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The Development of Free Patent (FP) Monitoring System of PENRO Pangasinan

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Abstract – *The PENRO - Free Patent (FP) Monitoring System was developed to help applicants of PENRO Pangasinan applying for a Free Patent Application by providing the following features: 1.) Provision of an online solution for the organization; 2) Accessibility – applicants can access the checklist of their Free Patent Application remotely online, anywhere on the planet anytime of the day; and 3) The system provides the venue for scheduling of the clients preferred date of document retrieval. 4.) The Records officer can easily check if the applicants are complying with their requirements. The Free Patent Record Monitoring System improves the PENRO Pangasinan through giving good services to the applicants of free patent application and also to the employees. It benefits the records officer, by making their work faster, consistent and organized. The clients/applicant can also be benefited by viewing their Free Patent Application online. The process involved the Waterfall Methodology with its six phases: Requirements Phase, Design Phase, Implementation Phase, Testing Phase, Deployment Phase and Maintenance Phase. The requirements had gone through an internet research, library research, and established interview to the Records Officer. The study displays the checklist of the applicant who applied and applying for Free Patent Application. It has feature to add new entry, edit, search, and update button. All the data has been stored in the database for future reference which can be used by the agency.*

Keywords – *Free Patent (FP), Record Monitoring, Online Monitoring*

INTRODUCTION

One of the most notable users of technology are the governments around the globe. Technology is being utilized to enhance the access to and delivery of government services to benefit the organization, the employees, partners, and most importantly the citizens/public. Technology is also updated with reducing the cost of government operations and improving transparency and accountability (Hanna, N. and Knight, P., National Strategies to Harness Information Technology, 2012).

In the Philippines, technology, specifically in the field of Information and Communications Technology, is playing an increasingly significant role in the lives of the Filipinos, revolutionizing the rules of transacting and doing business with the people. In the realm of the government, I.T. starts introducing promising innovations such as the automation of processes and work flow of government agencies, greatly

improving their capacity to provide public goods and services effectively.

In addition to this a public record is information that is recorded and stored by a government which a member of the public has a right to access and review. Records can be in tangible forms, such as paper, photographs, and maps, or stored on electronic media, such as CDs, DVDs and computer databases (Grimsly, S., American Government: Practice and Study Guide, n.d.).

Furthermore, majority of the government field offices uses the manual system of records monitoring. This can implicate disadvantages which are major contributors to the problem identified above that results to constraints in time and resources. One of the major disadvantages of a manual records monitoring system is that the can be very labor-intensive. A lot of steps are needed ensure that the said system is operational and processes are stringently followed. This manual system will require continuous monitoring to ensure that the public's transactions are accounted for. It is also more difficult to share records information throughout the agency and the agency's clients and customers.

Moreover, the lack of computerization will also make accessing the records a more cumbersome process. As pointed out by Breitmeyer (2015), "Manual systems put pressure on people to be correct in all details of their work at all times, the problem being that people aren't perfect. With manual systems the level of service is dependent on individuals and this puts a requirement on management to run training continuously for staff to keep them motivated and to ensure they are following the correct procedures. It can be all too easy to accidentally switch details and end up with inconsistency in data entry or in hand written orders. This has the effect of not only causing problems with customer service but also making information unable be used for reporting or finding trends with data discovery. Reporting and checking that data is robust can be timely and expensive. It takes more effort and physical space to keep track of paper documents, to find information and to keep details secure. When mistakes are made or changes or corrections are needed, often a manual transaction must be completely redone rather than just updated. Another impact of manual systems is on Customer service. Customer queries can be difficult to respond to as information is stored in different places and may even require that you find the right person before being able to respond. This is no good if they are out to lunch or only work part time."

Good management and monitoring of records and information is fundamental to a well-functioning organization since it supports business activity and provides a basis for efficient service delivery. It also provides the mechanism whereby both the private and public sectors can account for their decisions and actions. Records provide evidence for the public to confirm or claim their public rights and entitlements, as well as providing individuals with evidence to justify government decisions and a mechanism whereby they can have trust in private enterprise. Moreover, good records monitoring is simply good business practice (ICA, 2008).

Furthermore, the goal of records monitoring is to help an organization keep the necessary documentation accessible for both business operations and compliance audits. In some small to mid-sized businesses, spreadsheets are used to track

where records are stored, but larger organizations may find records monitoring software suites that are tied to both a taxonomy and a records retention schedule to be more useful. Such software suites may be marketed as enterprise information management (EIM) products that can help an organization to manage and monitor both records and ordinary content (Rouse, 2014).

The PENRO - FPs record monitoring system aims to help applicants of PENRO Pangasinan applying for a Free Patent Application by providing the following features: 1) Provision of a Web-based solution for the organization; 2) Accessibility – applicants can access the checklist of their Free Patent Application remotely online, anywhere on the planet anytime of the day; and 3) The system provides the venue for scheduling of the clients preferred date of document retrieval. 4.) The Records officer can easily check if the applicants is complying with their requirements.

METHODS

The study uses a descriptive-development research design that employed modified waterfall as its development model.

Descriptive study can be explained as a statement of affairs as they are at present with the researcher having no control over variable. Moreover, descriptive research may be characterized as simply the attempt to determine, describe or identify what is, while analytical research attempts to establish why it is that way or how it came to be. An important distinctive trait of descriptive research compared to alternative types of studies relates to the fact that while descriptive research can employ a number of variables, only one variable is required to conduct a descriptive study. Three main purposes of descriptive studies can be explained as describing, explaining and validating research findings. Descriptive studies are closely associated with observational studies, but they are not limited with observation data collection method, and case studies, as well as, surveys can also be specified as popular data collection methods used with descriptive studies (Fox, 2007).

Winston and Hoffman (2005) explained the Waterfall Methodology applies the principle that the development process should be divided into phases to provide clarity of content. Results of each phase are documented and the next phase only begins when all pre-requisites are accomplished. It is not permitted to return to the previous phase, once another has started unless the implementation requirement s change. The project is completed when all phases' gate reviews are accomplished. Requirements change must be tracked and controlled so as to reduce scope creep.

The developers made use of the waterfall model for the development of the PENRO - FP's Record Monitoring System which is documentation driven because it is congruous and it systematize the processes being contracted in each distinctive stage that were resembled to the needs of integrating the functionalities of the system. This made the understanding much simpler and that testing in inherent to every phase of the waterfall model. Moreover, it is an enforced disciplined approach that caters to the very minimal amount of resources that was required by the developers to implement this model.

The waterfall model represents the sequential and linear process of software

development. It flows through the phases of Requirements, Analysis, Design, Implementation, Testing, Deployment and Maintenance.

Sources of Data

The developers conducted interviews to specific persons to give relevant information to support this study.

The locale of the study is PENRO Pangasinan the primary source of info was taken from the interview the Records Officer, Ms. Evangeline Evangelista. To whom the developers gathered relevant information needed for them to come up with a better idea on how to design the proposed system in PENRO Pangasinan.

The secondary source of data was based from the different forms from the record department, unpublished books from the research library, related thesis manuscripts from the research unit, which the developers used in making an outline for the study and internet research which also helped the developers to look for documents which cannot be found in the research library.

Instrumentation and Data Collection

In gathering data and information the developers used different techniques to define needed requirements which are essential in the development of the study. Those information and data gathered is a big help for the development of the proposed system. The data collection tools that were used by the developers are internet research, library research, and interview guide.

Internet Research. Internet Research is an international, refereed journal that aims to describe, assess and foster understanding of the role of wide-area, multi-purpose computer networks such as the Internet. The Internet continues to gather influence and momentum, and it becomes increasingly important to be aware of the potential applications of this powerful resource throughout professional, political, personal and academic life. We therefore strongly encourage research that develops theoretical insights and understanding on topics and issues addressing the potential social, ethical, economic and political implications which arise from mass public access to information resources (Thomson Routers, 2016).

In addition to this, internet research is the practice of using Internet information, especially free information on the World Wide Web, in research. It focused and purposeful, uses internet information or internet-based resources, tends towards the immediate and tends to access information without a purchase price. Internet research has had a profound impact on the way ideas are formed and knowledge is created. (Amandeep, 2014)

The developers made use of the internet to find articles, news, journals, and books in order to find related studies for reference and to find more information to be used in the literature of the study which supports the study.

Library Research. It is a general or specialized library that collects materials for use in intensive research projects (Jones, 2017).

Library research involves the step-by-step process used to gather information in order to write a paper, create a presentation, or complete a project (Rasmuson, 2016).

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The researchers decide to conduct a research from the library to answer the hypothesis formulated in the study and make decision about important issues. The library holds an in-depth collection of material on one or several subjects it will generally include secondary sources. This helps the researchers in finding similar studies and thesis that can be used as references in the process of studying the system.

The researchers also looked for relevant PENRO - FP's Record Monitoring System reference materials in the library such as related IT project and instruments in reading magazines that had topics related to the study.

Interview Guide. A good interview guide also acknowledges four important facts of human social interactions that influence what people are likely to say to you. These four facts are: (1) Research questions are not the same as interview questions; (2) People's espoused theories differ from their theories-in-use; (3) Interviews are social occasions; and (4) Testimony by itself is relatively weak form of evidence. This guide to interview guides offers some techniques for accommodating these four important facts (Kennedy, 2006).

The interview guide is a list of questions you will ask your participants during the interview. The order of the questions and the level of degree to which you diverge from your set defined list of /questions will vary based on the type of interview you choose to conduct (Angus, N.Y.)

The researchers have decided to use an interview guide for data gathering to get all needed information faster and more reliable in creating the system. Interviewing is a technique of gathering data from specific person by asking those questions and getting them react verbally (See Appendix A).

Tools for Data Analysis

The following will be use in the data which aid in the development of the system.

Average Weighted Mean. The average weighted mean is similar to an arithmetic mean (the most common type of average), where instead of each of the data points contributing equally to final average, some data points contribute more than others. The notion of weighted mean plays a role in descriptive statistics and also occurs in a more general form in several other areas of mathematics (Weighted Mean, 2013).

Average Weighted Mean is a kind of average. Instead of each data point contributing equally to the final mean, some data points contribute more "weight" than others. If all the weights are equal, then the weighted mean equals the arithmetic. Weighted means are very common in statistics, especially when studying populations (Andale, 2014).

The developers made use of an average weighted mean to allow the final average number of percentage in test and acceptability of the system that reflected the relative importance of each number that is being averaged to gather and represents the overall evaluation of the respondents for the developed system (See Appendix B).

Average Weighted Mean Formula

$$\bar{x} = \frac{w_1 x_1 + w_2 x_2 + \ldots + w_n x_n}{w_1 + w_2 + \ldots + w_n}$$

Where:
x is the repeating value

w is the number of occurrences of x (weight)

$\bar{x}$ is the weighted mean

Database Schema. The structure of a database system, described in a formal language supported by the database management system (DBMS). In a relational database, the schema defines the tables, the fields in each table, and the relationships between fields and tables (Bean, N.Y.)

According to Tutorials Point (2015), a database schema is the skeleton structure that represents the logical view of the entire database. It defines how the data is organized and how the relations among them are associated. It formulates all the constraints that are to be applied on the data.

The developers utilized this tool in order to set forth the database structure for the system to be developed (See Appendix E).

Entity Relationship Diagram. An entity relationship diagram (ERD) shows the relationships of entity sets stored in a database. An entity in this context is a component of data. In other words, ER diagrams illustrate the logical structure of databases (SmartDraw, 2016).

An entity-relationship diagram (ERD) is a data modeling technique that graphically illustrates an information system's entities and the relationships between those entities. An ERD is a conceptual and representational model of data used to represent the entity framework infrastructure (Techopedia, N.Y.).

The developers utilized this tool in order to present the entities and its attributes involved in the system developed (See Appendix C).

Flowcharts. A flowchart is a visual representation of the sequence of steps and decisions needed to perform a process. Each step in the sequence is noted within a diagram shape. Steps are linked by connecting lines and directional arrows. This allows anyone to view the flowchart and logically follow the process from beginning to end (SmartDraw, 2016).

A flowchart is a formalized graphic representation of a logic sequence, work or manufacturing process, organization chart, or similar formalized structure. The purpose of a flow chart is to provide people with a common language or reference point when dealing with a project or process (Galagher, 2008).

The developers utilized this tool in order to identify the systematic flow of information of the system to be developed.

RESULTS AND DISCUSSIONS

The Existing Process of Record Monitoring System

PENRO Pangasinan is currently using a manual system to process the free patent application that has been applying by the applicants. The creation, storage, retrieval use, and permanent archival retention of information are increasingly difficult challenges for the Records Officer.

Despite the influence of technologies, PENRO Pangasinan still remains in the manual procedure in managing applicants' free patent application. Using filling cabinets and storage room as their essential tool in storing files and applicant records, it wouldn't neglect the possibilities of occurrences of

having misfiled, mislabeled, untracked, or even lost records.

The manual process of the current system they are using, consequently time consuming and less orderly. Thus it will take longer time for the Records Officer in locating and releasing a certain file and the process for applying for a PENRO - FP. Moreover, the amount of work done on paper as well as inaccessibility of other files to be preserved properly for future use increases. Furthermore, data stored in filling cabinets is easily accessed by anyone without the implementation of a high security system.

The tendency of having manual system in today's modern world can weaken the productivity in the production of goods services and effort to become more competitive than others.

In Figure 4.1 shows the flowchart of the existing system in locating and releasing copies of documents enclosed in the Free Patent Application.

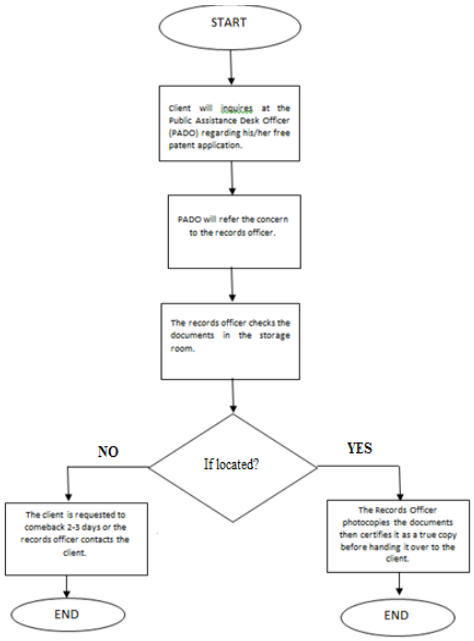

FIGURE 4.1 Flowchart of the Existing System in Locating and Releasing Copies of Documents enclosed in the Free Patent Application.

This is the flowchart that shows the client physically goes to the office to inquire about the status of his/her application and/or to retrieve copies of the submitted document requirements wherein the Records Officer checks for the availability of the said documents which takes at least thirty minutes to locate.

Figure 4.2 shows the existing process in the application procedure that clients undergo when applying for a Free Patent.

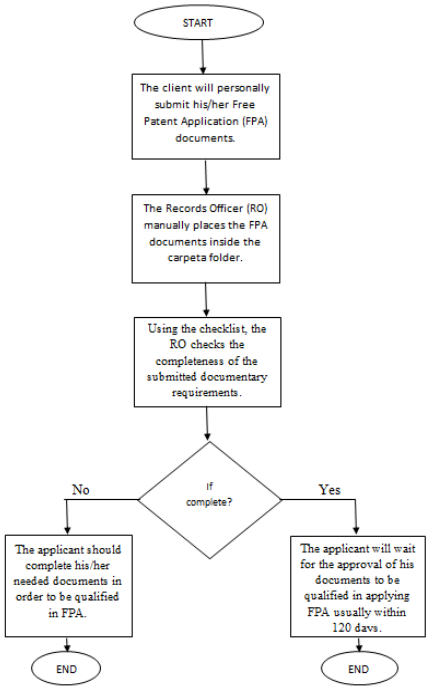

Figure 4.2 Flowchart of the Existing System in Applying for a Free Patent

This is the flowchart that shows the process in applying for a free patent. The applicant will submit his/her required

documents to the office. Upon submission of their documents, the records officer manually places the PENRO - FP documents inside the carpeta folder and using the checklist, the records officer checks the completeness of the submitted documentary requirements.

Features of the System

The system is being developed in HTML with Bootstrap and using MySQL as the database for the system. The system's features are implemented in order to monitor and manage clients Free Patent Applications (PENRO - FP) and also upload documents for checking purposes. The system also features viewing of client's checklist from the homepage.

The overall system's features and functionalities are presented in the following pages. The developed system is composed of different pages including the following in the succeeding pages.

The Home Page is presented in Plate 4.1 shows the client can view their checklist.

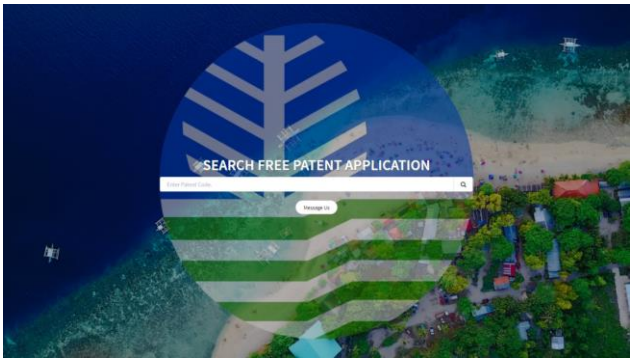

Plate 4.1 Home Page

This is the homepage of the system where the client can view their checklist by inputting their Free Patent Application number. After inputting the PENRO - FP number, the client can click the search button to show the "Checklist Modal".

The client is also able to send message to the system by clicking the "Message Us" to show the "Message Modal" where the user will input the message.

The Checklist Modal is presented in Plate 4.2 that shows the availability of the applicant documents.

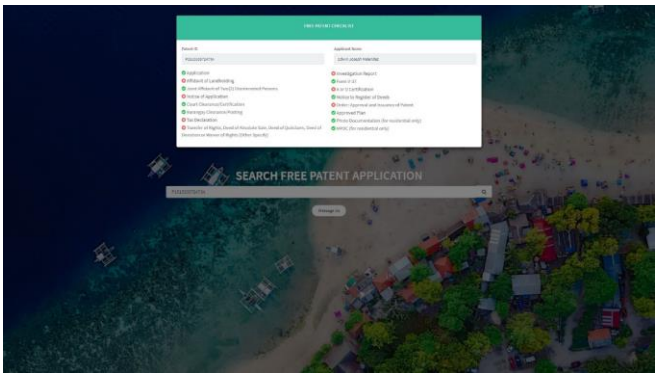

Plate 4.2 Checklist Modal

This is the modal that shows the client the current status of their Free Patent Application. All required documents are listed on the modal. The check and cross icon represent the status of a specific document. When the icon is cross, it means PENRO doesn't have the specific document, while the check icon means that PENRO has the specific document of the Free Patent Application.

The Message Modal is presented in Plate 4.3

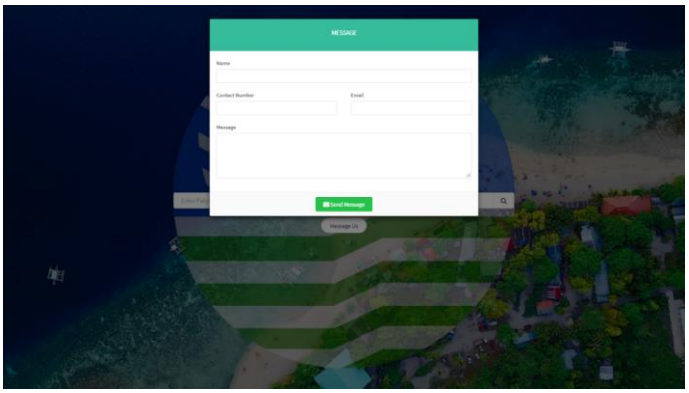

Plate 4.3 Message Modal

This is the modal that shows the message form where the client is able to send message to the system by inputting all the required field of the form. After

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submitting the message, a notification will show whether the message is sent or not.

The Login Modal is presented in Plate 4.4.

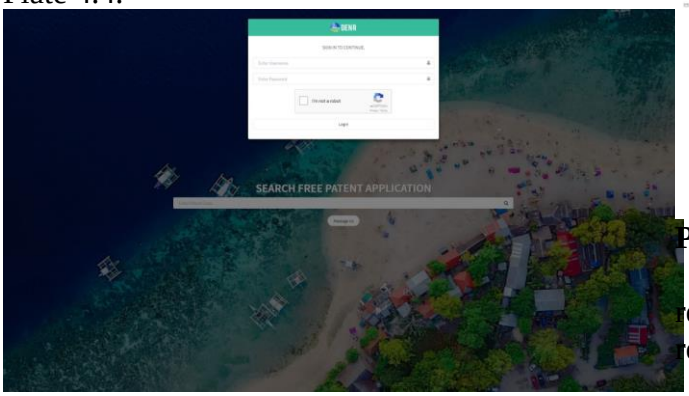

Plate 4.4 Login Modal

This modal can be shown by pressing the keys CTRL+M and it shows the login form where the user can input his/her credentials to be authenticated to access the system. The user is required to input his username, password and also a captcha for better security of the system.

Once the user has successfully entered the correct credentials for his/her account, the user will be redirected to the administration panel where he/she can manage Free Patent Application record.

The Add Patent Page is presented in Plate 4.5 Applicant Information Tab, Plate 4.6 Lot Information Tab, and Plate 4.7 Patent Information Tab that shows the page where the user is able to add client's Free Patent Application.

Applicant Information Tab is presented in Plate 4.5 shows the user must input all required applicant information.

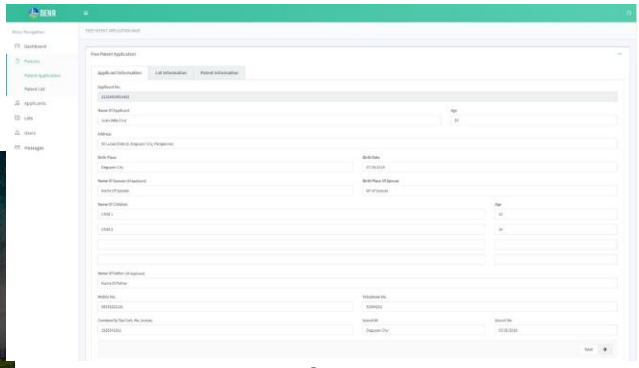

Plate 4.5 Applicant Information Tab

In Plate 4.5, the user must input all required applicant information to be recorded in the system.

Lot Information Tab is presented in 4.6 show the user must input all lot information of the applicant.

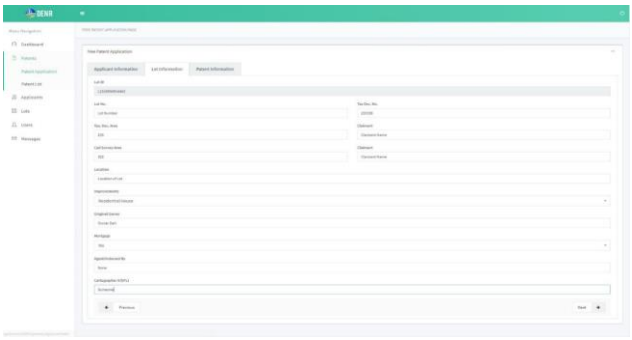

Plate 4.6 Lot Information Tab

In Plate 4.6, the user must input all lot information that is required to be recorded in the system.

Patent Tab is presented in plate 4.7 that shows the user must input all patent information and check all submitted documents for the client's checklist.

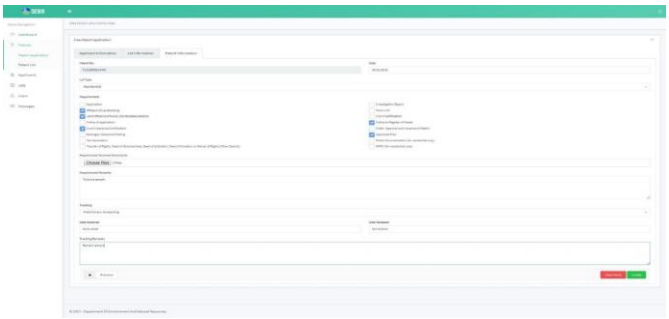

Plate 4.7 Patent Information Tab

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In Plate 4.7, the user must input all patent information and check all submitted documents for the client's checklist. The user is also required to upload scanned documents for monitoring purposes.

Once all fields are complete, the user can click the "Create" button to save the Free Patent Application. The user can also clear all fields by clicking the "Clear Form" button.

The user can navigate through different tabs by clicking the "Next" or "Previous" button below the forms.

The Patents Page is presented in Plate 4.8 shows the page where the user can view list of recorded patents.

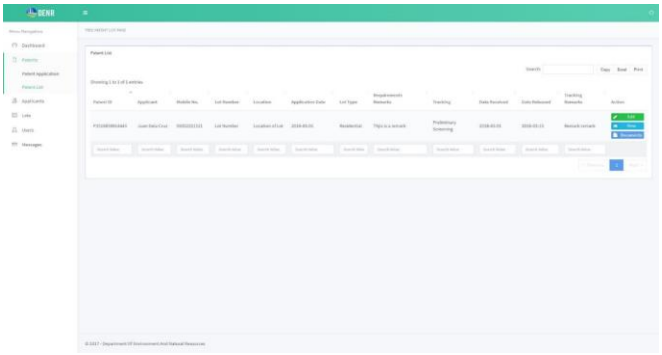

Plate 4.8 Patents Page

This is the page where the user can view list of recorded patents. The user has the privilege to edit patent information by clicking the "Edit" button on the action column. The user can also view all information of a patent by clicking the "View" button which displays the applicant information, lot information, and patent information.

The user can also view all uploaded documents of the patent by clicking the "Documents" button which will show the "Scanned Documents Modal".

The user can also copy, print, and export the list by clicking the buttons on the top right of the table. The table also has a search feature per column and a keyword search on the top of the table.

The Scanned Documents Modal is presented in Plate 4.9 shows all uploaded documents of the selected patent.

This is the modal that shows all uploaded documents of the selected patent.

The user can navigate on each document by clicking the left and right arrows on the image.

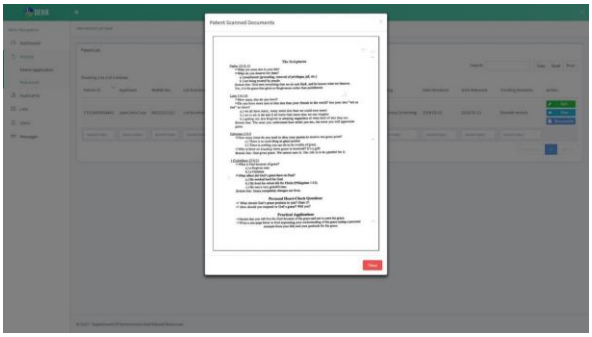

Plate 4.9 Scanned Documents Modal

This feature is for viewing purposes only and all documents are confidential.

The Applicants Page is presented in Plate 4.10 shows the user is able to view and manage applicant's information.

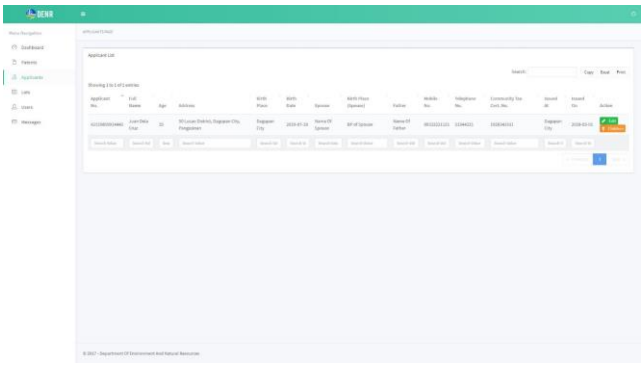

Plate 4.10 Applicants List Page

This is the page where the user is able to view and manage applicant's information. The user can edit an applicant by clicking the "Edit" button and a modal form will show if required.

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The "Children" button will show the "Applicant's Children Modal" which displays the children of the applicant selected where the user is also capable of editing a child's information.

The user can also copy, print, and export the list by clicking the buttons on the top right of the table. The table also has a search feature per column and a keyword search on the top of the table.

The Lots List Page is presented in Plate 4.11 shows the page where the user is able to view and manage lots that are recorded to the system.

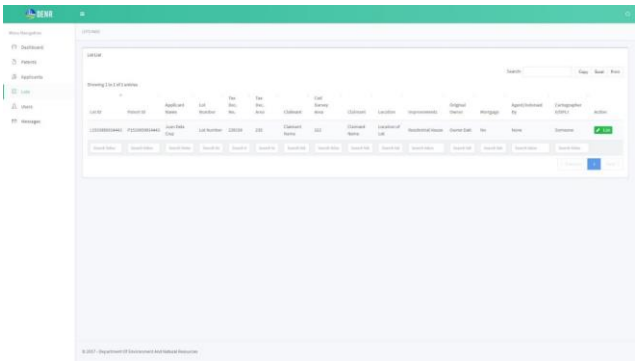

Plate 4.11 Lots List Page

This is the page where the user is able to view and manage lots that are recorded to the system. The user can edit a lot by clicking the "Edit" button and a modal form will show if required. The user can also copy, print, and export the list by clicking the buttons on the top right of the table. The table also has a search feature per column and a keyword search on the top of the table.

The Messages Page is presented in Plate 4.12 shows the user can view client messages that are sent from the homepage.

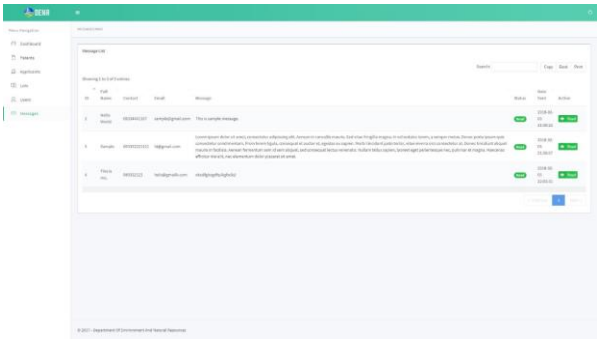

Plate 4.12 Messages Page

This is the page where the user can view client messages that are sent from the homepage. One the message is read, the message will update the status as "Read" if not, and the status is "Unread".

The Users Page is presented in Plate 4.13 shows the lists of users who are registered in the system.

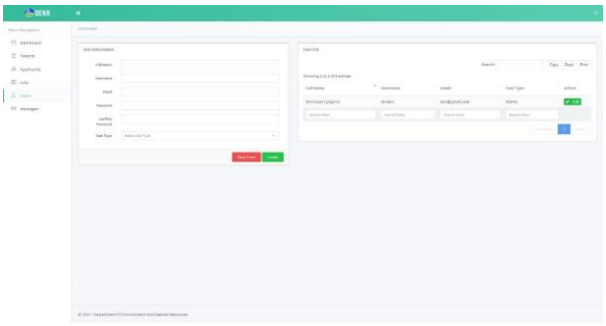

Plate 4.13 Users Page

This is page can only be accessed by the admin. This page displays lists of users who are registered in the system. The admin can add and edit users from this page.

The admin is required to input all required fields for the user to be added.

Acceptability of the System

In testing the acceptability of the developed system, a survey was done to assess the quality of the system. The developers conducted a survey to evaluate the acceptability of the developed system.

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The respondents of developed system were composed of three people these includes Evangeline Evangelista (Records Officer), Raymundo C. Gayo (PENR Officer), and Geofel Soriano (Planning Officer III). The system testing was based according to Design, Usability, and User Satisfaction.

The following questions were scaled as follows: 5 - Strongly Agree, 4 - Agree, 3 - Neutral, 2 - Disagree, and 1 - Strongly Disagree.

Design Evaluation. The system's structure and component's organization were evaluated in the system's design evaluation. Table 4.1 shows the respondent's evaluation in terms of the system's design.

Table 4.1 *Design Evaluation*

Design Question	**Mean**	**DE**
The interface is user friendly	4.6	Agree
The organization of buttons are not confusing	4.6	Agree
The design is innovative	4.8	Agree
The overall design is pleasing to the eyes	4.8	Agree
Weighted Mean	**4.7**	**Agree**

5 - Strongly Agree, 4 - Agree, 3 - Neutral, 2 - Disagree, and 1 - Strongly Disagree.

The result of this testing produced a total mean of 4.7 in terms of the system's design. The stated questions were used for testing the graphical user interface that the system offers.

Usability Evaluation. The capabilities of maximizing the system's functionalities are evaluated in terms of usability. Table 4.2 shows the respondent's evaluation in terms of the system's usability.

Table 4.2 *Usability Evaluation*

Usability Questions	**Mean**	**DE**
The system is easy to understand	4.7	Agree
The system is easy to navigate	4.5	Agree
The system responds according to my tasks	4.8	Agree
The system features greatly benefits the existing process	4.8	Agree
Total Weighted Mean	**4.7**	**Agree**

5 - Strongly Agree, 4 - Agree, 3 - Neutral, 2 - Disagree, and 1 - Strongly Disagree.

This shows the result of user acceptance evaluation for the system. The result of this testing produced a total mean of 4.7 for the usability properties of the system. These questions were asked from the user to test the usability and offers learnability.

User Satisfaction Evaluation. Through the given evaluation the user's perspective of the system can be assessed. Table 4.3 shows the respondent's evaluation in terms of the satisfaction.

Table 4.3 User Satisfaction Evaluation

User Satisfaction Questions	**Mean**	**DE**
I can finish my work faster.	4.9	Agree
The functionalities greatly aids my work.	4.7	Agree
I am happy with the hardware and software Requirement of the system.	4.7	Agree
I have no problem in operating the system.	4.6	Agree

I am willing to implement the system.	4.7	Agree
Total Weighted Mean	**4.8**	**Agree**

5 - Strongly Agree, 4 - Agree, 3 - Neutral, 2 - Disagree, and 1 - Strongly Disagree.

The result of this testing produced a total mean of 4.7 for the satisfaction of the system's usage of the user. The satisfactory of the user with the using of the system can be assessed through the presented evaluation.

Overall Evaluation. This is the overall evaluation including the qualitative, usability and user satisfaction of the system. These three parts of the evaluation were used in testing the acceptability if the developed system has met the functional and non-functional requirements which predicated the change. Table 4.6 shows the overall respondent's evaluation.

Table 4.4 Overall Evaluations

Overall Evaluationx	**Mean**	**DE**
The overall design is pleasing to the eyes.	4.8	Agree
I am satisfied with the present functionalities.	4.8	Agree
I am happy to use the system.	4.7	Agree
Total Weighted Mean	**4.8**	**Agree**

5 - Strongly Agree, 4 - Agree, 3 - Neutral, 2 - Disagree, and 1 - Strongly Disagree

The overall acceptability test was evaluated with a weighted mean is 4.8 that the agency agrees and was satisfied with the deployed system. The result shows that the agency is willing to implement the deployed system of the developers.

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