KIRIWINA GOODENOUGH DISTRICT DEVELOPMENT AUTHORITY OFFICIAL WEBSITE

Post Graduate Thesis Report

Submitted in partial fulfilment of the requirements for the Post Graduate Diploma in Science
University of Papua New Guinea

Declaration:

I, Emmanuel BUDIBUDI, hereby declare that the work presented herein is original work done by myself and has not been published or submitted elsewhere for the requirement of a Post Graduate Programme. Any literature date or work done by others and cited within this thesis has given due acknowledgement and listed in the reference section.

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Working on your own project, doing research, writing your thesis is the last phase of the Post Graduate program. For me, it was obvious that it had to be practical. I like research, new techniques, and new possibilities, but only if they are applicable. My thesis project needed to be something practical, a real life situation. It had to be something that was intended to be used by a larger audience. And then this came along. Maybe not be the newest techniques, or a brand new invention. But it is practical, it is a real life situation. I'm glad that it became my project... This thesis was carried out at Kiriwina-Goodenough District in the MILNE BAY Province, for which I'm grateful to Member for Kiriwina Goodenough Electorate, Hon. Douglas Tomuriesa. Although the initiative was initially yours, the project became mine. Thanks for the freedom to work on your idea. I really hope that we can bring our people together to appreciate that technology is a tool to drive development agendas in our district. To those who assisted me in one way or another like the District Administration, headed by Gansen Kadi, and the people who work with the office of the Local Member, Nelson Kurina, Delorin Tomdawa and Richard Luvakesa. Appreciate your enormous support.

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Thanks to my parents and my extended family for the long-wait. You all may be wondering why your son was never part of your family and traditional expectations or obligations over the last couple of years. Despite that you all continue to support me. And of course, Jessie (my wife), thanks for supporting me, keeping me focussed and giving me a hard time whenever I had something else to do. Thanks!

ABSTRACT

The study was aimed to investigate the problems/issues the Kiriwina Goodenough District has faced which has in one way or another hindered its progress over the years. In addition, it focused on coming up with an I.T project aimed to solving most of those issues identified. The study had finally opted to come up with an official website for Kiriwina Goodenough District Development Authority (KGDDA).

The project was then done in five (5) different phases. The first one was the planning stage which consists of the data collection, interviews and the critical analysis of relevant work done before. It also involves the identification of the web site goals or purpose.

The second phase was the Analysis phase which is the identifying of the key functions of the website that involved its architectural design.

Design and the development phase was the third phase where the architecture was put into a design in a form of a sitemap and eventually developed into a working website. Languages, techniques, and technologies such as Cascading Style Sheets (CSS), the Extensible Hypertext Mark-up Language (XHTML), JavaScript, and PHP etc. were used to develop the website.

The fourth phase was the Testing phase**.** It is commonly referred to as usability testing when the codes, links, speed, etc. of the website was done. This process was even done at various stages of the Website Development Life Cycle (WDLC).

In the Implementation and Maintenance which was the final phase of the Website Development Life Cycle (WDLC) involved the publishing of web pages to the web server and determining who was responsible for updates to the website.

The website acts as the hub of the districts important information. It's a catalyst to drive the district's development agendas. It is also a source to grow tourism industry in the district. Apart from tourism, it was predicted there are other economic activities and opportunities this project will unlock bringing more revenue to the district. Despite certain limitations faced during the course of the project, the audiences or the users of the website will come to realise the enormous benefits this project brings to the district over them.

Contents Pages

ACRONYMS USED

CSS – Cascading Style Sheet

DDA – District Development Authority

DSIP – District Services Improvement Programs

HTML – Hyper-Text Mark-up Language

I.T - Information Technology

KGDDA – Kiriwina Goodenough District Development Authority

PHP- recursive acronym for PHP: Hypertext Preprocessor

RLLG – Rural Local Level Government

WDLC – Website Development Life Cycle

3G - 3rd Generation network
4G - 4th Generation network

CHAPTER 1. INTRODUCTION

Web-technology has matured a lot over the last few years. It (web-technology) is still fairly simple with a number of unsolved problems, but the advantages and potentials are so significant that most of today's design of information systems to some extent is based upon web-technology. Organizations increase their investments in the usage of web-based technology. The scope of web-based application has grown enormously and has moved to become a platform that can support all facets of organizational work.

In parallel with this trend the activities to be IT supported become increasingly knowledge demanding even to supporting the a simple website (Howcrofft, D., Carroll, J., 2000).

This chapter, points out some of the issues/problems the Kiriwina-Goodenough District Development Authority has faced in its operations since its inception in 2014. It also outlines the purpose as to why those problems/issues were needed to be solved. It further elaborates on what to be done in order to solve the problems in the district and sets objectives on how those problems be solved with the use of the web-technology.

1.1 Problems Identified

A preliminary study was conducted at the district in 2016, and there were several serious problems identified.

The study had discovered that there was no proper medium to measure the level of progress the district has undertaken over the last five (5) years despite the national government's commitment of 10 million Kina DSIP funds yearly. Despite, efforts by the leaders to develop the district, some impact projects initiated seem to have been invisible like the district's education scholarships scheme as the result of the project may not be reaped immediately. Some projects the district had undertaken over the past five (5) years may be visible to one or two parts of the district but not in other parts of the district. Some of the examples are the infrastructural projects like the classrooms, community church buildings, community halls, jetties, rural clinic centres, etc.

It was also exposed that there was no proper storage for the district's important documents. The only medium discovered was the manual storage where reports, district yearly acquittals, etc. were stored on drawers and cabinets in the offices. There was very little evidence that the soft copies of the critical documents were stored in the office computers.

The above problems have triggered another issue that is also worth considering. There was very poor indication as to whether or not transparency is practiced by the district leaders in handling their leadership roles especially roles that involve dealing with district funds, etc. Over the last couple of years, the people of Kiriwina-Goodenough both living in and outside of the district have been questioning via social media on how the DSIP funds are used. This has created verbal tensions among themselves.

One of the problems found was that; there was about more than 50 % of the district workforce have low Computer Literacy level. Some unfortunately cannot even handle most of the assumed office basic computer skills like word processing, excel spread sheets, etc.

The final and the very important finding was that; there was no proper medium to showcase the district's natural and cultural beauty to the outside world. Undeniably, both Kiriwina and Goodenough Local Level Governments (LLG) have so much to show off as far as natural beauty and rich untapped cultures. The district had lacked in this area to properly promote its natural beauty, its cultures and its people.

1.2 Purpose

The question raised in the preliminary study stage was that; why do these problems identified in the district needed to be solved?

First of all, there was a proposal approved by the KGDDA for an I.T project to be carried out in the district. It never got implemented unfortunately, despite funding being already approved and paid in advance to the proposer. The project was a failure. There were also other examples of failed projects in the district that were useful lessons towards avoiding the same errors hence this study. That was one of the main drivers why this study was carried out or initiated. The main purpose of the study was to come up with an I.T Project set to solve the identified problems and not to repeat the past mistakes.

Having had working knowledge on web technology, and what web technology does to this changing and challenging world and benefits of web technology to the business world, it became the main target in this study to solve the district's identified problems.

The website project came along mainly based on the interest and expertise in website development. At this stage, the work on designing and developing an official website for Kiriwina-Goodenough District as partial fulfilment of the Post Graduate thesis was formally decided on. It was taken on board, because by attempting to solve the district's problems plays an important part in what seen as helping to contribute back to the district.

One of the reasons why the idea of website project came along was because, it is by law that all districts in the country must develop the concept of District Development Authority (DDA) in running the affairs of their people, and so new ideas and new initiatives are needed in order to take the districts forward. Kiriwina Goodenough District is no exception. It needs technology to drive its development agendas forward.

In the later parts of this paper, it presents on how the website was developed using the languages, techniques and technologies such as Cascading Style Sheets (CSS), the Extensible Hypertext Mark-up Language (XHTML), JavaScript, and PHP etc.

1.3 Aim/Objectives

In this section the following questions were asked; what could be done to solve the mentioned problems? How could it be done to go about solving them?

The aim of this thesis is to design and develop a website that could solve most if not all the problems listed above. The main idea was to create an official dedicated website that would provide official information to the audiences who what to know or even who desire to invest (resources/time) in the district. This will allow audiences including tourists and potential investors or donors to have access to a dedicated website, consisting of official information about Kiriwina Goodenough District. The website will have a discussion forum where it will enable visitors to constructively debate issues concerning the district. The site will also hold information of every Rural Local Level Government (RLLG) and every ward in each RLLG. The website will be administered by an assigned officer who has working basic knowledge of basic computing.

There are some vital objectives set, which should be accomplished, in order to allow the successful completion of the website project. These are to:

- Conduct thorough **problem investigation**, which involves KGDDA's analysis, stakeholder (e.g. District's Development Partners, Citizens, NGOs, Tourists, Business houses, etc.) analysis and evaluation and comparison of similar websites. This is the only way to understand the wider context of the problem, identify the target audience of the website, find out how other districts websites in Papua New Guinea work, and discover possible gaps that need to be taken on board in the project. This would lead to a preliminary project proposal.

- Come up with a **project proposal** that aims to solve the identified problems. This will be the basis for a dedicated website tailored to the needs of the targeted audiences.

- Investigate and decide on **research methods**. Compare their advantages and disadvantages in order to choose the right one for testing the feasibility of the initial project proposal with various stakeholders.

- Understand the strong and weak points of several **website development methods** and pick the methodology that will be the guideline of the project.

A detailed document of how the thesis is planned to progress and the cost, is available in the **Appendix A** of this thesis report.

1.4 Significance of the Kiriwina Goodenough website

This section outlines some underlying significance of coming up with an official website for Kiriwina Goodenough District. As mentioned in the earlier sections of the report, the website becoming 'Information Hub' would bring enormous benefits to different stakeholders in the district. The **major stakeholders** of the district are listed below;

I. The main beneficiaries of the website is the district **workforce** itself, this includes all the public servants working in the district. They will be the main important beneficiaries. The website being the 'Information Hub' means availability and accessibility of districts information for both the district Administration and its workforce.

II. The second group that will benefit from the website is its people (**Kiriwina Goodenough's people**). This group of people deserve to be made aware of what their leaders are doing for their district and their people. They need to know what impact projects are being undertaken and how those projects would bring about development to their people. Generally, as very citizens of the district this group of people deserve to have easy access to every information regarding developments in their district.

III. The third group is the district's **partners**. This includes district's development partners, its business partners and others like the Non-Government Organisations (NGOs). They work hand in hand with the District Administration, Local Level Government and the Local Member to develop the district. They are the implementers of most of the big projects undertaken in the district. They are the professional organisations on their own rights. The district has to in return professionally appreciate them. Appreciating them via the official website is a way of promoting them at a global stage. Those are professional organisations and deserve professional partnership with those who partner with to ensure stronger, longer and confident partnership.

IV. The final very important group of people who would be the beneficiaries of the website are the **tourists** (external Audience/visitors of the website). This people would like to know Kiriwina Goodenough prior to visiting it. Most of this people do not like been told by others about a place. They would want to find out themselves. Having a website in place for the district would act as a first impression tour guide for them. Enormous returns would be reaped by the district if its tourists are treated properly. The benefits the district would gain if its tourists were to be treated professionally will be discussed in the next section. *(1.5 Practical implication)*

1.5 Practical implications

What would the district's official website mean to the different stakeholders? This includes the district Administration, district's partners, its people and its visitors (tourists).

To the District Administration, it would mean transparency. Transparency in a way that any major project or major role undertaken by the district are made aware via the official website. The official website would play an important part in advocating transparency and accountability at the district level. Over the last couple of years, queries were raised on social media concerning the district's administration. The website would take care of this.
It would also take away the concerns and pain-points the district has regarding the non-existence of the website. The following in bullet points were some the concerns raised during the initial study stage;

- Regardless of level of progress Kiriwina-goodenough had gone through in terms of development in the last 4 years, in the minds of the vast Kiriwina-Goodenough educated people, there is no proper medium to showcase what has been done, what is yet to be done, etc… An official Kiriwina-Goodenough website will cater for this and absorb those concerns.

- No proper storage area for district's documents (all types of doc's e.g. project Proposals, District plans, Acquittals, etc... The KGDDA website has catered for that.

- Community Forum – this will contribute greatly to KG district where issues are debated constructively.

Most tourist would want to find out themselves about a place they want to visit and not from what they may have heard from others. Websites is one important source tourists go to know about places they would want to visit or discover. Websites have the power to grow tourism sector and to grow business opportunities in the district. A good quality website will bring enormous opportunities to the district and its people. Studies have proven that quality and an up-to-date website attracts more visitors than a poor one. Visitors of the site would eventually want to visit the actual place just from the first impression posed by the website. In doing so, they bring in money to spend in the district.

The district's partners on the other hand need to be appreciated. They deserve to be promoted for their efforts in developing the district. Recognising them through the official website is a way of recognising them and appreciating them for the efforts in developing the district.

CHAPTER 2. BACKGROUND

2.1 Information is Power

'Information is Power' is one of the most widely accepted statements and applies for every aspect of human activity. People have come to realise that Internet is an unlimited pool of information and benefits anyone who uses it properly. According to Porter and Millar (1985) information gives competitive advantage to an organisation in three different ways:

a) *By changing organisation's structure and changing the rules of how it operates.*
b) *By providing the organisation with new ways to outperform their competitors.*
c) *By creating new businesses, even from within a company's existing operations.*

The authors continue by discussing the strategic significance that Information Technology has obtained for organisations, by affecting the value chain, thus the technological and economic activities that an organisation performs to do business. Not only it transforms the values, but also transforms the service of the organisations nature. Additionally, authors suggest five ways for Information Technology to be successfully implemented in organisations. This can be done by:

a) *Assessing the intensity of information*
b) *Determining the role that Information Technology will have in the industry structure*
c) *Understanding the ways that it can create competitive advantage for their companies*
d) *Investigating the possibilities of new businesses*
e) *Developing a strategic plan to take advantage of Information Technology.*

In their work Porter and Millar (1985) relate the advantages of Information Technology with the ability it provides to an organisation to gain and sustain competitive advantage, one of the main goals of every organisation. However, one key characteristic that they do not thoroughly refer to, is innovation. It is in the nature of these technologies to allow innovative ideas to prosper. Innovation is capable of changing the structure of the organisation, creating new business opportunities and providing new revolutionary methods to companies in order to beat the competition. So it is another way to gain competitive advantage through Information Technologies and especially through websites.

Kiriwina Goodenough is heading along that line. Now that the government is going through decentralisation reform and at the same time financially supporting those reforms yearly, every district in Papua New Guinea is expected to be more independent and run its own development agendas. One of the catalysts that Kiriwina Goodenough district should embrace in order for it to see real and tangible development is the Information Technology. Having an official website which serves as an 'Information Hub' for the district means that it (Kiriwna Goodenoug District) believes in the power of information and what it can do to an organisation if utilized well.

2.2 Software Engineering Methods

Websites are software artefacts, a fact that suggests that the understanding of traditional software engineering techniques is critical. (Howcroft and Carrol, 2000). At this point, before looking at specific website development methodologies (life cycles), it is essential to present the key advantages and disadvantages of some well-established software engineering techniques, in order to examine their applicability to the development of KGDDA website.

Fig 1: Comparison of software Engineering methods

Software Development Method	**Advantages**	**Disadvantages**
Waterfall	• straight systematic flow • easily understood • well-established	• Requirements list should be complete and finalized by the end of stage one. • errors of one stage transfer to all the next stages • no user feedback before the final product • new requirements are hard to implement • rigid structure
Prototyping	• communication with users • user feedback • lower maintenance costs	• can be time consuming because of user involvement • Developing a prototype demands effort, time and money. • Increased development costs
Spiral	• allows new requirements to be added more easily • risk analysis • iterations	• risk analysis demands people with advanced knowledge in this field • time consuming
Agile	• early and constant user involvement • early deliverables • paired programming	• user involvement may lead to new requirements added continuously • difficult to reach customers

The Agile method was followed during the Web Development Life Cycle of the KGDDA website development as users were heavily involved in the process. Another reason was being that this method (Agile) is widely accepted and used in Website Development.

2.3 Console Management Systems (CMS)

Today, the involvement of the very knowledgeable web-developers has brought up the idea of creation of very developer-friendly templates called Console Management Systems (CMS) for other developers to develop web-sites or web applications. This on the other hand makes developers especially the young upcoming ones to lose the knowledge, skills and applications of many languages, techniques, and technologies such as Cascading Style Sheets (CSS), the Extensible Hypertext Mark-up Language (XHTML), JavaScript, and PHP etc...

This study have found out that without these appropriate design techniques being available to the so-called website developers, there is a real risk that overly complicated and messy websites will be developed, which may not only frustrate the website users but may mean that future website maintenance activities may be unnecessarily complex.

2.4 Website Development Life Cycles

Laudon and Traver (2007, p. 193) propose a five-step life cycle of developing a website.

- **System analysis/planning.** In this step objectives are identified, in order for the project to have measurable targets and achievements. Also some functionalities of the system that the system must produce in order to achieve the objectives, are defined.

- **System design.** In this step the main components of the system and their relationship to one another should be described. This phase consists of the logical design, where functions that are going to be performed, databases that are going to be used, security procedures and controls to be used, are all specified. This phase also includes the physical design, which is the materialization of the logical design.

- **Building the system.** The actual development of the website takes place here. That is where coding begins.

- **Testing the system.** Once the coding is complete the system has to be thoroughly tested. Unit testing involves the testing of the website's modules. System testing aims to test the site as a whole and ensure its functionality for the user. Acceptance testing is used to verify that the system meets the business objectives that were defined in the system analysis phase.

- **Implementation and maintenance.** This step is very important, since websites, as any other software, may break down. They need continuous checking, testing and repair. A perfectly designed website, which is often unavailable due to technical reasons, is not a successful one.

This process, described by Laudon and Traver (2007, p. 193) is very abstract and does not focus on the details of each phase. It can only be used as a general guideline, since many methodologies follow similar steps to reach the goal of developing a successful website. A similar, though much more detailed approach, is the one proposed by Howcroft and Carroll (2000). The authors proposed their own methodology for website development after comparing a number of available methods, such as the "Four Phase Model" (strategy, design, production and

delivery, designed by Siegel (1997) and Ikonic's Five Box Development Process (a five stage process, which highly depends on thorough documentation between each stage).

The method suggested by Howcroft and Carroll (2000) tries to combine the advantages of the compared methods that are presented in the relevant literature. Their method consists of four phases with several steps in each phase. An overview of the main points of this method is presented below.

Phase One: Analysis. Deals with the development of a web strategy and an analysis of how a website may achieve this strategy. The main objective of this phase is to reduce the risks of lack of top management commitment and misunderstanding the system requirements. This phase consists of three steps:

I. Development of a web strategy, which means defining where the organization is now, where the organization wishes to be and how it will get from the present state to the desired one.

II. Defining the objectives.
III. Objective analysis, which involves: technology analysis, information analysis, skills analysis, user analysis, cost analysis and risk analysis.

Phase Two: Design. "The website should be designed with the knowledge that it is likely to have sections and processes added to it during its lifetime, as requirements change and new technologies emerge." (Howcroft and Carroll, 2000). It consists of two steps:

I. Information and Graphics Design
II. Testing of Design, since testing in the early stages can help prevent future errors and malfunctions of the website, making the whole development process more efficient.

Phase Three: Generation. It consists of the four steps that lead the project from the design phase to the actual generation of the website.

I. Resource selection
II. Design Review
III. Code generation and Installation
IV. Testing.

Phase Four: Implementation. This is an ongoing phase that does not stop after the development of the website. It involves:

I. Implementation
II. Maintenance
III. Objectives review

This method has some key advantages. It is well structured, detailed and simple to understand. It organizes the task of building a website into four well defined phases and provides further guidance to the developers by breaking down each phase into steps. Not only does it allow the tasks to be organized but it makes the tracking of the progress quite effective. On the other hand, Howcroft and Carroll (2000) provide a useful but general framework to assist in the web development process. Their method should be altered and adapted to the special requirements of

this dissertation's project, since it is not created to be efficient for a specific website. Also their method looks to be more appropriate and effective for larger projects, where developers have their own distinct roles.

Another interesting web development methodology, which follows the same pattern as the one presented above, is the one described by Alexandrou (n.d.). Based on his commercial experience as a Web Developer, he introduces a method which is also organized in phases. As Alexandrou (n.d.) states "phases are typically used to communicate a grouping of deliverables and functional progression within a project timeline and to assess the progress of a project." His methodology involves eight phases:

I. **Sales:** identifying client opportunities, evaluating potential clients and market opportunities and prepare proposals.

II. **Project Initiation:** gather together the project team and plan all the activities in detail.

III. **Analysis:** defines the strategy, the processes and the financial viability of the solutions. It also involves defining technical and business functionalities of the solution.

IV. **Design:** "undertakes a thorough creative design process that ensures the goals of the e-Business model are defined, designed and implemented in a creative solution."(Alexandrou, n.d.)

V. **Development:** involves prototyping and application building, unit and system testing.

VI. **Implementation:** producing the final system or website.

VII. **Production Operations:** take all the necessary actions to ensure the viability of the solution for a long period of time.

VIII. **Project Close:** ensure that the project is running as planned and according to user requirements.

The above methodology has similar advantages and disadvantages with the one of Howcroft and Carroll (2000).The main difference of this methodology and its main strong point is that it starts earlier than most of the other methodologies and it does not end until after the review of the final project by the client. This is very helpful in the first stages of the development process of the commercial website, since it can provide a useful guideline on how to move from the original innovative concept to the first stages of building the website. It also provides useful guidance on how to make the final solution more viable.

A very interesting variation of the above methodologies is the one presented by December (n.d.). His method is not only based on six processes but also on six web elements, which the developer should take into account and try to develop through the building process. The six processes described by December (n.d.) are similar to the ones of previous methodologies. Planning for the audience and purpose, analysis (setting objectives and gathering domain information), design, implementation, promotion, ongoing innovation.

Through all these processes the developer should try to develop the following sets of information, as defined by December (n.d.):

- Audience information, which is an information set about the target audience of the website.

- The purpose statement defines the reason for and scope of the web's existence.

- The objectives list defines the specific goals the website should accomplish.

- The domain information is a collection of knowledge and information about the subject domain the website covers.

- The web specification is a detailed description of the constraints and elements that will go into the website.

- The web presentation is the full description of the technical structures (hypertext and other media) by which the web is delivered to the users.

The detailed documentation that this method suggests makes it easier to keep track of the progress of the project and it defines specific deliverables, which indicate the success of the various processes. This information-based method can also help the developers to understand the problem and the domain in depth and produce the most effective solution. As December (n.d.) states "*a web intended for business or professional communication needs to not only reflect a consensus of meaning among the sponsors and originators of the information, but it must reach a diverse audience and continuously change as user needs change"*. However this method can be too complicated and time consuming for a simple web project and can result in loss of focus from the actual target, which is the website.

The Kiriwina Goodenough District Development Official Website project followed first mentioned method (*Laudon and Traver (2007)* as it was not categorised as a big project. More details on how the methodology was used to develop the website for Kiriwina Goodenough can be found in Chapter 3 of this thesis.

The decision on which method to follow throughout the project was necessary for the progress of the project. After conducting a thorough and critical research on various well established methods (**Fig 1: Comparison of software Engineering methods**) certain decisions were made. The project's methodology should follow, in general terms, the phases of the method presented by *Laudon and Traver (2007, p. 193)*. This method has a very detailed description of the various steps that are followed for the development of the website, so it was regarded as the most useful guideline for the Kiriwina Goodenough District uthority (KGDDA) official website. Moreover, it allows excellent tracking of the project's progress, something which is essential for an academic project, which needed to adhere to a specific timeline.

2.5 Functions of the Kiriwina-Goodenough District Authority

According to *District Development Authority Act (2014)*, the functions of the Authority are-

a) To perform service delivery functions and carry out service delivery responsibilities specified in the Ministerial determination made under Section 6; and

b) To develop, build, repair, improve and maintain roads and other infrastructure; and

c) To approve the disbursement of district support grants and other grants; and

d) To oversee, co-ordinate and make recommendations as to the overall district planning, including budget priorities, for consideration by the Provincial Government and the National Government; and

e) To determine and control the budget allocation priorities for the Local-level Governments in the district; and

f) To approve the Local-level Government budgets for presentation to the Local-level Government and to make recommendations concerning them; and

g) To draw up a rolling five-year development plan and annual estimates for the district; and
h) To conduct annual reviews of the rolling five-year development plan

Kiriwina Goodenough District Development Authority (KGDDA) has been in operation for the last four (4) years in the district responsible of the following functions stated above.

Since the district has a keen interest on coming up with a website, the main aim of this project is to come up with a district's website that will act as an **information hub** for the district and as much as possible appear appealing to more visitors. One of the important objectives of the project is to boost tourism in the district. The project is designed in a way that it does not only makes very good sense to them (audience) but also attains district's goal of embracing technology as a development tool.

The important part of this thesis is how the project was done from researching, data collection, site mapping and of course assembling the design into a working website. The output of this project is a website that provides a proper communication medium between KGDDA and its stakeholders like development partners, its people, tourists, etc. It becomes the official information hub of the district, an official notice board. And also is a place where the district is promoted and exposed of what it does in terms of development to global community. It was very much expected that the final website will help the Kiriwina Goodenough to be a better district in Milne Bay Province, in Papua New Guinea and globally in terms of information accessibility.

CHAPTER 3. DEVELOPMENT PHASES

This chapter describes the necessary methods used to state how the research of this thesis was addressed that resulted the successful design and the development of the website. The methods described in this chapter should give enough detail should the study be replicated, or at least repeated in similar way in another situation. Every stage in the chapter is explained and justified with clear reasons for the choice of the particular methods and materials.

The methodology that was applied consisted of five phases (5) and iteration between them was experienced especially when there was a need during the process of design and development of the project. As stated in the previous chapter, the Website Development Life Cycle (WDLC) used was the method proposed by *Laudon and Traver (2007).*

3.1 Planning and Requirements Gathering

This phase involved the identification of the website goals or purpose. During the phase the decisions on who will use the Web site, what Web technologies would be used, identification of the content owners and authors and finally deciding what and where information would go on the Web site.

This is the phase where preliminary investigations and data collection involving personal interviews to KGDDA Chief Executive Officer (formerly District Administrator) and other stake holders of the district were conducted. While there are various methods like surveys, focus groups, etc. to be used to conduct the problem investigation, **personal interviews** were conducted throughout this phase.

3.1.1 Data Collection

Personal Interviews was a method that involves unstructured, open-ended questions conducted as major part of this stage. The main advantage of this method is the additional information that the interviewer can extract from the face-to face communication. Interviews help in gaining deeper understanding of the participants' responses. They are very useful to obtain information about feelings and opinions. Interviews can trigger the researcher to change questions according to the response and can pick non-verbal clues from the respondent. Each participant is free to express his own opinion and there is no risk of being influenced by other participants as in other methods. Additionally, interviews usually achieve a high response rate. Interviews also yield valuable insights into participant attitudes and are excellent ways to uncover issues related to what the researcher aims to discover. Finally, they can be targeted to specific people who will provide valuable information on the area of research, based on their knowledge and experience.

On the other hand, there are some main problems with personal interviews. It is a costly method that requests many resources. The process of setting up an interview and analysing its results can be very time consuming. Researchers should be well equipped in terms of preparations and much effort and money should be spent in order to conduct as many interviews as possible. This results in a smaller sample available. The data collected by personal interviews are more subjective and

because of the small number of respondents, they can be less reliable. Finally, this method is also highly dependable on the skill and the experience of the interviewer, since he is the one who has to extract the information from each participant and be able to interpret each answer in the right way.

Based on the context and the pre-requirements set during the problem investigation and the following approach was applied. In order to test the proposal against what available system the district already had, the selected bureaucrats were interviewed. That was because this selected group provided the chance to present the proposal and explained any misunderstanding that there might be. Open ended question provided a better way to find out the opinions of KG DDA for the website better. Also, results will be much more targeted to the needs of the project. Finally, assembling a group of KG DDA bureaucrats does not demand much effort, since they are easily accessible via phone calls or text messages after the actual formal interviews.

At one point during this phase, those selected group of people were called together for a brief meeting where they effectively contributed to the topic of discussion, enabling the study to abstract the valuable information needed or required for formality of the study proposal. **Figure 2** below shows answers in bullet points to some of the questions raised during the interviews.

Fig 2: Sample Interview questions answered

Some Questions answered;

1. ***What is the purpose of the website?***

    - ***INFORMATION HUB*** *- It is part of the Kiriwina-Goodenough's five year development plan (2012-2017) that it will gear up to improve its current ICT facilities in line with the District Development Authority's (DDA's) goal of achieving a modern and affordable information and communication technology that reaches all parts of the district. Kiriwina-Goodenough District website (with its back-end database) will be a catalyst for development of the district since many of the elite district population are scattered in other provinces in the country and overseas. Also vast majority of the district voter-population are scattered along the smaller islands of which almost 90% of them having access to phones and further 70% with access to internet.*

2. ***What concerns and pain-points do you have regarding the non-existent website?***

    - *Regardless of level of progress Kiriwina-goodenough had gone through in term of development in the last 4 years, in the minds of the vast Kiriwina-Goodenough educated, there is no proper medium to showcase what has been done, what is yet to be done, etc… An official Kiriwina-Goodenough website will ease this issue.*
    - *No proper storage area for district's documents (all types of doc's e.g. project Proposals, District plans, Acquittals, etc... The DB part of the project will cater for that.*
    - *Community Forum – this will contribute greatly to KG district.*

3. ***Who are the target audience?***

    - *KG People – Living in or Living out of Kiriwina Goodenough.*
    - *KG Partners – Development partners e.g. RH Foundation, Au Namona, etc.. .*
    - *KG visitors (Tourists) - Both local and overseas tourists, researchers, etc..*

4. ***What goal would you like to reach after the website is completed?***

    - *All types of audiences mentioned above should be kept well informed with up-to-date information of the districts progress in terms of infrastructure development, human resource development, etc… through the website.*
    - *After the website is completed, Kiriwina-Goodenough admin Team should have a clean and secured storage system where all districts important documents should be stored.*
    - *After the website is completed, it will improve the level of integrity, accountability and transparency in the way the leadership roles are done. In other word, with the website in place, people who hold leadership roles in the district will feel that in everything they do, their citizens are watching them.*

The questions and answers above have formed the basis of the development of the KGDDA official website.

3.2 Analysis of Kiriwina Goodenough District Website

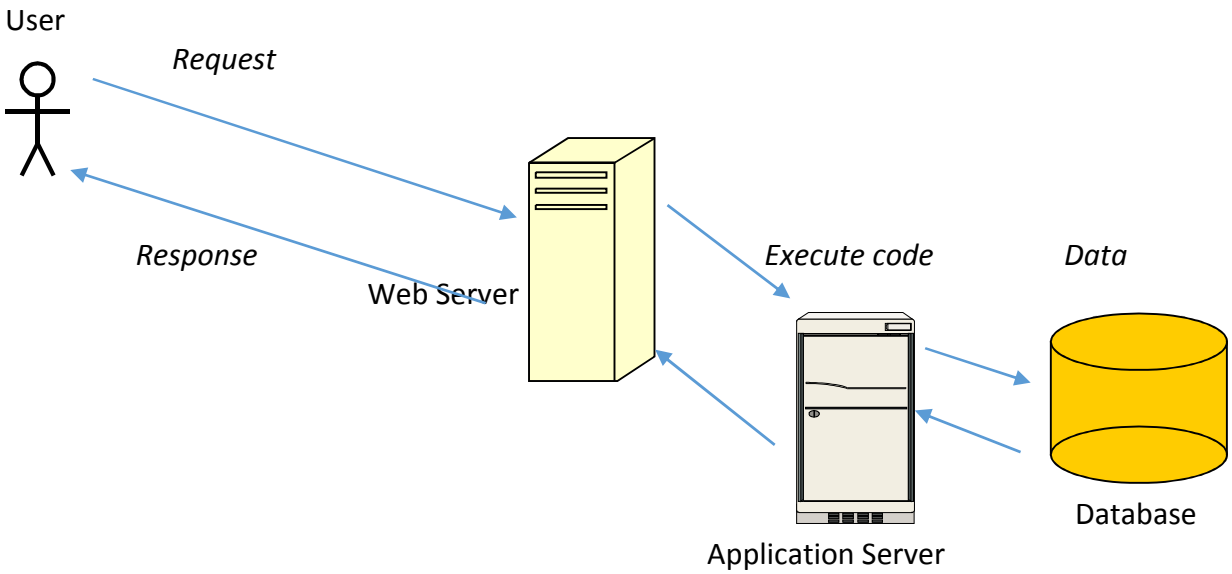
According to *Laudon and Traver (2007*), this phase was the most critical phase of all the phases in KGDDA website development. The architecture of the (website), some dynamic aspects, the layout and the navigation of the website were decided in this phase. The main aim was to decide what human activities the KGDDA website will assist. In other words, it was the identifying of the tasks users will need to complete.

It was common knowledge that good website design is always backed by how well the analysis phase is done. Even the most attractive, user-friendly website isn't successful when it isn't achieving the nature or the purpose of an organisation. In this phase, it was basically considering the processes required to support Web site features.

3.2.1 Architecture of the KGDDA website

It was the planning and design of the technical, functional and visual components of the KGDDA website - before it is actually designed, developed and deployed. KGDDA Website architecture was used as a basis to design and develop the actual website.

Figure 3: The general architecture of the Kiriwina Goodenough website.



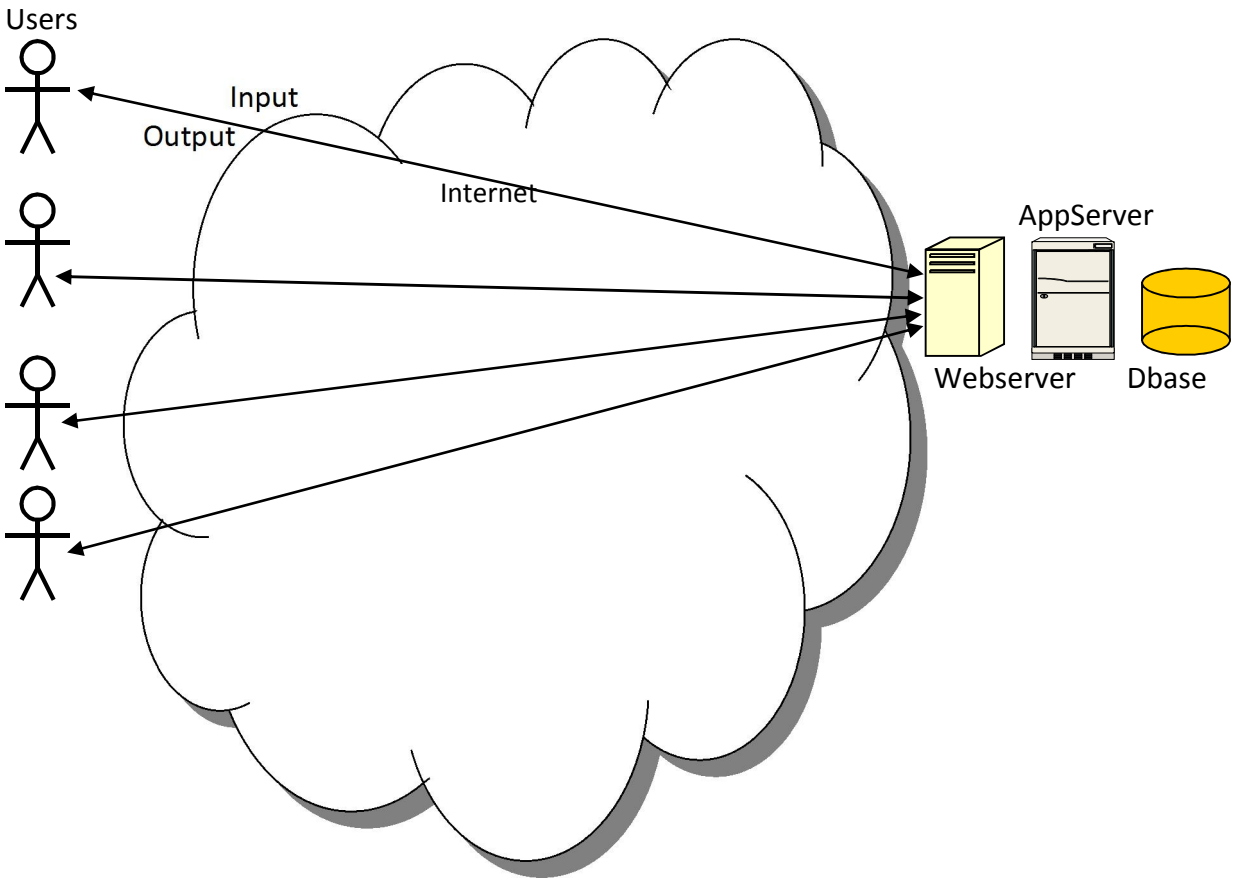
The general architecture of the Kiriwina Goodenough website shown in figure 3 shows that once a user sends a request, it is first sent to the webserver. If the webserver has the information that the user requested for at the front end level, it responds to the request, otherwise the request is then executed by the application server then sent to the database (backend) to search for the right information. Once the right information is found in the database it is sent back to the webserver via the application server and then it gets displayed for the user's consumption.

3.2.2 The Dynamic aspects of the KGDDA Website

Dynamic website elements refers to anything on a webpage which is regularly moving, updating, or changing. They can be text, imagery or advertising (basically anything on the website could be made dynamic). According to *(British Designs Experts, 2012),* it is definitely something that makes designs sharper and more engaging as far as website development is concern.

KGDDA website dynamic aspects were also decided during the analysis phase. The images on the home page were planned to change in 10 seconds interval. The updated time, date and day were also decided to be visible on the home page of the website. The most important dynamic aspect of the KGDDA which was decided during this phase was the district forum as it would encourage interactivity among users.

Figure 4: The architecture of KGDDA district forum



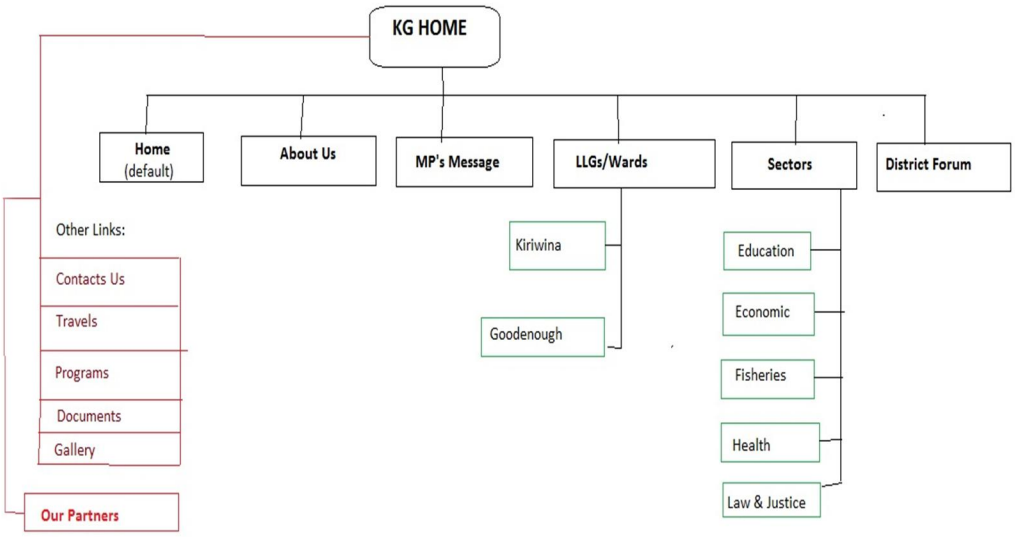
As shown in Figure 4, each subscribed user will be allowed to post a forum topic in which the other users will be able to see and in turn post a comment in reply to the post. All the posts and comments are to be stored in the database as illustrated above.

3.2.3 The Layout and the Navigation of the KGDDA Website

According to *(Cal Poly 2018),* the usability and ease of use of a website is influenced to a great extent by the content layout and the navigations. Navigational elements should provide intuitive guidance that allows users to find desired content as quickly as possible.

After coming up with an architecture of the website in the analysis phase the content layout and the navigations of the KGDDA website were decided. Figure 5 on page 18 shows the site map or layout of the KGDDA website

Fig 5: Site map of the KG official website



Up to this stage the architecture, dynamic aspects, the layout and the navigation of the website were decided. The next section of the Design and the Development phase of the KGDDA website will be the actual design and development of the website. That will involve the use of the techniques and languages of the web technology such as Cascading Style Sheets (CSS), the Extensible Hypertext Mark-up Language (XHTML), JavaScript and PHP as stated in section 1.2.

3.3 Design of the KGDDA Website

3.3.1 Design

Key design decisions were made in this phase in more detail. Hardware/software to be used, implementation of database-server-browser connection and algorithms to perform queries are some vital design goals.

So questions were triggered like: Do new visitors get a clear sense of what the district offers when they arrive at the site? Will the design direct visitors to do what the district want them to do? Is there clear strategy/plan informing the design? To evaluate the effectiveness of strategy in the website design, some checklist of questions were run through during this phase:

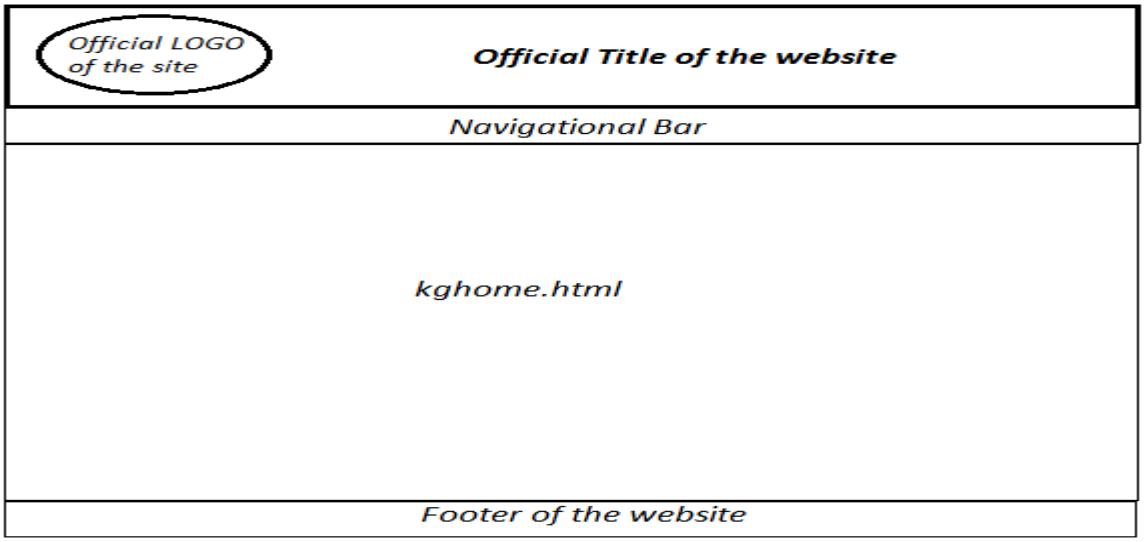
- What category of organisation is the district, and is that obvious on the website?
- What is the purpose of this website, and will the design of the website accomplish it?
- Who are target audience, and how will the design take them into consideration?
- What do the audience will do, and will the design encourage that action?

Defining the brand and setting specific website goals—then aligning the design accordingly, the website project is much more likely to succeed.

In the design phase, all the ways that would make the site as usable as possible has been considered. It has been imagined coming to it as a visitor and trying to find information from the site.

The organisation or the arrangements of the home page of the KGDDA website was one aspect that was decided and designed in the design stage. That includes how the title of the website would appear to the users, the appearance of the navigations, the contents, the footer and the general look of the home page.

Fig 6: The front page of the Kiriwina Goodenough website showing index.html page and the section where the home.html page resides



Beauty of the site may be relative, but that doesn't mean there aren't clear aesthetic principles to guide the website design. The best designs will align with their brands, create positive impressions for visitors and complement the content they're communicating (Mallon 2014). That was the idea that was taken on board in the designing stage of the KGDDA website.

3.3.2 Development

The main focus in this stage was to turn the design (section 3.3.1) into a working website. This is done by choosing the right programming tools/techniques as mentioned in the chapter 1 of this thesis. The following technologies used to develop the KGDDA website are listed below in bullet points:

- **The HyperText Mark-up Language (HTML)** – responsible for the skeletal structure of the website. HTML was used to create electronic documents (called pages) that are displayed on the KGDDA website. The pages may contain a series of connections to other pages called hyperlinks. HTML codes used during the development stage ensured the proper formatting of text and images so that your Internet browser may display them as they were intended to look. Without HTML, a browser would not know how to display text as elements or load images or other elements. HTML also provides a basic structure of the

page, upon which Cascading Style Sheets are overlaid to change its appearance. One could think of HTML as the bones (structure) of a web page, and CSS as its skin (appearance).

- **Cascading Style Sheet (CSS)** – was responsible for the website's style or presentation. CSS was used to define styles for the web pages, including the design, layout and variations in display of the KGDDA website for different devices and screen sizes.

- **JavaScript** – responsible for the website's functionality

- **PHP(recursive acronym for PHP: Hypertext Preprocessor)** – is a server scripting language responsible for back end scripting part and a powerful tool for making dynamic and interactive Web pages. It was used to execute the request from a user and in turn finds the right information from the backend and displays it on the front end for the user.

- **Mysql** – used to create the database for the district's forum in the website

The order in which the website was developed was outlined on the next page starting from the index page (*kgindex.html*).

3.3.2.1 Home Page for Kiriwina Goodenough

The index page is the Universal Resource Locator (URL) or the file that automatically loads when the website's domain name is launched in the web browser (Firefox, internet explorer, chrome, etc...). The term is also used to refer to the front page of the website. Some web developers refer to as a home page.

In this project, the index page which is called *index.html* is different HTML file from its home page *(kghome.html)*. The home page *(kghome.html)* resides in the index page and both are coded in a way that they are launched as the main page (front page) of the website once the URL (universal Resource Locator) or the domain name of Kiriwina Goodenough District (www.kiriwinagoodenough.gov.pg) is launched in the web browser. This was done with the use of <iframe> tag as shown in figure 7.

The *index.html* page contains the main title of the website, the official Logo, the main navigational bar and the footer. The *kghome.html* page contains the contents of the website and the other links (e.g. link to the gallery, travels, documents, etc...). Both pages were embedded to appear as one single page to the user as KGDDA home page.

3.3.2.2 Navigational Bar

The navigational bar is immediately below the title of the website. It contains the main links of the website. The main links of the website are as follows in bullet points below:

- **Home** – *by default the home link is the home page of the website once the URL (kiriwinagoodenoguh.gov.pg) is launched.*
- **About Us** – *Generally information about Kiriwina Goodenough District; its people, its culture, its environment, etc...*

- **MP's Message** – *Local Member's Official Message to Kirwirina Goodenough people.*
- **LLGs/Wards** – *Detailed information about each Local Level Government (LLG) in the district and Wards*
- **Sectors** – *Information of different sectors (Government departments) that service the district*
- **District Forum** – *it is in this section where issues concerning the district are raised and discussed by the people of Kiriwina Goodenough district.*

The above navigations were the main navigational buttons that were placed on the main navigational bar visible to the users while on the home page. There are also other navigations that link to both the internal pages of the website and the external web pages of different sites but relate to the KGDDA website.

3.3.2.3 Linking webpages to the backend data

Many Organisations develop websites that link to back end databases mainly MS Access, MS SQL server or MySQL. The Kiriwina Goodenough district's data was stored is a database created using MySQL database management system. The information about number of local level governments, the number of it wards, the names of its councillors, the total households each ward has, total population in each ward, etc. were stored in the database.

The back end language (PHP) was taken on board to be responsible for the display of the data to the front end (website) from the database. The PHP code retrieved the data from MySQL database table, then it got displayed again in a table form on the website.

The design of the table on the website was done in a way that it suits the theme or brand of the website and the type of data to be displayed.

The back end data for Kiriwina Goodenough district stored in a database table is available in **Appendix B** of this thesis report.

3.3.2.4 Kiriwina Goodenough District Forum

The District forum was developed from a module called Phorum downloaded from the http://www.phorum.org. Started in 1998, Phorum was the original PHP and MySQL based Open Source forum software. Phorum's developers pride themselves on creating message board software that is designed to meet different needs of different web sites while not sacrificing performance or features (Brianmoon, 2008).

Unpacking the module

The module was downloaded as a zip file. The files were then extracted using the inbuilt windows extraction software, then placed in a folder which was created and assigned a name 'phorum'. The

folder then placed in the document root for the website which was the folder in which all the KG website's web pages were stored. For instance KG website's URL is http://www.kiriwinagoodenough.gov.pg and the forum files were placed in a directory called phorum inside the document root, the forum installation will be available at the URL http://www.kiriwinagoodenough.gov.pg/phorum. From there on, the forum URL is simply {http://www.kiriwinagoodenough.gov.pg/phorum}.

District forum Database creation

Officially, only the MySQL database server supports Phorum, so it (MySQL) was used to create the database for the forum. The KG website is hosted by the hosting provider (Kumulsoft), and this was done via the access to a control panel. There is a MySQL database link on the main page of the control panel, and from there the database for the forum was created. Alternatively, this can be done via access to phpMyAdmin by Logging with the credentials (username and password) provided by the host, and the use of the "create new database" function on the main page.

The user name and the password are not the same in an official forum for KGDDA website from the current working forum. It was for security reasons, the username and the password for the district forum is not the same in the officially hosted KGDDA website.

Database Configuration

After setting up the database, it was the time to tell Phorum (the module) how to access that database. The configuration for this was in the file include/db/config.php inside the phorum folder. Following the instructions very carefully, the file was located and edited to agree with database details created. This part was found to be very technical thus full concentration was sought to ensure successful configuration of the file.

Admin interface

The files for the admin interface have been uploaded, the database has been created and the database access for the district forum was configured, the web based installation script was then run to create the administration interface. As long as the configuration was done successfully in the previous steps, running the administration interface proceeded smoothly.

Once the installation was done, the "kiriwinagoodenough.gov.pg/phorum/admin.php" link was opened using Mozilla Firefox browser to see the admin interface home page. From then on, further fine tuning of the district forum was conducted.

General settings like the home page of the forum, the title, the general appearance of the forum was done while in the admin interface. Even how to subscribe to the forum was done while in the admin interface.

Figure 7: Home page of the forum showing the result of the settings done while in the admin interface of the forum.

The Administration interface and the home page of the district forum are shown in the **Appendix C.**

3.4 Testing of the KGDDA Website

Testing of the Website's functionality was conducted at various stages of design and development phase. Reviewing of Web page content, functionality, and usability was done during this phase. Usability is the measure of how well the Web page allows a user to accomplish goals. Testing how well the web pages allow users to do that is called usability testing.

Usability testing is all about the practical checks of what is in a good final website, such as speed, user-friendliness, security, etc. A lot of these details aren't visually apparent; for example website's security cannot be seen when typing its URL. Nonetheless, usability is a make-or-break issue for websites that work. If a visitor can't find what he or she is looking for because of poor navigation, he or she will usually leave. If pages take too long to load, both search engines and visitors will surely leave.

While in this phase there were important certain things that the website needed to have that were checked, to ensure that the potential visitors are happy. Following checks were conducted before the website was allowed to move to its final phase, the Implementation.

- **Navigation** is crucial when it comes to website design. Without it the potential visitors would not be able to find out about Kiriwina Goodenough district and what it does. The navigation should be easy to use and clearly visible. Important navigational buttons where placed on the home page of the website to ensure visibility to the users. Some examples include visible links to home page, "About Us" and other buttons.

- **Testing the links**. This was done to ensure that the users were directed to what they want to see while visiting the website. The navigational buttons that link to both internal information and external information were tested to make sure right links were linked to the right information.

- **Browser compatibility.** This was testing the website if it could still launch successfully on different browser windows. The website was launched successfully on four different browsers, the Internet Explorer, Safari, Firefox, and the Chrome.

- **Platform Compatibility.** The website was tested on mobile devices. It was important to ensure that the webpages were responsive and be able to be read on a variety of different browsers and screen sizes as well as on mobile and tablet devices. This was done by sending the temporary link of the website to selected colleagues and they were able to launch the site using the mobile phones.

- **Content** was the most important part of the webpage. No matter how flashy and aesthetically pleasing the website looks, without the content the website would be useless and of little value to the readers or visitors. Contents of the website were place in way that it was less cluttered, easier to read and manoeuvred around the website's readable areas.

- **Website Speed.** It is important that the KG website loads quickly. This was one of the most important requirements during the designing and development phase. To ensure to maintain standard speed of the website, images that are on the website were compressed or reduced in sizes before using them on the website. The files were also reduced in size before being loaded to the website.

- **Branding.** The District's name (Kiriwina Goodenough District Development Authority) and district's logo needed to be included on every page so that the visitors know exactly where they are and what to expect. The official colour (*Green, red and white*) of the district should be promoted also although out the website.

- **Consistency.** The design, font, style, content and other aspects need to be consistent throughout the entire website. Keeping the website simple and consistent was one of the most important basic website requirements that was considered during testing. Some colleagues were asked to give their views on the content, font style, design and size during this test.

- **User Friendly.** This means that the website should be user-friendly, simple and reliable. Selected group of colleagues were asked to do a tour of the website to ensure it was user-friendly and visible to what they want to look for.

- **Interactive.** Having a **district discussion forum** on the website encouraged interactivity among the users. It is the feature that allows or gives opportunities to users to discuss of debate developmental issues concerning the district. Certain users were subscribed to the as part of the testing process to ensure interactivity.

As explained above, those tests/checks were done on the website to ensure its successful implementation.

3.5 Implementation and Maintenance of KGDDA Website

Implementation involves the publishing of Web pages to a Web server, determining who is responsible for updates to the Web page and limiting the ability of certain users to update the Web page. It also involves website monitoring and utilizing logs to keep track of website usage and statistics. Security of the website was an important aspect that was considered during the Implementation and the maintenance phase.

3.5.1 Implementation of the KGDDA Website

Implementation of the KGDDA website meant that the Design and Development stage was completed, passed the Testing stage and was ready for launching.

The following steps were taken in the implementation stage of the KGDDA:

I. Identification of the Host. Choosing a reputable website hosting firm was very important when it comes to implementation stage. Kumulsoft Limited was selected due to the company's reputation in hosting secured websites for a long time.

II. Registration of the KGDDA website **domain name**. With the assistance of the Host (Kumulsoft) the registration was done with the involvement of the Papua New Guinea University of Technology (Unitech) ICT services upon formal application as they are the specialised party for domains with (.gov.pg) extension.

III. Gathering all the contents necessary to populate the pages of the site, and entering them into the pages.

IV. Transferring the pages to a server, and testing them. Technical aspects like platform compatibility between the local host and the webserver was tested during the implementation stage. Some minor technical issues faced during publishing were fixed like missing links, images and some coding issues.

V. Launching the KGDDA site by informing the public about its existence.

All the above steps where followed to ensure successful implementation of the KGDDA website.

3.5.2 Security of the KGDDA Website

Security was an important part of the KGDDA website development. Like other websites, KGDDA website unfortunately will be prone to security risks. And so is the network to which web server it is hosted resides in. Setting aside would-be risks created by people who misuse the network resources, the web server and the website it hosts present the most serious sources of security risk.

Web servers by design open a window between the host's network and the world. The care taken with server maintenance, web application updates and the website coding will define the size of that window, limit the kind of information that can pass through it and thus establish the degree of web security a website will have.

The security is high if the host has few network resources of financial value, website and the host aren't controversial in any way, the network is set up with tight permissions, the web server is patched up to date with all settings done correctly, the applications on the web server are all patched and updated, and the website code is done to high standards.

The security is relatively lower if the host has struggling financial statues, if the website content is controversial, the servers, applications and site code are complex or old and will maintained by an underfunded or outsourced I.T firm. Most I.T firms are budget challenged and tight staffing which often creates deferred maintenance issues that play into the hands of any who want to challenge the web security.

Website security testing, also known as web scanning or auditing, is a hosted service provided by Kumulsoft Limited – who will be responsible for the hosting and the security of the KGDDA website. This service requires technical expertise and capabilities of a host and so Kumulsoft Limited was the reason why it was taken on board.

The host has the security measures that keep the websites safe from intruders or would-be hackers on the web. It has the best defence against would-be attacks on any website. It regularly scans websites and competently set up domain that is running current applications that support websites.

3.5.3 Management and Maintenance of KGDDA website

Determining who is responsible for the general management of the website was not part of the scope of this academic project but worth mentioning as it was part of the very important WDLC phase the 'Implementation and Maintenance'. The general management includes updating the web pages, tracking and monitoring the usage of the website, maintaining the security of the website and general management.

KGDDA Website Maintenance comprises all the activities needed to ensure the operational integrity of the website. In other words, it is about doing all the things needed to make sure the website runs smoothly.

That is the end of the development phases of the KGDDA website. The next chapter discusses and brings the thesis to a conclusion.

CHAPTER 4. DISCUSSIONS AND CONCLUSION

This chapter discusses the findings and contributions of the thesis, points out limitations of the current work, and also outlines directions for future work/research.

The core objectives of this research has been demonstrated in the thesis report as well as on the website itself. However, still many extensions of this research deserve further consideration.

The chapter is divided into two main sections. Section 4.1 is a Discussions section and Section 4.2 brings the thesis to a conclusion.

4.1 Discussions

4.1.1 Contributions of this Thesis

The end result of this thesis is a working official website which is the 'information hub' of the district. The Kiriwina Goodenough district was never officially represented like this before. This work has made the district archived a milestone in its history as a district in more than 40 years since Papua New Guinea became an independent nation in 1975.

The website will be a catalyst to drive the district's development agendas including tourism, economic, infrastructure, etc. It has the power to drive forward economic activities in the district if utilised well.

The website also has the capacity to store important documents for the district as part of its drive towards advocating transparency and accountability in the way the leadership in the district is conducted.

4.1.2 Limitations of the Current Work

While this project brought about good symptoms of changes/improvements for the district, it has several limitations that require consideration.

Important projects like this one need reasonable amount of money to start it all the way to implementation phase. The delay in funding the project by the would-be-owners of the project had slowed the expected smooth progress. That had cost the expected completion date of the project. It was expected the project would have been completed in six (6) months but took almost a year to be completed due to financial constraints.

Another pressing one was the network coverage. Though it may be out of scope of the project, it is worth mentioning in this section. The network needs to be upgraded to 2G or 3G or even 4G to allow easier browsing and administration of the website at the district level. Currently the administration of the website is done outside of the district due to weak internet coverage.

On the implementation part, the website was partially hosted but currently with restricted administrative rights due to non-payment of the full hosting bills to the hosting company. Administration of the site will be granted to the appointed district officers once the payment issue is finalised.

Audience is another limitation to this project. It is predicted that about 90% of the audience or visitors of the site will come from outside of the district. Only less than 10% of them will be the few educated and the public servants in the district who can afford internet access. There are couple of reasons as to why that was predicted. One is the low level of literacy in the district. Another reason being is the lack of educational awareness from the Government, Non-Government Organisations (NGOs), students, etc. on what information Technology (IT) can do to drive the district's development agendas.

4.1.3 Future Work

While this thesis has pointed out how much benefit it will bring to the district as far as IT is concern, many opportunities for extending the scope of this thesis remain. This section presents some of these directions.

I. **Upgrades of the website:** Even though it is officially a kiriwina Goodenough district's website, it is still regarded as a prototype. It is always a room for upgrading of the website whenever the need arise in the future. Today every website is meant to be constantly dynamic and so it is better to say every website is always a prototype.

II. **Network:** This may become a project on its own in the future. It will embark on upgrading network from very basic 2G to 3G or even 4G to enable easier internet access in the district. This is only possible with the assistance of the service providers like Digicel or Telekom.

III. **I.T Infrastructure:** The setup of I.T infrastructure in the district come after the network upgrade or in parallel. It is alone a very important project. The I.T infrastructure includes setting up of servers, clients (desktops and laptops), network printers, Local Area Network (LAN), email, etc. Currently the district don't really have such in place.

4.2 Conclusion

This thesis report is the official background report for the academic work done for the Kiriwina Goodenough district. The decisions on how the website was built depended on the results of the planning/requirements gathering stage, since it played a major role into describing the specific user requirements for the website.

Furthermore, more awareness on how Information technology (I.T) can drive development agendas should be encouraged to not only in Kiriwina Goodenough District but to all the rural districts in Papua New Guinea. It was discovered during the study that more than half of the Kiriwina Goodenough district's work force are not yet to that level where they can appreciate what I.T can do as far as development is concern.

While it is appreciated that websites sit on the web that does not guarantee the smooth administration and updating. The I.T infrastructure is very important that it must be set up to not only enable smooth administration of the site but also act as a catalyst for more development in the district.

Responsive design was used for the website to maintain the district's requirement. A module was integrated to the website to add more functionality. The responsive design and the module make the website development more multi-tasked. In addition both helped to save a lot of time as far as development time is concern.

The website is linked to a couple of very important external websites; to ensure it attracts more visitors. The website has a photo gallery link that show pictures of Kiriwia Goodenough district's people, land and cultures as it is one of the main requirements of the district. Due to several issues faced during the research process like the 2016 student's unrest and financial constraints; the project was not officially delivered on schedule. The approved time period of the project was about six (6) months, but whole project took around a year to finish the design and development process due to reasons stated above which were beyond control. Eventually the website was launched/hosted by the host (Kumulsoft Limited) under the registered domain name kiwirinagoodenough.gov.pg in April of 2017. It fulfils most if not all the district's requirements as per the last meeting with the district in the year 2016.

It was a great experience working and researching not only in the university environment but outside as well especially in a rural setting. It was discovered during this recent research work that the information technology (I.T) is very much needed out there in rural areas in order to drive their development agendas. On the academic part, many new techniques and skills of working on a web application academic project like websites were learnt. The work had enriched me with different web programming languages such as HTML, CSS, JaveScript and PHP. It had played a great part in contributing towards growing my knowledge and confidence on working with different levels of people on coming up with successful projects especially the I.T projects.

Appendix A – Project timetable and the cost

1. Timetable

The table shows the detailed information on the expected timetable for the project. The project is divided into phases, and the schedule for each phase was also shown on the table.

Start/End Date	Phase	Description	Responsibity
Mid-2015-March 2016	**Planning/Requirement Gathering**	This first phase is a very critical phase as it helps to set the foundation for the entire project. I see it as the most in-depth phase, as there will be a high volume of discussions and information gathering. Sample questions that should be asked during the meetings are as follows; What is the purpose of the website? What concerns and pain-points do you have regarding the content of the current website or non-existent website? What goal would you like to reach after the website is completed? Etc.…	Emmanuel BUDIBUDI/Kiriwina-Goodenough DDA CEO/Sector Heads
1st April 2016-22nd April 2016	**Analysis phase**	The architecture of the (website), the layout, the navigation and some dynamic aspects of the website were decided in this phase	Emmanuel BUDIBUDI/Supervisors (Mrs. Pingi/Mr. Moare)
25th April 2016 – 15th July 2016	**Design and Development**	Actual Development of the website then takes place in this phase.	Emmanuel BUDIBUDI/Supervisors (Mrs. Pingi/Mr. Moare)
18th July - 29th July 2016	**Testing and Deployment**	Once the project is completed, conduct in-house testing with the supervisors and presentation.	Emmanuel BUDIBUDI/Supervisors (Mrs. Pingi/Mr. Moare)/KumulSoft Limited

2. Budget

The proposed costs and budget of the project. Also include information on how you intend to manage the budget.

Phase	Cost Description	Estimated costs
1. Descovery/Expolorat ion	Air Fare (return): POMLSAPOM Stationary: Two Weeks village Stay cost:	K1800.0 0 K1000.00 K2000.00
2. Layout Design	Design cost: Consultation cost:	K1000.00 K2500.00
3. Development	Air Fare (return): Development Software cost: Consultation cost:	K1800.00 K1500.00 K5000.00
4. Testing and Deployment	Testing Hosting cost: Launching:	K5000.00 K8000.00 K2000.00
5. Others (Cost of the Academic Program)	Academic Program Fee (UPNG):	K4000.00
	TOTAL:	**K35,600**

Appendix B – District database

The Part of kiriwinadata table in the kgdata database that stores data for Kiriwina Local Level Government.

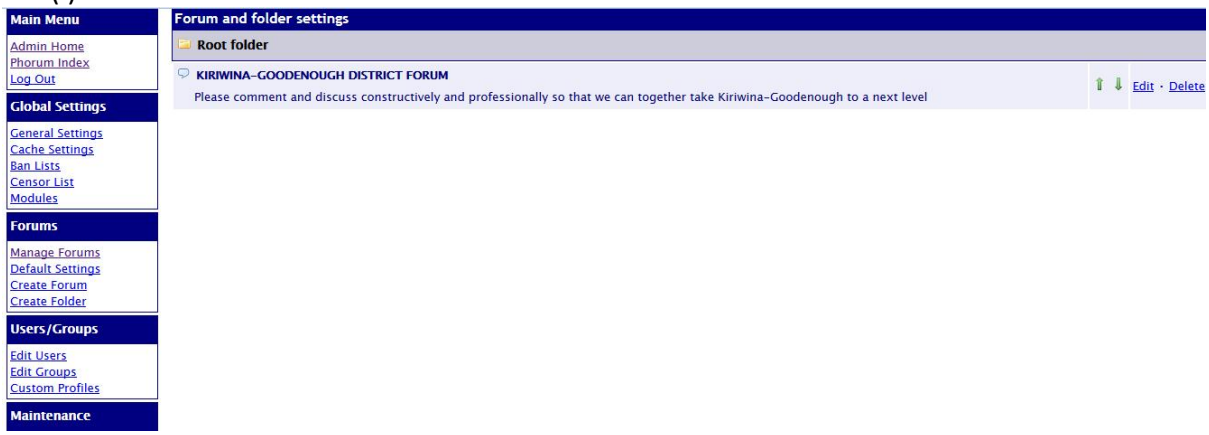
Kiriwinadata table of kgdata Database

+ Options

ward_number ▲ 1	Ward_name	Ward_councillor	No_Household	No_Male	No_Female	Total_Popuation
1	Dayagila	Hon. B MOKARAWABU	98	274	318	592
2	Kabwaku	Hon. Solomon PALUWA	180	599	538	1057
3	Kaibola	Hon. Bunemata TAORI	238	498	489	987
4	Kuruvitu	Hon. David KEYALU	177	584	575	1159
5	Kwebwaga	Hon. Kuleleku TOMDIA	170	453	444	897
6	Mwatawa	Hon. Modadeda MODAOSI	193	690	583	1273
7	Omarakana	Hon. Afred MWABWANA	242	845	831	1676
8	Okaikoda	Hon. Jasper Mwaveda	202	656	589	1245
9	Liluta	Hon. Lawrence YAWATA	340	1087	1060	2147
10	Tubowada	Hon. Toidaya MWEYOGA	225	647	655	1302
11	Koma	Hon. Yapeta TOSIU	244	971	958	1929
12	Kaduwaga	Hon. Amos MOWANA	265	761	735	1496
13	Simsimla	Hon. Persian GILBERT	74	245	240	487
14	Wabutuma	Hon. Cedrick TASAKI	193	514	522	1136
15	Yalaka	Hon. Andrew MEKANAI	193	689	572	1261
16	Gumilababa	Hon. Gerry TOMAGARI	367	1531	1423	2954
17	Ilalima	Hon. Kwemwai MULAMOGA	174	587	579	1166
18	Kapwapu	Hon. Tony GIYOGAGA	142	397	390	787

Appendix C

(i)KG forum admin interface -



(i)KG forum user page

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