantages and it also has it disadvantages. It is also worth noting that there is a digital divide with some part of the world having access to the internet, information and communication technologies while other parts do not (Compaine, 2001). This may be as a result of technological infrastructural challenges which are true for most developing countries and Sierra Leone is no exception.

2.7 ICT Infrastructural Challenges in Sierra Leone

While online retailers in developed countries have gone a long way to establish well-organized E-Commerce systems, those in developing countries are faced with technological challenges, as I mentioned earlier. At the moment, there are little or no online retailers in Sierra Leone; one of the major causes of this is as a result of the level of computer literacy and exposure to advanced technologies among citizens especially those outside major cities. Retailers in Sierra Leone do not have the confidence to venture into online shopping activities, one because it is uncertain whether or not they will attract enough customers that will increase sales and secondly lack of technologies to facilitate online transactions these challenges have created a digital divide in Sierra Leone as all the benefits derived from some of these technologies are not realized. This project aims to reduce some digital divide by filling in the gap and to serve as a motivating factor for other retailers and businesses in Sierra Leone to take up this challenge.

3.0 LEGAL, ETHICAL, SOCIAL, PROFESSIONAL AND RISK ISSUES

3.1 Chapter overview

This chapter looked at the legal, ethical, social and professional (LESP) issues that are related to developing a website. The chapter also looked at risks that may likely occur during the development and implementation process and how these risks could be mitigated.

3.2 Legal Issues

One of the legal issues that are related to the conduct of technological projects especially if involving human participation had raised concerns to policy and lawyer makers. If care is not taken there may be some legal issues such as data protection. However, there will be no involvement of human participation in the project. As I mentioned in data protection, there is are numerous data protection Acts depending on the country, the project is developed at this initial stage for users in Sierra Leone and hopefully be rolled out to other countries once the pilot phase is successful. However, as I am studying at a UK university, a high premium will be considered with regard to the General Data Protection Regulation (GDPR). This project shall make use of basic and general users' information to create user accounts which may be discretional depending on the activity that the user may want to undertake on the website. Information required may not go against any data Act and shall be used only for the purpose intended (better user experience, feedback and update on product purchase); all information obtained will be treated with utmost care and confidentiality.

Due care shall be taken to adhere to all legal and regulatory frameworks that are directly and indirectly related to the project. However, no active user information will be used at this point (This will be for future development).

3.3 Ethical Issues

This project will not make use of human participants for the primary research. No questionnaires will be administered neither shall any interview be conducted. If at all human participation will be sourced, which is highly unlikely, the University's policy shall be followed by applying for ethical approval for using human participation. Using human participation involves you ensuring that there is no privacy intrusion, non-breach of confidentiality and also ensures participants are always safeguarded from any possible danger.

3.4 Social Issues: Social factors have a lot to influence the success or failure of most projects. Social issues include individual, group, and organizational culture and behavior that are affected by the project. The Social issue envisaged for this project might be the reaction of people due to change in the usual way of doing business. As mentioned in earlier chapters, Sierra Leone is a developing African Country and it has only recently been exposed to technological advancement and there are little or no online stores that people can be able to buy and sell online. An example of such an issue might be the willingness of customers to purchase items online as most of the populace is computer illiterate. One major mitigating factor for this is to make the website user-friendly, simple to navigate and use appropriate visual design and

display. A major positive impact is that the project may bring with it new ways of doing business which is more unique from the traditional ways. One does not have to come to town to buy items but can do so in the convenience of their homes with the option to collect or for their items to be delivered to their doorsteps.

3.5 Professional Issues:

In the UK, there is a code of conduct for all IT professionals which guides them on professional behaviors and integrity (The British Computer Society BCS 2015). This code of conduct makes reference to competencies, technical ability and prohibits professionals from claiming to have the ability or skills to perform tasks which they do not possess. It is clear from the code that security, integrity and privacy issues should not be taken lightly and be treated with utmost seriousness.

Literature review and secondary research shall be undertaken and the necessity to recognize the work of others is critical. The research will be well referenced, acknowledging all authors whose ideas are used. This project aims to develop and deliver a high-quality website that can work well, which is secure, reliable and user friendly. As an IT professional, all codes of conduct and best practices shall be abide by to avoid intended and unintended damage to users (ACM Code, 2018).

As mentioned earlier, professional codes of conduct shall consistently be followed to ensure that credit is given to all whose works or ideas were used in the project.

It is important to note that for this project, data security and confidentiality are taken seriously. However, this is a personal project and the intention is not to be used as a public domain at this stage. Therefore real data is not going to be utilized as no permission has been sought, fake data shall only be used to test the functionality of the website.

3.6 Risks

According to Chapman and Ward 2003, undertaking any kind of project involves risk and a project without risk is not worth pursuing, accepting some risk is likely to yield a more desirable and acceptable level of benefit for the time and resources committed.

Risk is an important factor that one should think about while undertaking any sort of project. To increase the chances of completing a project, potential risks that may arise need to be identified at an earlier stage of the project planning and devising appropriate countermeasures (Wallacea et al., 2004).

Figure one below shows an example of a 3X3 risk matrix and how it works. The horizontal axis to the left shows the likelihood of the risk occurring and the vertical axis below shows the impact of the risk.

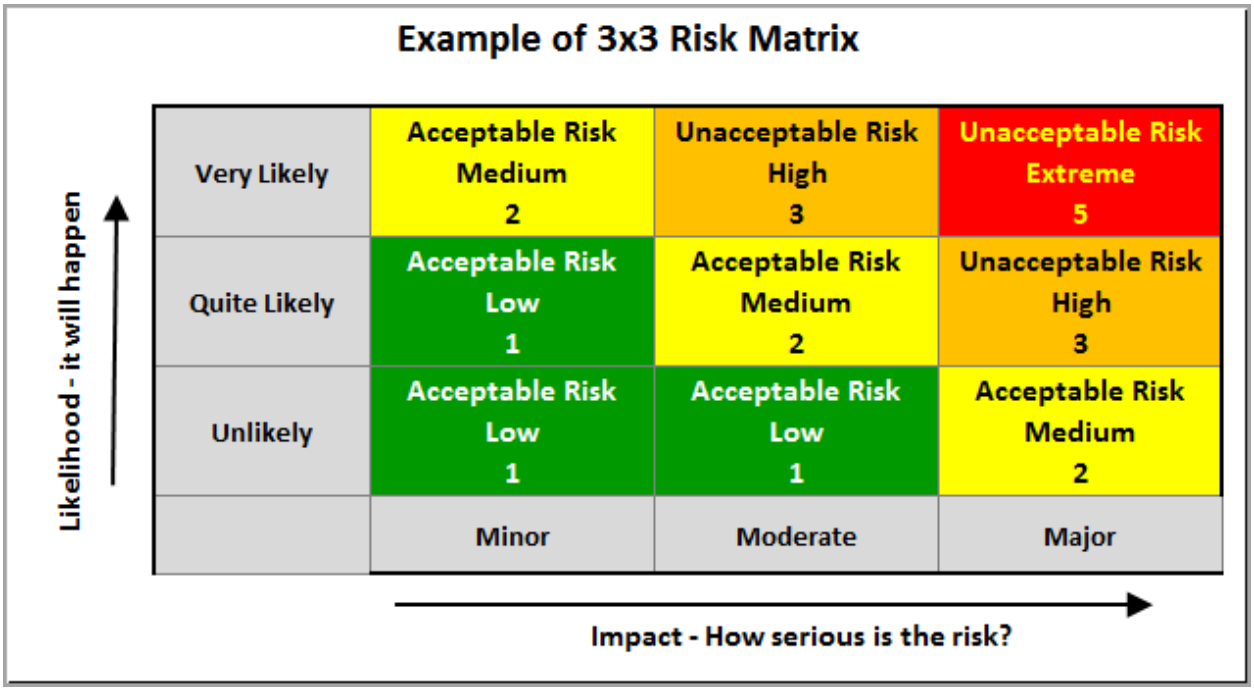


Figure one: Generic risk matrix which can be adopted by any project or organization

Source: https://oac.chris21.com/OAC_ichrisp/Help/ichrisUG/625236.htm

The matrix describes the following:

Table 1: Risk level and Description

Risk Level	Description
1	Low Acceptable Risk
2	Medium/Moderate Acceptable Risk
3	High Unacceptable Risk
5	Extreme Unacceptable Risk

3.6.1 Risk Envisaged

Unavailability of resources such as adequate software to use in the development process can pose a challenge on the timely completion of the project, but however extensive efforts shall be made to exploit all other available resources.

Internet connectivity is also a risk envisaged that is likely to impede the timely completion of the project. The cost of using the internet is high and connectivity issues remain a challenge even with the availability of resources to pay for the service due to weak connectivity infrastructure.

Natural disasters such as floods and otherwise could also be a risk factor that could delay the completion of this project. However, to mitigate this regular backup of files shall be undertaken and the use of other storage facilities shall also be utilized.

Ailment or legal battle can also pose as a risk factor that influence the timely completion of the project. However, much time shall be dedicated to the successful development and completion of the project.

Another risk is that there has been no previous experience in website development and it will be very easy to miss out on some details which may pose a huge challenge to successfully complete the project. If there is no prior experience in undertaking such a project, there is a high tendency that the complexity of the task can be misjudged and implementation becomes an issue that could lead to missing features and functionalities.

In conclusion, time management is also a risk that may arise. Given that it takes time to develop a website especially if it is the very first attempt where there is no prior experience, a lot of time will be consumed to ensure that the pieces are put together to have a successful project outcome. If care is not taken, the time of delivery will not be met. All the risks highlighted above ranges from low to medium and are acceptable and their occurrence is not very likely to happen.

4.0 PROJECT METHODOLOGY AND REQUIREMENT ANALYSIS

4.1 Chapter Overview

This chapter gives a brief account of the project's methodological approach chosen and provides detailed project requirement analysis including functional and non-functional requirements, discusses system design and the methodological approach used with justifications. The chapter also looked at the HCI issues and how they influenced the project design.

4.2 Methodological Approach

There are many project methodologies one can choose from when undertaking a new project but the most commonly used methods for software development are Agile and Waterfall (Dawson, 2009). The waterfall methodology will be a more effective solution for small projects that have well-defined functional requirements that will not change in a short time, while the agile method is the preferred method when it comes to continuous delivery and feedback, updating and improvement. Because this is a small project and there is well-defined functional requirement, the waterfall methodological approach was used. The chapter covers phase one

of the Waterfall Software Development Life Cycle (SDLC) which is the design phase of the Artefact as shown in figure two below.

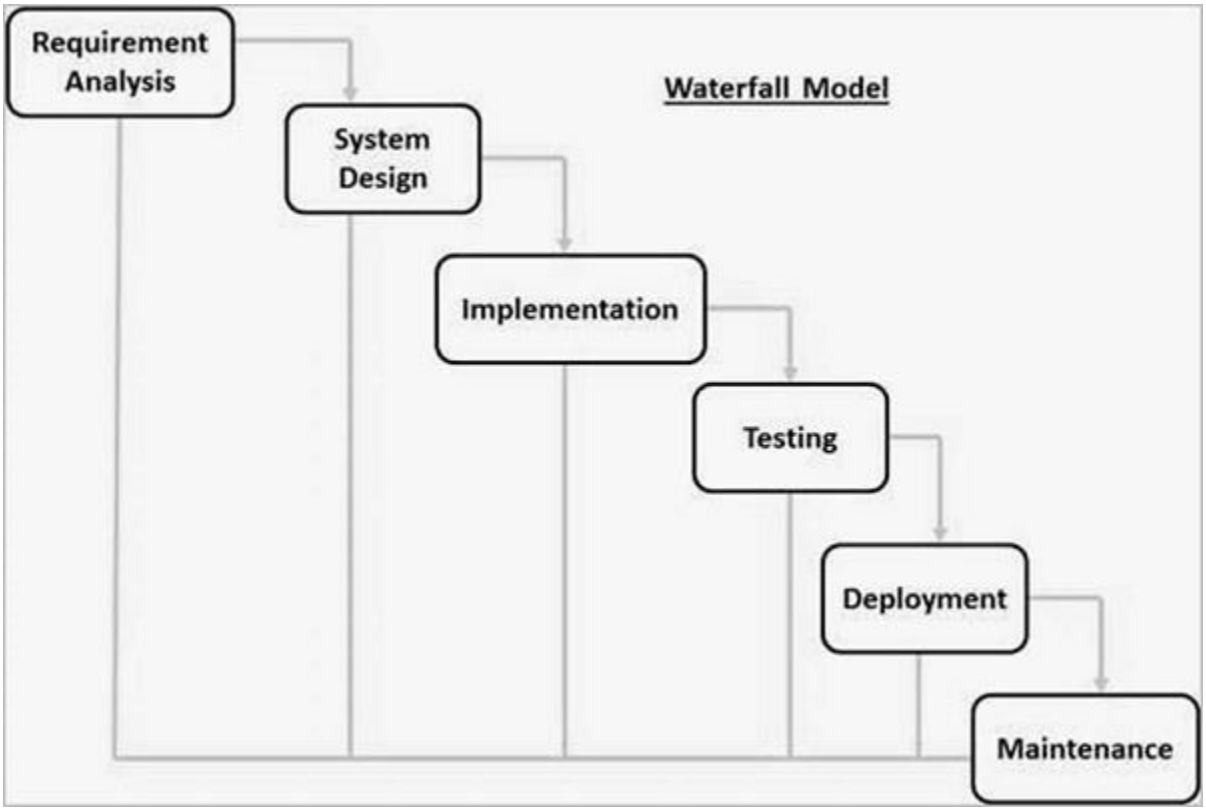


Figure two: Waterfall Model

4.3 System Requirement Analysis

Requirement Analysis is one of the most important phases of the web development process. Its aim is to gather good requirements from sources, stakeholders and it is important for every web development or software project to develop quality products that can satisfy the needs of users (Pandey et al., 2010). To achieve a successful project result, the system requirement of the Artefact needs to be defined clearly and well understood before actual design and execution (Grady, 2010). Upon successful completion of the project it may be used for my personal business and in the future caters to clients upon demand.

4.4 Developing the Requirement Analysis

Before any requirement specifications were devised, some successfully existing online shopping centers were researched on and evaluated such as amazon, eBay, Walmart etc. Even though these are a mega website that deals with millions and millions of customers and suppliers, the idea behind basic online shopping remains the same irrespective of size and their features are

not too different from each other. These features influenced the requirements for the Artefact which are sub-divided into Functional and Non-Functional Requirements discussed below.

4.5 Functional and non-functional Requirements

Usually, the usefulness of any system can be determined by both its functional and non-functional characteristics such as performance, usability, security, speed, flexibility and usability amongst others.

Nevertheless, there has been a one-sided emphasis on functional characteristics of a system even where the functionality may not be used without the necessary non-functional characteristics (Dabbagh and Parizi, 2015). However, irrespective of functionality, the quality of a system must be taken into consideration in the development of any system such as the proposed website for this project.

The table below shows the functional and non-functional requirements of the Artefact. The functional requirements of the Artefact are further divided into Core and Advance functionality.

Table 2: Functional and Nonfunctional Requirements

Functional Requirements		
No	**Requirement**	**Functionality**
1	Site Visit	Core
2	Customer Registration	Core
3	Customer Login/Out	Core
4	Password Recovery	Advanced
5	Changes to Carts	Advanced
6	Add/Delete/Edit product- Administrator	Advanced
7	View product / Product details	core
8	Order/Cancel Order	advance
9	Payment Method	advance
Non-Functional Requirements		
1	Accessibility	
2	User friendly	
3	speed	
4	Security	
5	Reliable	
6	Maintenance-	
7	Compatibility- The system must be compatible with different browsers	

4.6 System Description /Use Case with Use Case Diagram

This online shopping website will enable the vendor to set up an online shop enabling visitors to view the site and register, customers to browse through the shop virtually, view products and products details, add or delete product items in cart, order and make payment either by card or cash upon delivery of items. A system administrator at the back end that can add, remove, edit and update items, approve or reject customer requests.

A use case diagram shows how activities are performed by system users (Klimek and Szwed 2010). The use case diagram in figure three below was developed to indicate the functions of users and administrators of the system; the diagram shows fundamental functions and flow of activities.

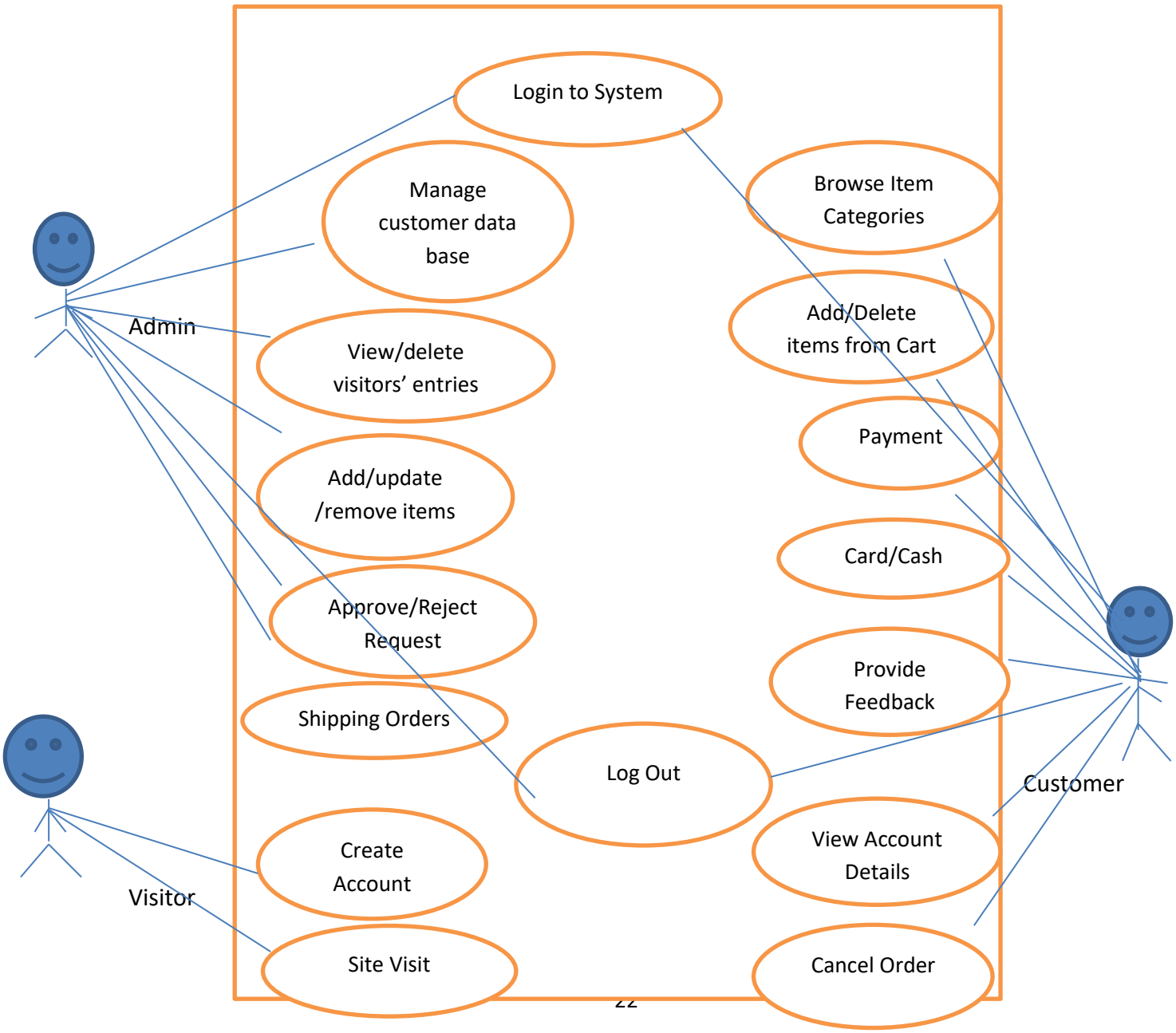


Figure three: Use case Diagram

From the above, we can see that the site contains the necessary functions for an online shopping system where users can be able to manage their accounts, browse through products and place orders. Administrators taking control of the back end of the system by posting news, adding, editing and deleting products.

4.7 Information Architecture

The above use case diagram helped with analyzing how users interact with the system. This serves as a determinant as to which information was needed to be displayed on the site and where to navigate. The structure from the information above was used to develop a site map which assisted with the grouping of pages, illustrates the flow of web pages and contents as shown in Figure four

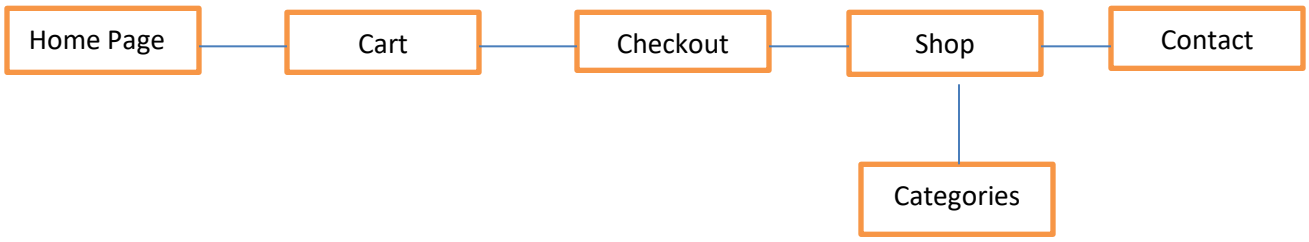


Figure four: Site map

5.0 PROJECT DESIGN

5.1 Chapter Overview

This chapter discusses the project design phase which represents phase two of the waterfall methodology project development life cycle. The chapter discussed the project design idea, interface design and web wireframes, Human-Computer Interaction Issues and how they are addressed.

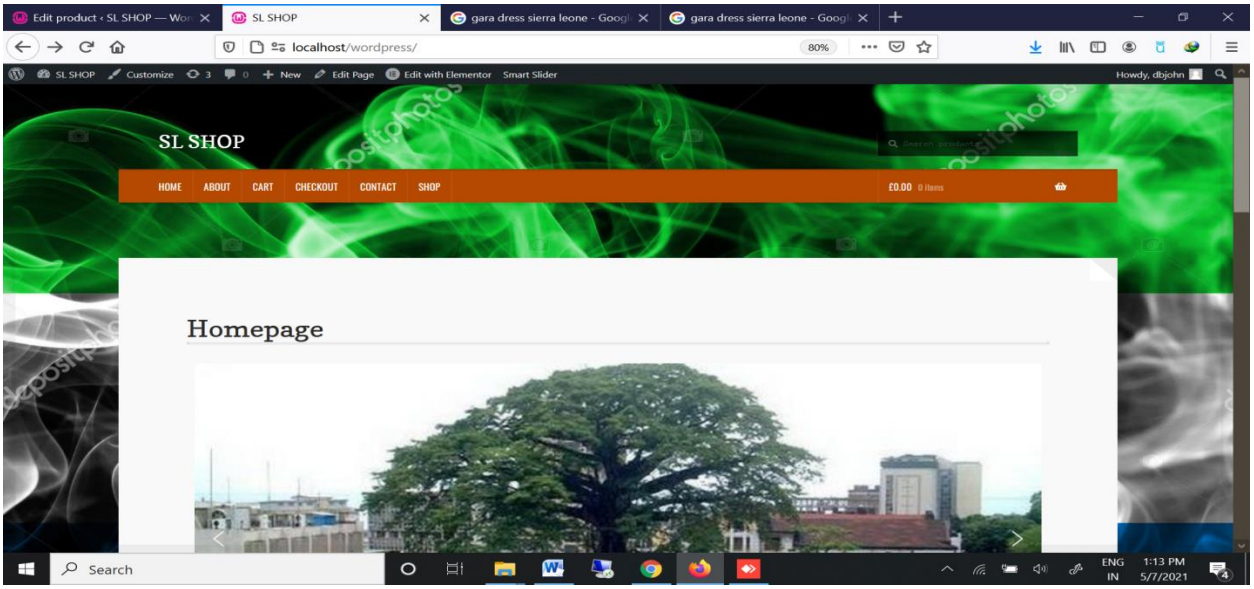
5.2 Design Idea

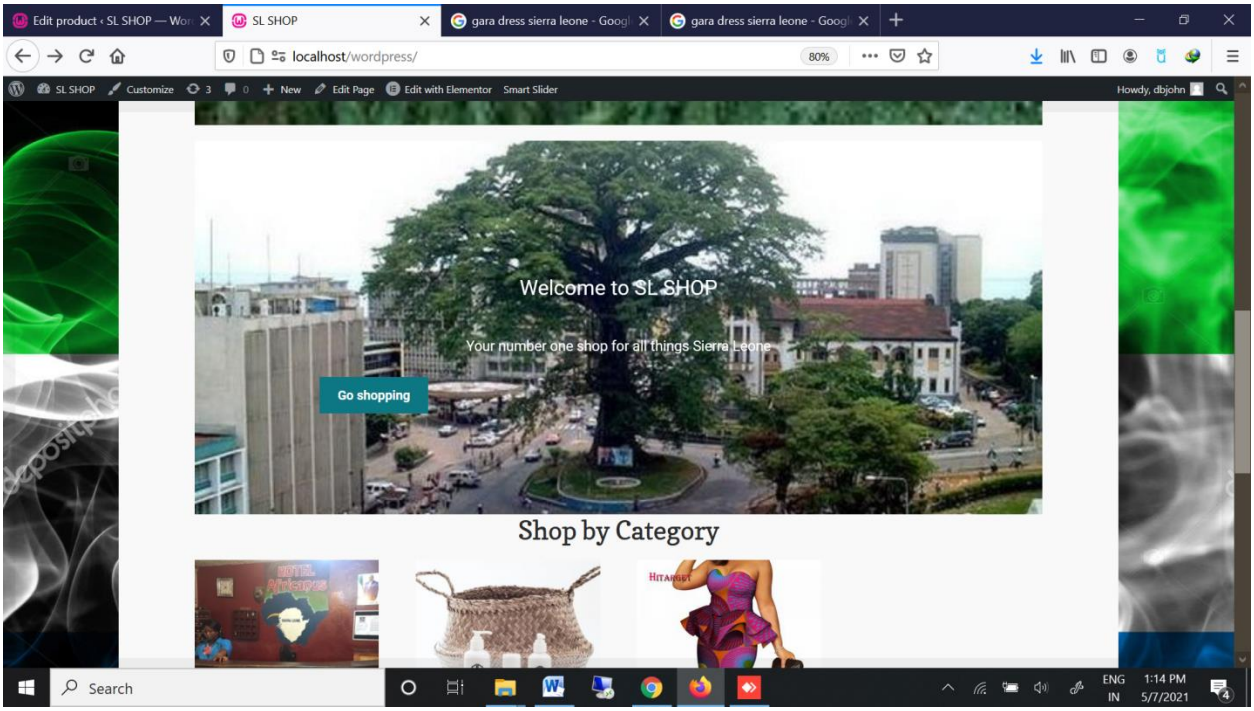
The design idea was based on the requirement of the system. The website was built on WordPress and the shopping functionalities were facilitated using the Sydney theme, WooCommerce plugins and other plugins. The idea for the visual display was such that the main page, shopping area, cart and account management pages are all displayed automatically once the site is reached.

5.3 Artefact Interface Design

Developing a well-designed interface for any website is crucial in helping users undertake activities and help them learn how a new system works rapidly (Idyawati et al., 2014). The theme, color, layout and background to be used were taken into consideration in designing an attractive website layout. Figure five below shows the general appearance of the main page menu. Upon entering the home page users can see the other key pages including the shopping area which displays different products users can navigate through and gather preliminary understanding and price details. The main menu and search area are on top of the web page which enables users to easily select which product they want to explore.

Figure five: Main Page





5.4 HCI issues

Being knowledgeable of Human-Computer Interaction issues helps web developers to design useful and usable technologies. Taking into consideration some of the HCI issues the waterfall methodology was a necessity for this project as it presents a step-by-step basis of the development lifecycle as discussed in section 4.2 of this report.

It is worth noting that the visual appearance of a website has a great influence on user's perception and impression of the site's usability. It is not uncommon that the ratings of sites by users can be high depending on the visual level. Sites with high visual appeal and low usability are rated high while those with low visual appeal and high usability are rated low (Philip and Chapparro, 2009). According to Altaboli and Lin (2011) website with visually appealing interfaces can perform better. Keeping this in mind, the theme and plugins used for this site were carefully researched and selected to present an appealing site that is well designed and easy to use.

5.5 Database Design

The system needs to be accessed by multiple users, so access levels need to be set, and each user has set of access into the website. Therefore, the database design needs to be such it

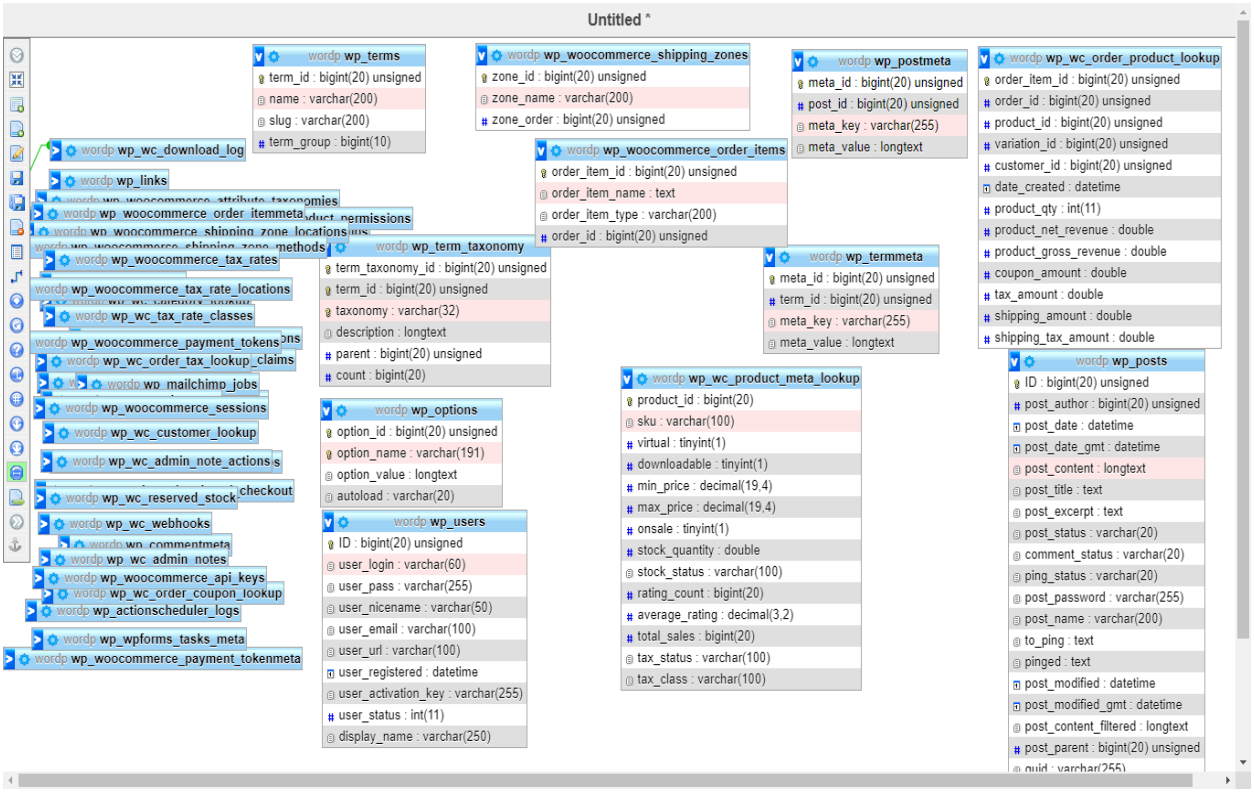
should save all the user information and website content as the content is controlled by the administrator. As the website is taking credit card and cash on delivery as the payment methods, user information needs to be saved very carefully so that it is private.

Also the email and password is getting checked each time the user logs in and password is saved in an encrypted format to have a more secure system.

The Entity Relationship diagram represents the database tables and their relationships with each other. The database used is MySQL. MySQL is an open source database that it is widely used among web developers. The database E-R diagram of the most important tables is given below in figure 6. Not all of the tables in the system will be stressed on as WordPress has a lot of tables, and I thought it fit to focus on the ones that were specific to the. The site is to be used by users who want to buy different products in Sierra Leone. There is only one kind of user for this system, the admin, customers are not allowed to create accounts on the system, they should only be able to view the products, add to cart, and only provide their information during checkout.

However, for the admin area, there are different types or category of admins, each category has different access levels. If an admin is registered, a unique username/email and password will be used to access the system and administer changes as per their access levels. All their information will be saved in the database and each time they log in, it will verify the credentials against the one stored in database. Also, admins can add, delete, and modify product information.

Figure 6 database E-R diagram



6.0 SOFTWARE DEVELOPMENT IMPLEMENTATION AND TESTING

6.1 Chapter Overview

This chapter shows how the project was implemented providing detailed information on what was carried out to bring out the artefact to life. The chapter covers the development environment and how they were set up. The chapter also covers various software used, the purpose of using them.

6.2 Project Environment

6.2.1 Content Management System (CMS)

According to Cobat (2018), a CSM facilitates the creation and publication of digital content including the creation of static pages, forums, blogs, online store, etc. The WordPress CSM can be located between the front end which is the web-server and the back end where contents are created, edited and modified. The site was developed using this system without the use of coding skills. By using the CMS, I was able to utilize content editors, themes and plugins and as such most programming skills required to build a website through other platforms were not utilized.

6.2.2 Integrated Development Environment (IDE) – can be referred to as any software application which provides programmers with comprehensive facilities to enable software development (Chafle et al., 2007).

The development environment begins with undertaking some background research on Content Management System that can be used to develop an online shopping system. There were series of them out there such as Joomla, Drupal etc. but the one that was preferred was WordPress which is one of the world's most popularly used CMS to create a website (Cabot, 2018). This was selected because it can be operated even without prior experience in website development and is useful for a small to medium sized site as this project.

This project utilizes a locally hosted development environment (WordPress with WAMPP server) both are open source applications. The first step was to download and run the WordPress Application which comprises the following features as shown in appendix six below. The WordPress runs on an apache server with PHP version 3.7.4 and uses MariaDB 10.4.10 as a database. The above are embedded in the application as such there was no need for me to download them separately.

Locally created sites are common practice among website developers and creating it locally enables developers to test the futures and functionalities safely and privately before hosting externally.

The frame for the site was created with WooCommerce, which is an E-commerce plugin for WordPress. Since the goals and requirements for the site were very loosely determined,

WordPress seemed like a good general-purpose platform. Because of its high customizability and wide range of available add-ons, a WordPress site can also conveniently be changed or updated in the future, if new goals appear. The platform's user-friendliness makes it relatively easy for anyone, regardless of tech-knowledge level, to manage the site.

6.3 Selection and Installation of theme

The WordPress application provides several themes but most of these themes did not meet the project's design idea. In finding a proper theme for developing an online shopping site, key elements such as the home page, sidebars and the general layout design must be considered and how well they can fit a particular theme.
Different themes presenting good appearances were tried but all of them had a common issue with customization. However, an ideal theme (Deli) that can customize contents freely was found and selected for this project. Deli theme was chosen due to its responsiveness, flexibility, full compatibility with WooCommerce, and the fact that it is offered by WooCommerce as a ready-made theme for free (Deli 2021). Installation process can be found in appendix 7.

6.4 Appearance Customization

After the installation of the theme, some customizations were done on certain appearances such as the font size, color of the background on the content management interface. The main tone selected for the web page was white and grey which reflects the Nordic home style which also makes customers comfortable. The font size was enlarged for a clear display of content, some unnecessary widgets were removed. Most of the format and content was customized directly from the application without any changes in the CSS and PHP. The design idea and the selected theme were almost the same and as such the site's structure was aligned with the theme.

6.5 Plugin Utilized

WordPress CSM has some plugins embedded into it. Plugins help website developers to enhance, modify create or define the site's functionality, add features etc. easily and conveniently manner without changing or writing codes. To achieve and enhance the site's functionality, the following plugins were utilized (installation of WooCommerce can be found in appendix 7).

- **WooCommerce-** this is a free open source plugin for WordPress sites and offers an avenue for the sales of any products online. It is one of the most commonly used plugins by online website developers (WooCommerce, 2021). The major reasons for selecting this plugin is its compatibility with the design idea, the numerous functions it provides and security
- Other Plugins for additional functionalities

- ✓ Elementor
- ✓ WPforms
- ✓ Jetpack

6.6 Setting up the online shopping Site

The setting up process starts with downloading and installing the WordPress application locally on my computer and this is followed by downloading and installing the Deli themes in the WordPress theme repository. The WooCommerce Plugin and other plugins were also downloaded in the WordPress plugin repository (all setting up processes are shown in the appendices section of this report). WooCommerce automatically creates most of the pages that are needed for a typical online shop which includes the shopping area, shopping cart, the account page etc. all of these were added in the main menu area of the site. After the above installation and setup, the site is now ready and can be accessed through the main page. Different African products (Grocery items and toiletries) were added with their descriptions and prices (all prices in SL Leones). The products were then put into different categories.

Adding up new products is one of the most vital parts of setting up the online system. Before adding any product, products were classified and categorized based on their nature, this helps buyers to easily browse through based on categories. All images of the products were physically taken from the store and not on any website.
The final steps were to customize certain areas such as the store location and contact details etc. in the general tap. Shipment details were updated to reflect the total amount spent on any purchase and location. The payment method was set up as credit/debit card/ PayPal and this is done in the checkout tab. There is also an option to pay with cash when the items are delivered. The email tab was used to set up which email receives new order notifications.

6.7 Project Testing

The testing phase is the later stage in the waterfall methodological framework. The object to undertake the test is to be able to ascertain whether or not the system's functionalities are working as planned (Naik and Tripathy, 2011) and to correct any error identified during the test process. The testing conducted for this project was mainly from the developer's point of view.

6.7.1 Test Results:

The table below shows the test results of the different functionalities of the system. If a functional requirement is met, the comment box will indicate met and if not met it will indicate not met.

Table 3

Functional Requirements			
No	**Requirement**	**Functionality**	**Comments**
1	Site Visit	Core	Met
2	Customer Registration/ Create Account	Core	Met
3	Customer Login/Out	Core	Not Met
4	Password Recovery	Advanced	Met
5	Changes to Carts	Advanced	Met
6	Add/Delete/Edit product- Administrator	Advanced	Met
7	View product / Product details	core	Met
8	Order/Cancel Order	advance	Met
9	Payment	advance	partially
Non-Functional Requirements			
1	Accessibility		Met
2	User friendly		Met
3	speed		Met
4	Security		Met
5	Reliable		Met
6	Maintenance-		Met
7	Compatibility- System must be compatible with different browsers		Met

7.0 EVALUATION AND CONCLUSION

7.1 Chapter Overview

This section basically covers how the project was evaluated, conducts an analysis of the steps taken to undertake the project and discuss the overall outcome of the project. The success of this project was measured by looking at different factors with the major factor being the completion of the core functional requirements set out in the project. The research and methodologies used were evaluated, timelines set out in the Gantt chart was evaluated and the overall positive and negative aspect of the project is also captured in this chapter.

7.2 Self Evaluation

Undertaking this project has been very challenging for me considering the time allocated for its completion and submission. Time management has always been one of the major risks for undertaking a web development projects such as this one especially when there was no prior experience or technical expertise in developing such a project. The technicality and timing to undertake this project was misjudged especially to the fact that I am living in a country with little ICT infrastructure and where access to certain software and tools is very limited and am working a full-time job.

Even though from one perspective you can see from the schedule of work and Gantt chart (Appendix 8 and 9 respectively) that the time allocated to implement the various stages may be appropriate the timing of the project was extended to an additional two weeks and as such the gannt chart adjusted to the new extension.

In conclusion, I am new to this but with extra effort and time, overall objective of the project was met. This entire project process was a learning point and an eye-opener to things that I could not imagine in the shortest feature I would cover and practically implement.

7.3 Research Evaluation

The background research carried out gives most of the necessary information needed to understand the project methodologies, features and functionalities as well as the design of the project. Through the research process, existing websites were looked at and most of the ideas, logic and flow of implementation of the various functionalities of this project were derived through the background research conducted on other successfully implemented websites.

Little or nothing would have been developed if background research was not carried out and thus the research undertaken greatly impacted the outcome of the project as it provides the baseline, direction and roadmap of how to carry out requirement specification, design and implementation of functionalities. However, if primary research were conducted the perspectives and opinions of different people would have been gathered and this would have greatly enhanced the outcome of this project. This serves as a key lesson learned for future projects.

7.4 Methodological Evaluation

The waterfall project methodological approach was used throughout this project. The waterfall methodology was a more effective methodology for this project since it is a small project that has well-defined functional requirements that will not change in a short time.
The project was undertaken sequentially and was broken down in the following phases:

- Project Requirement Analysis
- Project Specification
- Project design
- Coding and construction
- Testing phase and finally
- Project Implementation or delivery of the full package

The project plan schedule were developed and implemented using the SMART approach which helps the workflow and implementation process to be undertaken smoothly. The project analysis phase made use of use-case diagrams which was developed based on the project's feature requirement serving as a road map, structural and logical flow of how the system will function. The above was very vital to ensure that the functional requirements speak to one another and are effective in meeting the overall project's objective.

7.6 Evaluation of Artefact

As the artefact has been tested and efficiency and effectiveness of the site determined, I can say that most of the Artefact's functional requirement were implemented successfully and works properly as intended. However, I cannot boost that all is perfect but I know and can accept that are is room for improvement. For example, I found it difficult to change the currency during check out stage when using the online payment option and as such this feature was not met completely. The hosting was done locally as most of the requirements to host externally were not met but hopefully this will be worked on for future development.

7.6 Future Development

Even though there were lots of challenges in implementing this project such as prior skills and experience in website development and web hosting, little or no understanding of programming and codding (though not used), availability of adequate internet facilities and software applications, I was able to develop this site to an acceptable level. Although most of the functional requirements of the projects were working successfully, there is still room for improvement and to take the site to another level. Future work will be for the site to be hosted in a dedicated web hosting site, launched and make accessible to the general public. Search engine optimization functionality will be included which will enable the website to be visible in a web search engine.

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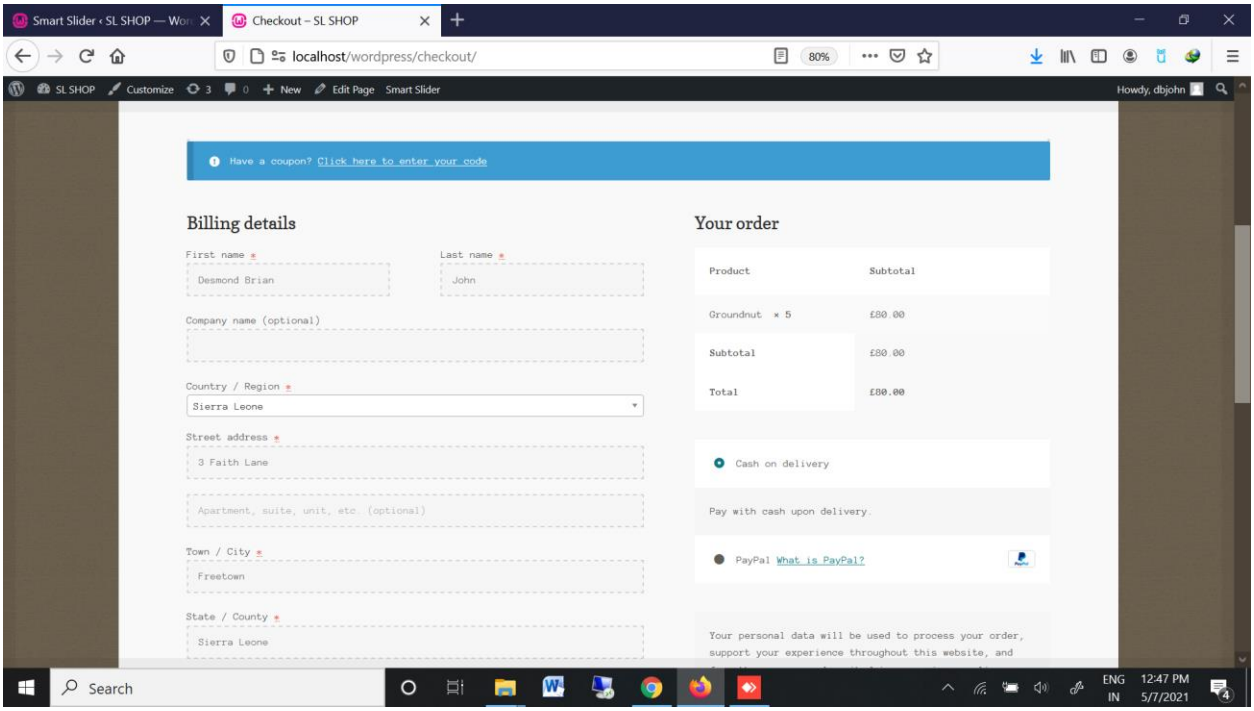
9.0 APPENDICES

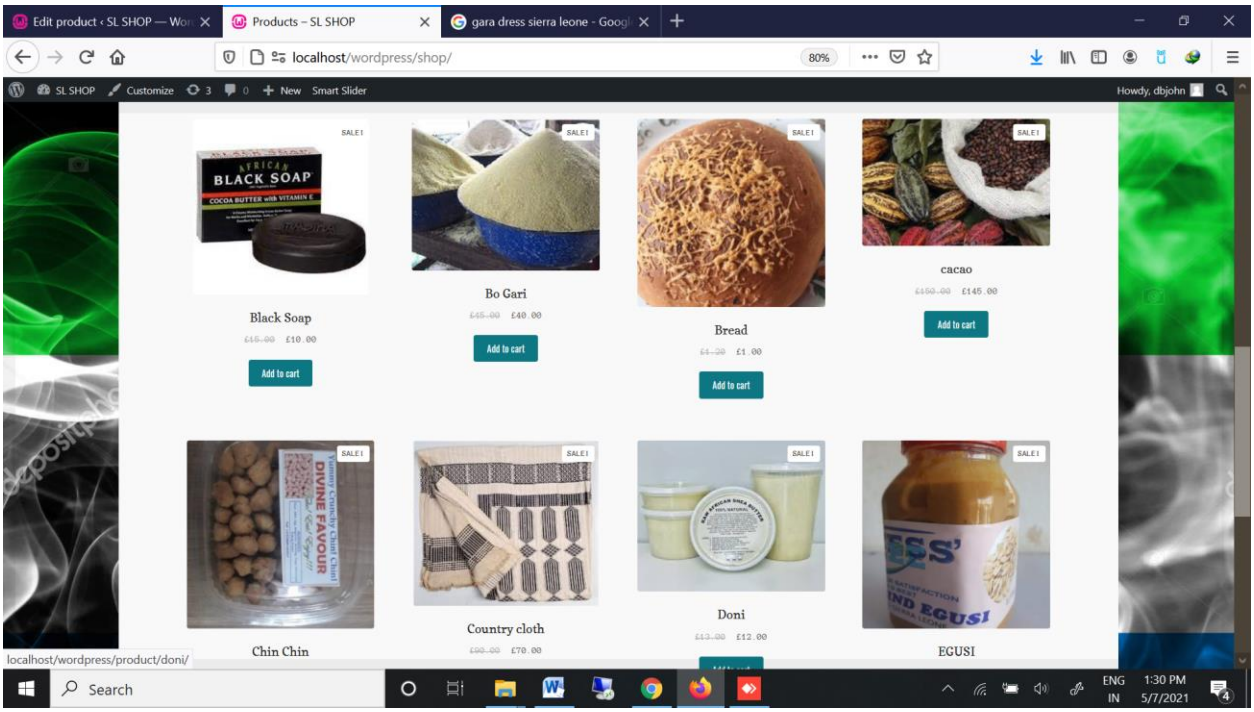
Appendix 1: Map of Africa showing the location of Sierra Leone

Appendix 2: Map of Sierra Leone

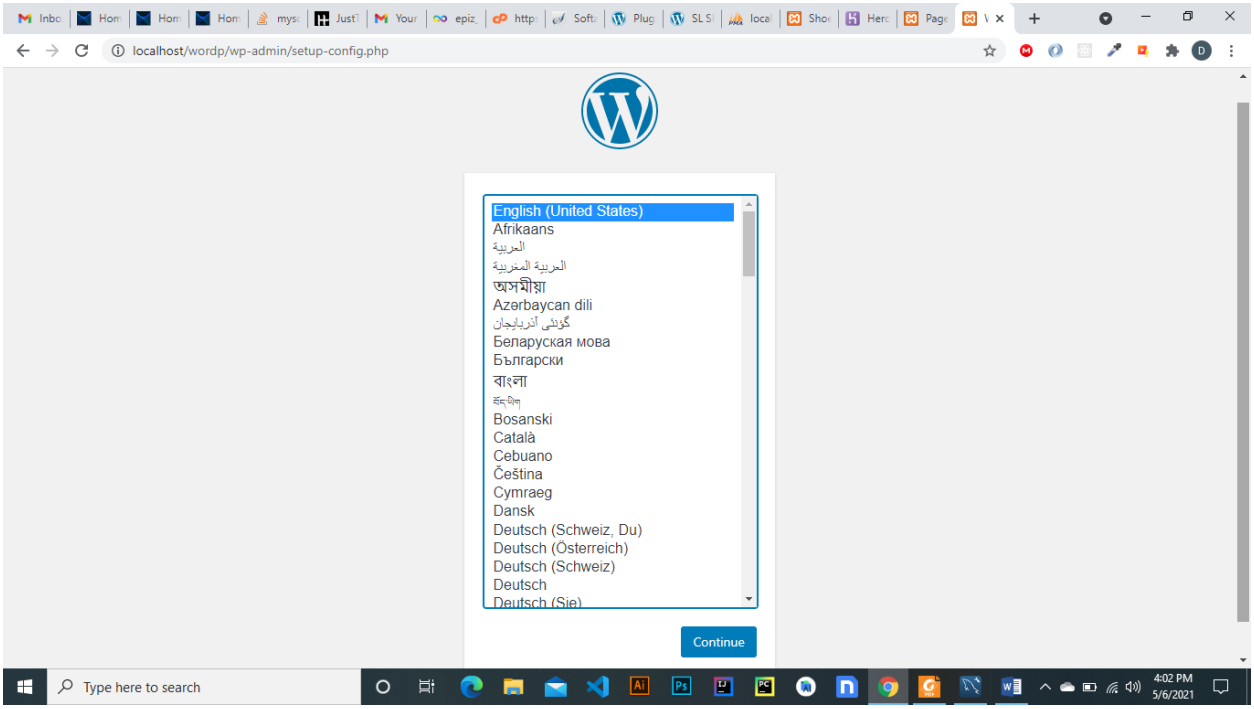
Appendix 3: Registration/Billing Detail Page on check out



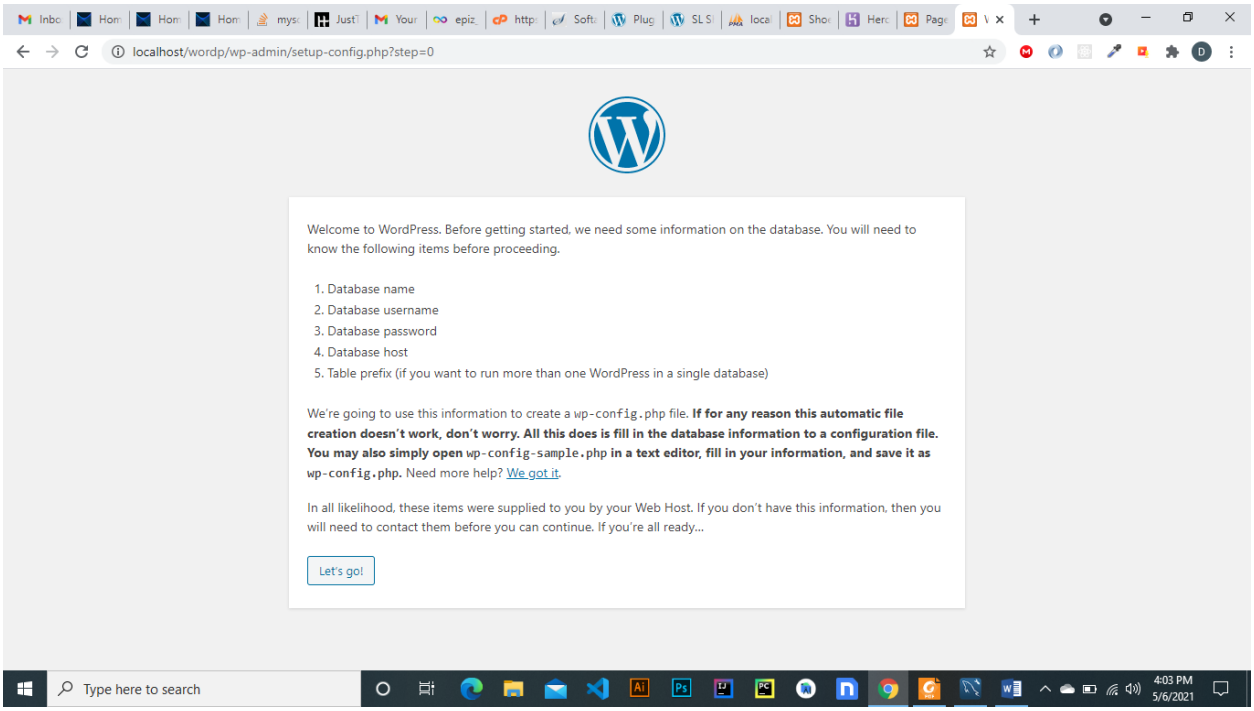
Appendix 4: Product Page



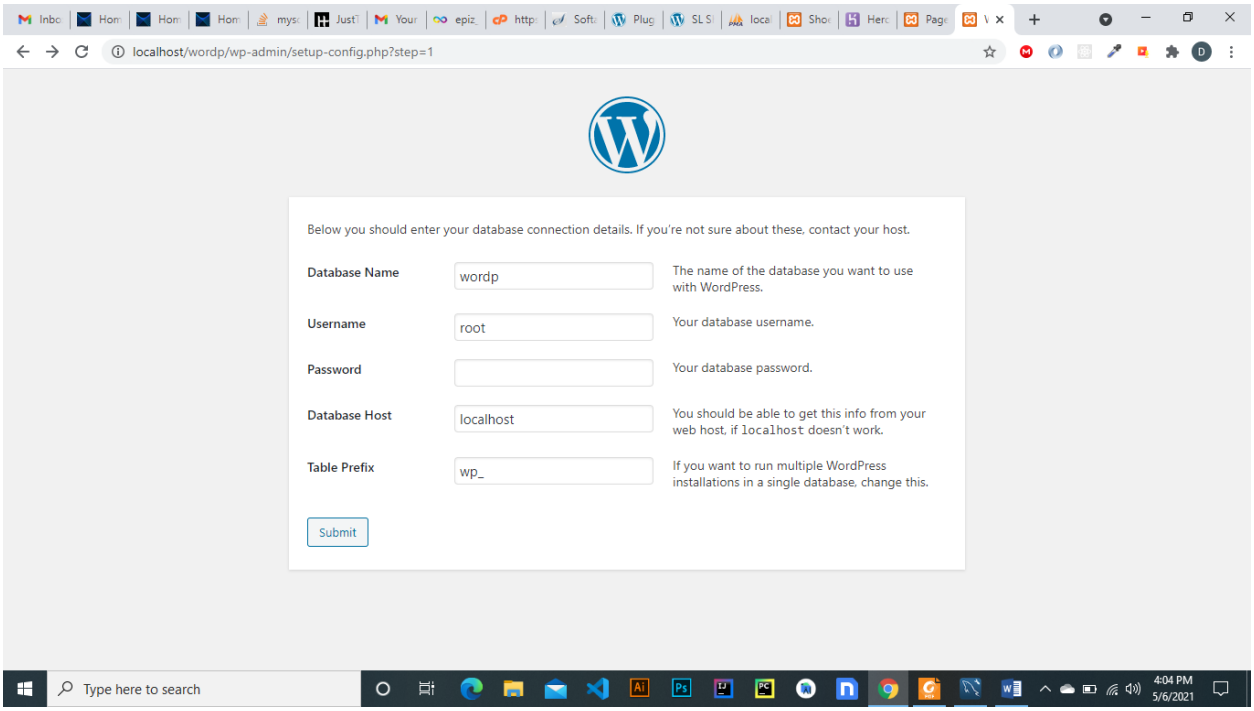
Appendix 6 WordPress Installation window



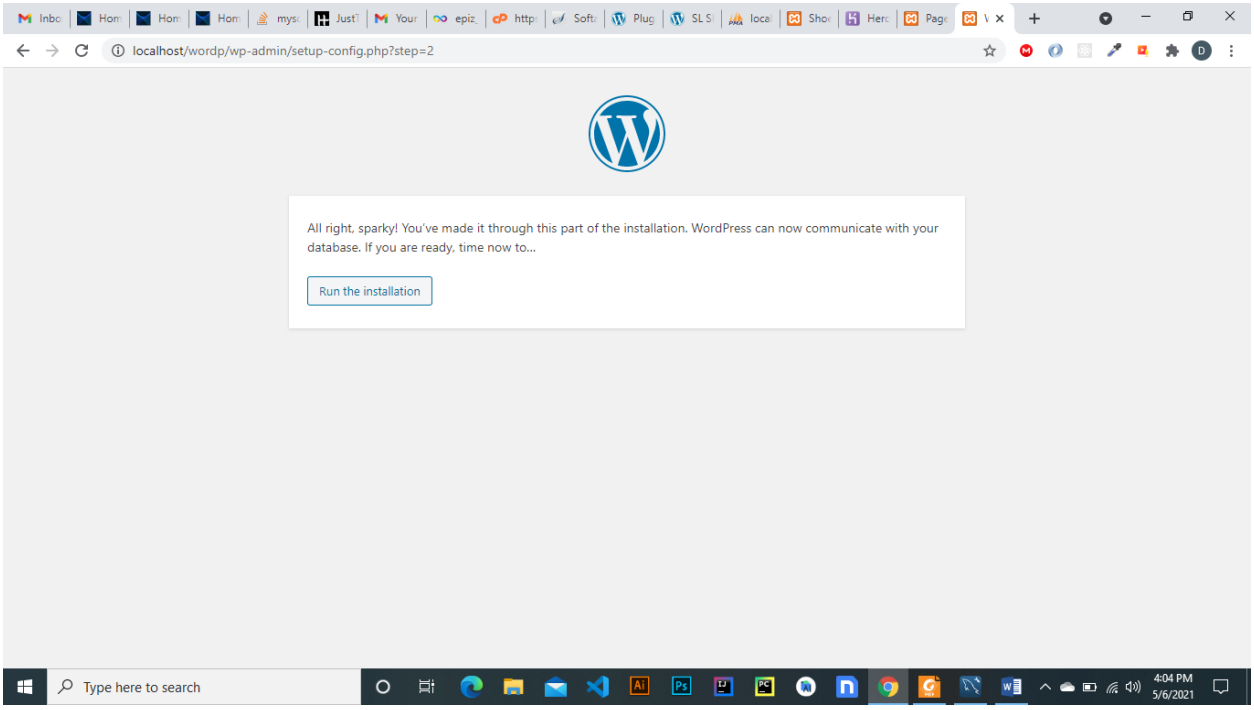
Language selection stage



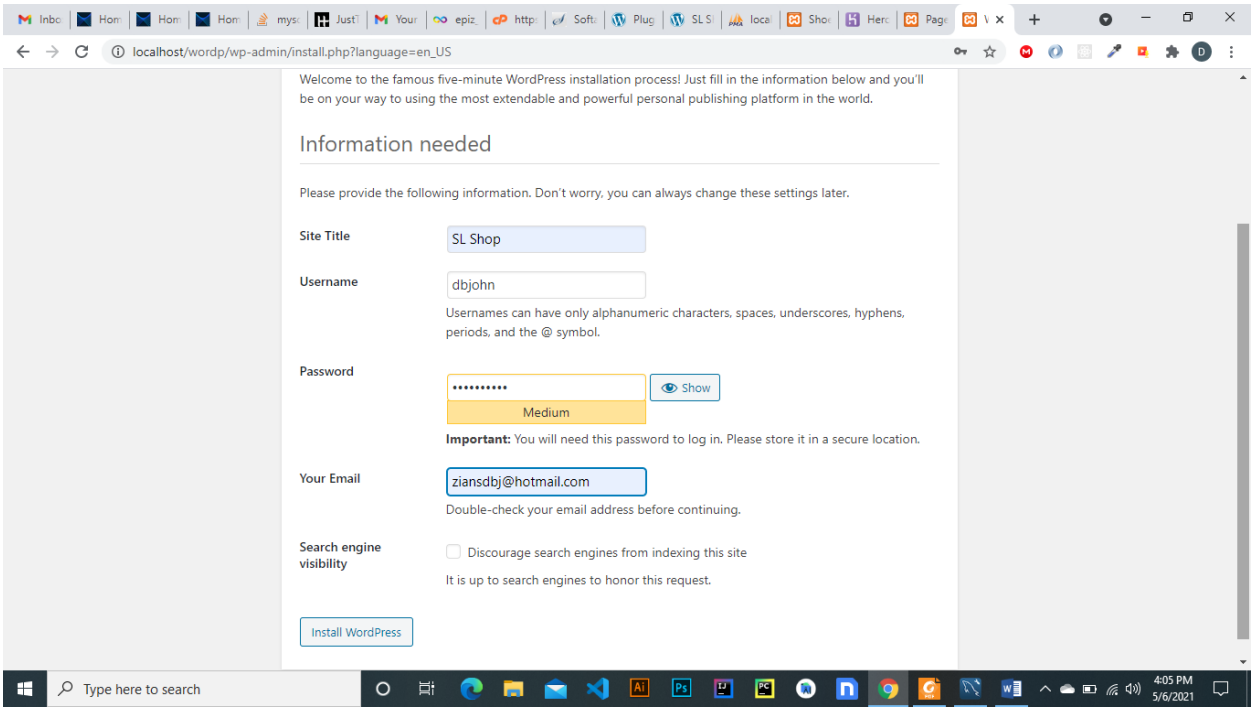
Database information that will be required



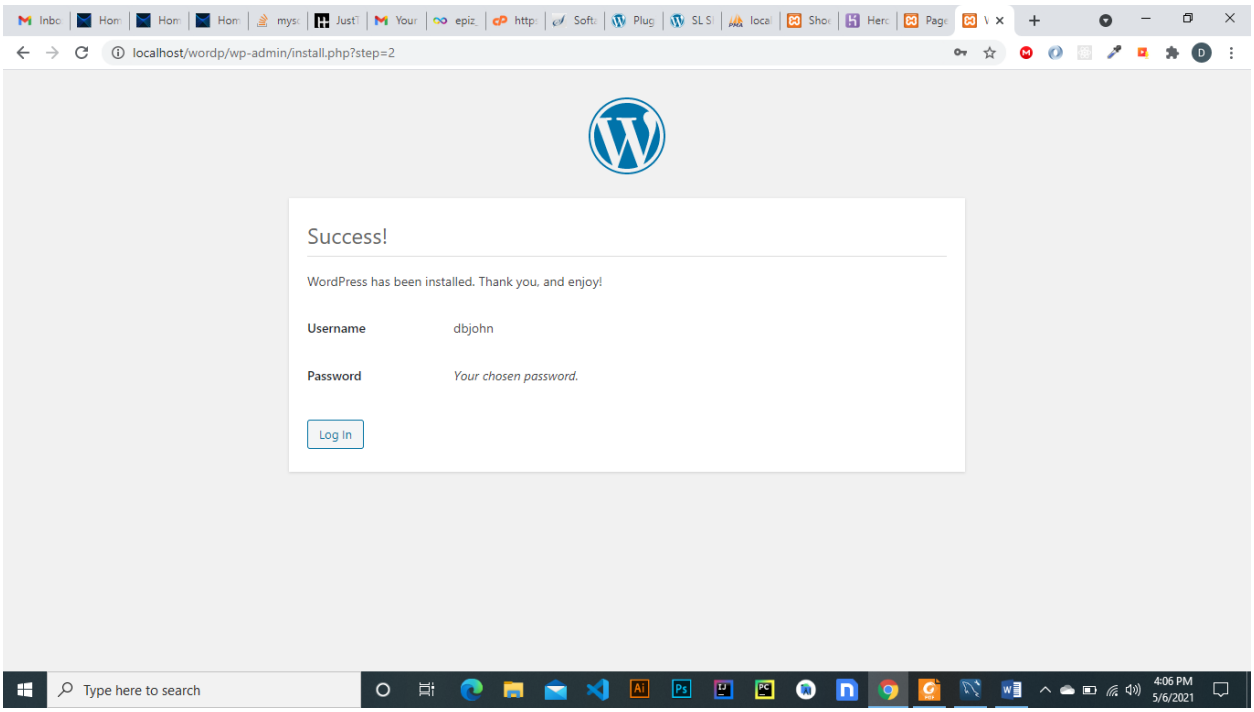
Entering Database connection information



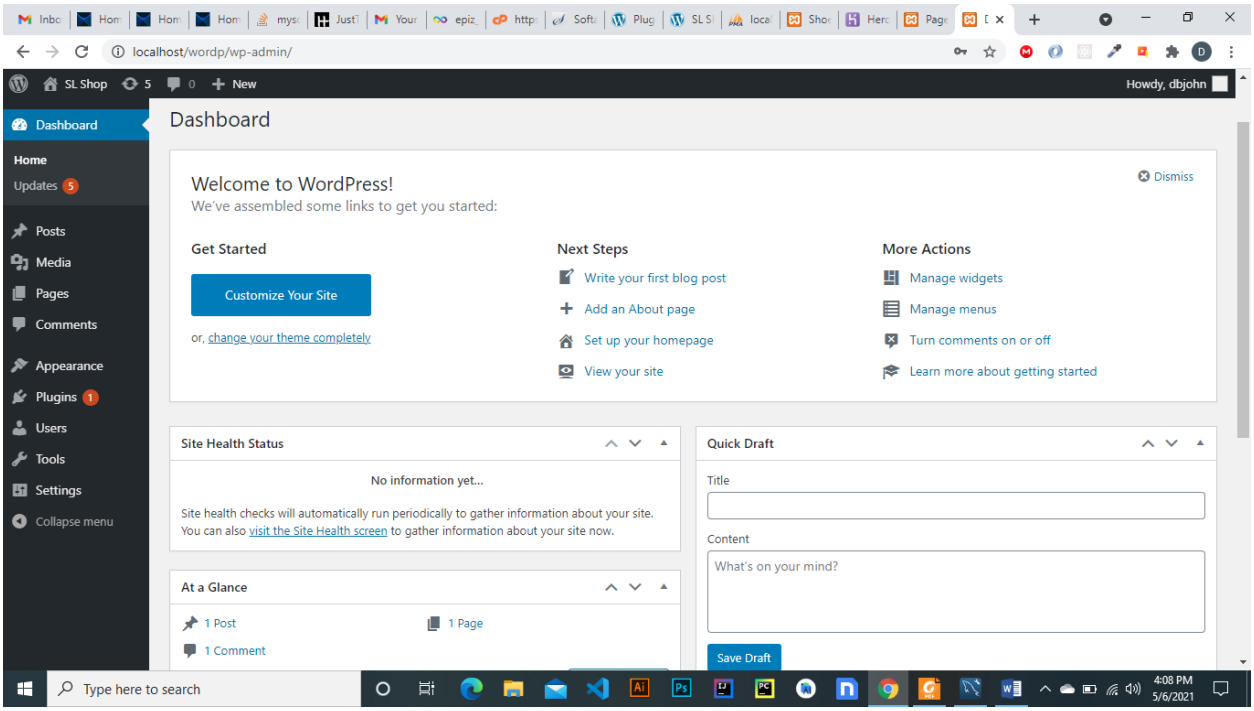
Running and Installation



Entering admin user information to login with later

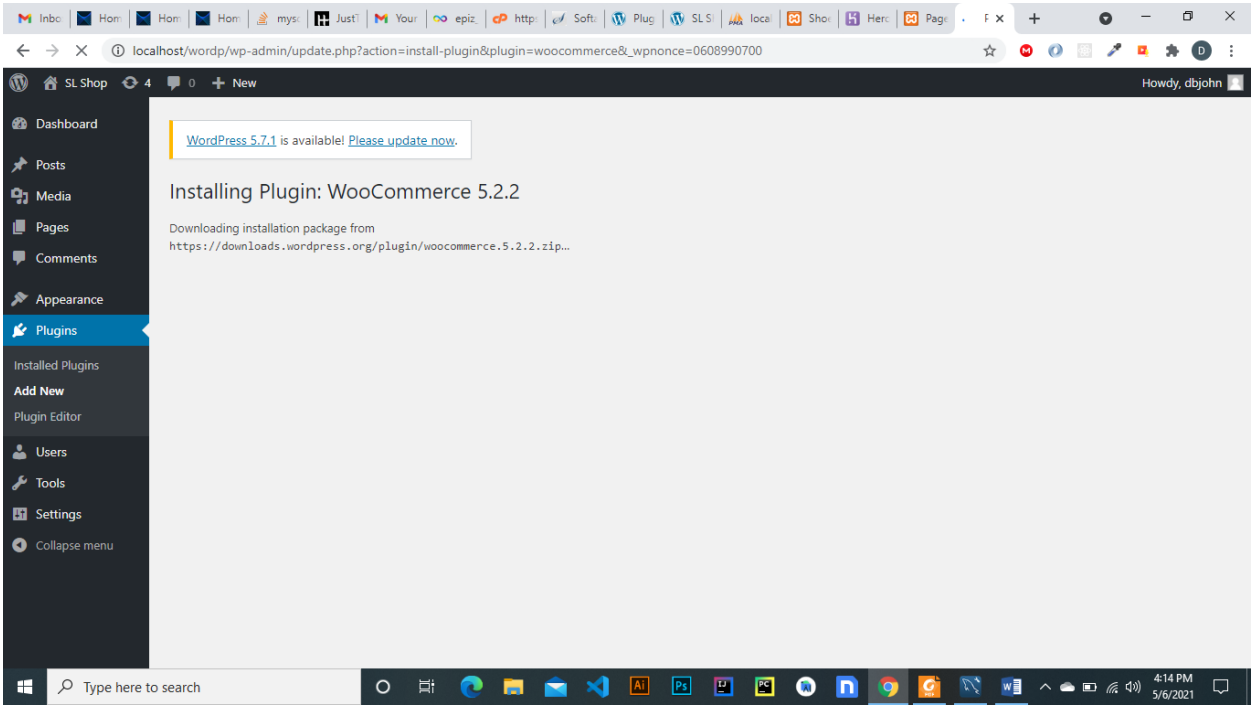


Successfully installed WordPress page

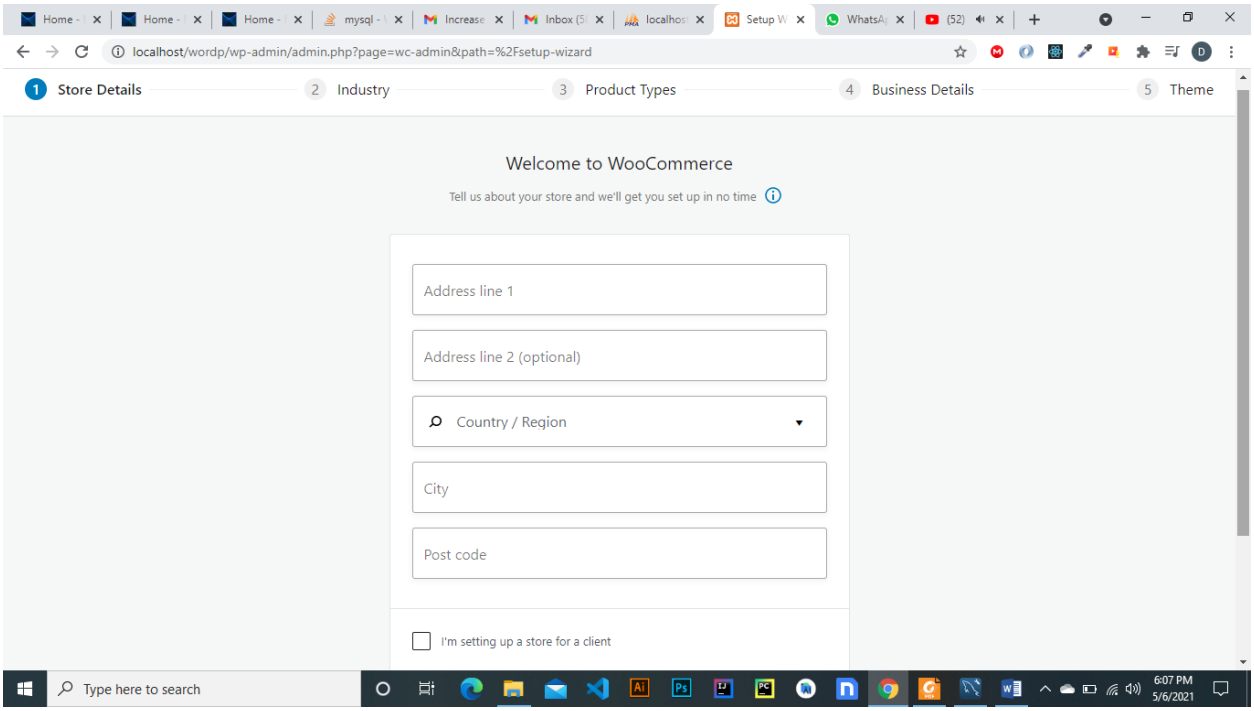


WordPress Dashboard

Appendix 7 Installation of Theme and Plugins



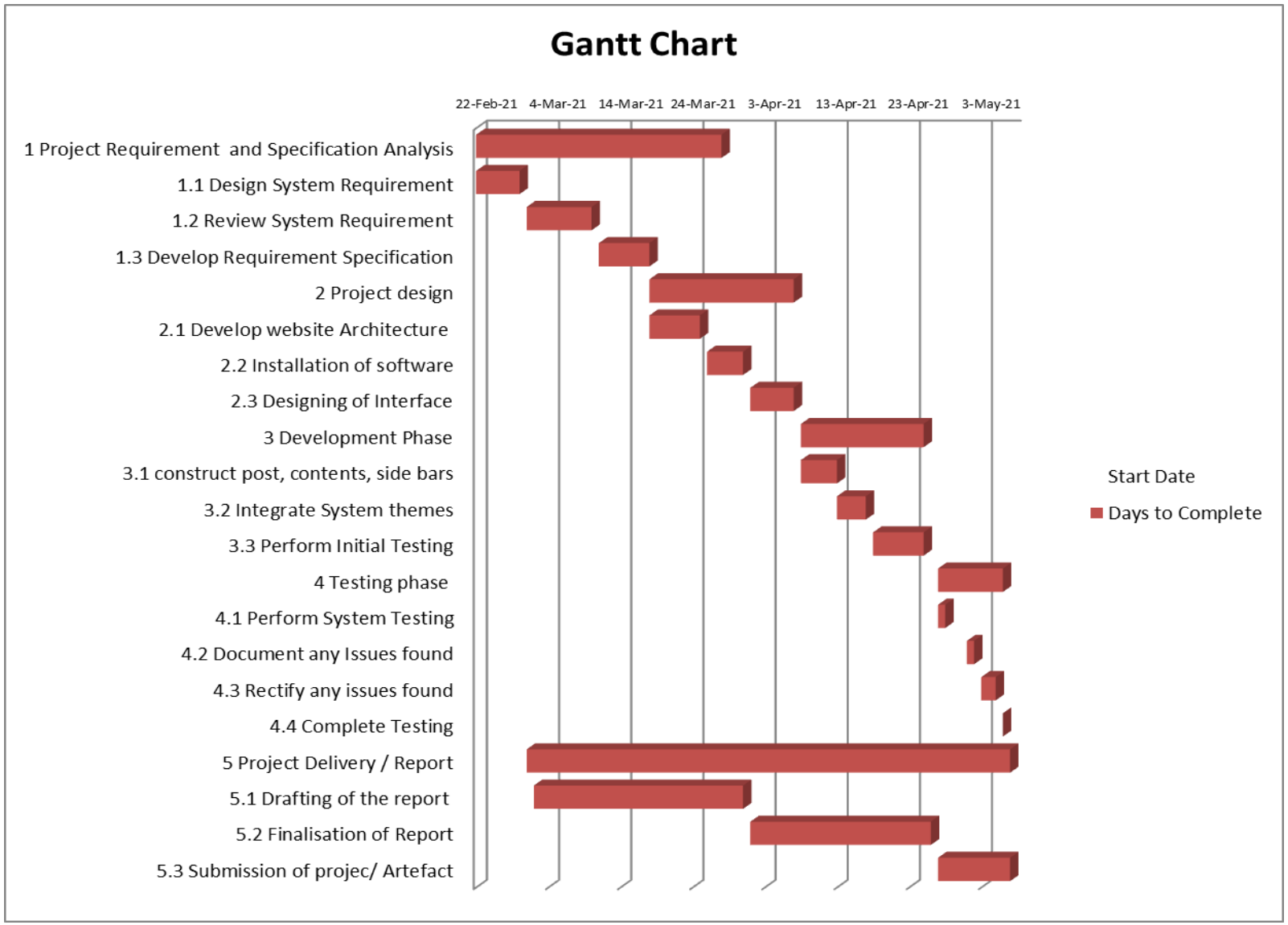
WooCommerce Installation



Appendix 8 Project schedule and list of activities

Task	Task Description Description	Start Date	End Date	Days to Complete
1	**1 Project Requirement and Specification Analysis**	**22-Feb-21**	**28-Mar-21**	34
1.1	1.1 Design System Requirement	22-Feb-21	28-Feb-21	6
1.2	1.2 Review System Requirement	1-Mar-21	10-Mar-21	9
1.3	1.3 Develop Requirement Specification	11-Mar-21	18-Mar-21	7
2	**2 Project design**	**18-Mar-21**	**7-Apr-21**	20
2.1	2.1 Develop website Architecture	18-Mar-21	25-Mar-21	7
2.2	2.2 Installation of software	26-Mar-21	31-Mar-21	5
2.3	2.3 Designing of Interface	1-Apr-21	7-Apr-21	6
3	**3 Development Phase**	**8-Apr-21**	**25-Apr-21**	17
3.1	3.1 construct post, contents, side bars	8-Apr-21	13-Apr-21	5
3.2	3.2 Integrate System themes	13-Apr-21	17-Apr-21	4
3.3	3.3 Perform Initial Testing	18-Apr-21	25-Apr-21	7
4	**4 Testing phase**	**27-Apr-21**	**6-May-21**	9
4.1	4.1 Perform System Testing	27-Apr-21	28-Apr-21	1
4.2	4.2 Document any Issues found	1-May-21	2-May-21	1
4.3	4.3 Rectify any issues found	3-May-21	5-May-21	2
4.4	4.4 Complete Testing	6-May-21	6-May-21	0
5	**5 Project Delivery / Report**	**1-Mar-21**	**7-May-21**	**67**
5.1	5.1 Drafting of the report	**2-Mar-21**	**31-Mar-21**	**29**
5.2	5.2 Finalisation of Report	1-Apr-21	26-Apr-21	25
5.3	5.3 Submission of projec/ Artefact	27-Apr-21	7-May-21	10

Appendix 9 Gantt Chart



Appendix 10 Supervisor's Meetings

Meeting Log: 1

29th January 2021: I sent an introductory email to Mr. Jukes introducing myself, provided my job description and my information Technology experience and programming experience in general. I also shared my project idea which was initially to develop an accounting software package for chiefdom councils in Sierra Leone.

30th January 2021: Mr. Juke replied to my mail. He took his time to research on my country Sierra Leone and gave an advice to change to another idea which he categorically mentioned is discretional to me.

1st February 2021: I informed him about the change of my project idea even though there was no idea that came to mind at the time and he welcomed the suggestion.

Meeting Log: 2

12th February 2021: Mr. Jukes sent me an email asking for my new project idea and a reply was sent to on the same day of the new idea which is to develop an online shopping center website which was welcomed by him and emphasized that I keep it to the Sierra Leonean context.

Meeting Log: 3

22nd February 2021: I sent a draft copy of the IPR for his review and comments.

24th February 2021: He sent his comments which were useful to the report.

Meeting Log: 4

12th April 2021: the first draft covering chapter 1-4 was sent to Mr. Jukes for his comments

14th April 2021: Initial Comments were sent by Mr. Jukes and the report was amended based on his advice.

Meeting Log: 5

1st May 2021: The final Draft copy was sent for review and comments

4th May 2021: Final Comments were sent by Mr. Jukes**.**

APPENDIX B: SUPERVISORY MEETING LOGS

Meeting 1 Logs:

February 9th, 2020: Ms. Mengle sent an email introducing and giving initial instructions about the Final Project Module. She requested a detailed list of system functionalities, project objectives and an updated project plan.

February 11th, 2020: Ms. Mengle sent further clarifications on the scope of e-learning sites.

February 11th, 2020: An introduction about myself and the requested information (system functionalities, project objectives and project plan) was sent to Ms. Mengle.

February 12th, 2020: Ms. Mengle replied with a few pointers about existing functionalities and suggested to create a feature for communication/ collaboration. She enquired about types of quizzes, file types to be uploaded and an updated project schedule.