CHAPTER 1

INTRODUCTION

1.1. Background

The advent of computers has given rise to information systems being used as a business tool on a large scale. Computers and more specifically information systems are being used by business houses at a vastly growing rate more than ever before. The application of the capabilities of Information Systems and Technology brings out improvements in business processes (Davenport and Short, 1990). One of the major sectors to reap the benefits of computers and information systems is hospitals. The nature of the healthcare industry along with its stakeholders involves information and confidentiality. Many hospitals in the 21st century, are using computer technology and more specifically, information systems to implement more efficient and more faster hospital processes and services.

Up until the late 1970s, the management of laboratory samples and the associated analysis and reporting were time-consuming manual processes often riddled with transcription errors. This gave some organizations impetus to streamline the collection of data and how it was reported. Custom in-house solutions were developed by a few individual laboratories, while some enterprising entities at the

same time sought to develop a more commercial reporting solution in the form of special instrument-based systems. Medical Laboratory Technology presents the development in the medical laboratory science. In many countries there are two main types of labs that process the majority of medical specimens. Hospital laboratories are attached to a hospital, and perform tests on patients. Private (or community) laboratories receive samples from general practitioners, insurance companies, clinical research sites and other health clinics for analysis. For extremely specialized tests, samples may go to a research laboratory. A lot of samples are sent between different labs for uncommon tests. It is more cost effective if a particular laboratory specializes in a rare test, receiving specimens (and money) from other labs, while sending away tests it cannot do. In many countries there are mainly three types of Medical Laboratories as per the types of investigations carried out, Clinical Pathology: Haematology, Histopathology, Cytology, Routine Pathology. Clinical Microbiology: Bacteriology, Mycobacteriology, Virology, Mycology, Parasitological, Immunology, Serology. Clinical Biochemistry: Biochemical analysis, Hormonal assays etc. Blood Banks:- Blood bank is a separate body. Its laboratory needs Microbiological analysis for infectious diseases that may be found in blood. Pathology to observe Blood grouping, Haematology and cross matching reactions. It also involves PRO department for the communication and contact for blood donations etc.

One of Papua New Guinea's major state owned healthcare institutions is known and recognized as the Gerehu General Hospital. In the most populous suburb of Gerehu in the Nation's Capital District, Papua New Guinea, Gerehu General Hospital, then known as St. John's Gerehu Clinic, began its life in April 1980. On the 10th of April 2017, the name St. John's Gerehu Clinic was changed to Gerehu General Hospital. The decision was made by the Government to free up space at the Port Moresby General Hospital to become the country's national referral and teaching hospital. The hospital serves the 50,000 plus people of Gerehu and its surrounding neighbor suburbs and even people from outside the city. Gerehu General Hospital provides medical treatment with specialized medical doctors, nursing staff, medical equipment and has a pathology department. However, there are several problems identified in the Gerehu General Hospital's pathology system faced by its stakeholders. Pathology services and activity for the patients accessing the hospital for immediate same-day testing and getting results consume a lot of time as patients wait hours for their results to be printed and given to them. This exercise causes the hospital a lot of cost and time wastage. Also, it makes the patients experience a lot of costs and time wastage if they live far and use public transport. For patients who need to collect their test results from the hospital's receptionist after a few days or more, both parties must be available so that the patient can pick and know their results. But most times turns out that the receptionist is unavailable or doesn't show up for

unknown reasons which is time consuming and frustrating for the patient as they might have other obligations to attend to as well. Other disadvantages faced by the pathology services at the Gerehu General Hospital are misplacement of information and less effective test result delivery. From the patients' experience are things such as receiving incomplete test result information, less monitoring and inconsistency on updating patients about firsthand information from the lab tests.

The hospital is still using the manual way of system flow so materials to speed up the system are not always available. Staff are very important in the manual way of the system therefore their unavailability causes slowness and inconsistency in delivering patient test results. For example, results for patients not printed and compiled fast. This results in patients waiting long hours in line to get their laboratory test reports. Not forgetting to mention the added costs they face financially just to get their test reports, especially for the patients who live far from the suburb and city.

The Automated Pathology Lab Reporting System will do away with the manual way of system flow like, registering patients, gathering of all test results, printing and filing. The biggest obstacle that will be removed in the current system is the printing of forms and manual writing of registration and reports depending on their nature. This will in turn bring about a more effective, more efficient and more

reliable system for Gerehu General Hospital to deliver to its valued patients. This new system proposed to the healthcare institution of Gerehu Hospital is called the Gerehu General Hospital Automated Pathology Lab Reporting System.

1.2. Problem Identification and Formulation

The identification and formulation for Gerehu General Hospital Pathology Lab Reporting System is shown below.

1.2.1. Identifying the Problem

The problems can be clearly identified as follows below:

1. Pathology services and activity for the patients accessing the hospital for immediate same-day testing and getting results consume a lot of time as patients wait hours for their results to be written or printed and given to them. This exercise causes the hospital a lot of cost and time wastage. Also, it makes the patients experience a lot of costs and time consumption if they live far and use public transport.
2. For patients who need to collect their test results from the hospital's reception after a few days or more, both parties need to be available so that the patient can pick up and know their results. But most times it turns out that the receptionist is unavailable or doesn't show up for unknown reasons which is time consuming

and frustrating for the patients as they might have other obligations to attend to as well.

3. Misplacement of information and less effective test result delivery. From the patients' experience are things such as receiving incomplete test result information, less monitoring and inconsistency on updating patients about firsthand information from the lab tests.

1.2.2. Problem Formulation

According to the above stated problems, formulation of problems can be listed as:

1. How to Analyze the current system for Gerehu General Hospital in pathology lab tests reporting.
2. How to Design the automated system for the solution to the ongoing problems that occur in the current pathology lab system.
3. How to Evaluate the automated system for Gerehu General Hospital to ensure that it meets the requirements for the hospital management with its operation work flows.
4. How to Implement the automated system so that it will become a full package system for Gerehu General Hospital.

1.3. Research Objectives

The research objectives are described as follows:

1.3.1. Purpose

The purpose of this study is as follows:

1. To analyze the current existing pathology system for Gerehu General Hospital of Port Moresby, Papua New Guinea, in each division such as the management, administration, supervision and customer services to determine the current issues being identified, and how to achieve the solutions in an efficient way.
2. To design an automated pathology lab reporting system for the solutions to the problems that occur on the current pathology lab reporting system.
3. To test the automated pathology lab reporting system for Gerehu General Hospital to make sure that it meets the requirements from the management, administration, supervision and customer services.
4. To implement the automated system pathology lab reporting system so that it will become a ready-made system for Gerehu General Hospital.
5. To maintain the automated pathology lab reporting system so that it can be sustained as part of the pathology procedure and process for Gerehu General Hospital.

1.3.2. Objective

The main aim for this study is to design and develop an automated Pathology Lab Reporting System for Gerehu General Hospital. In which the researcher based this research on Gerehu General Hospital pathology laboratory delivering its lab test report services to its valuable patients. The automated system will manage the procedures under the pathology lab system scheme for patient lab test reports.

1.4. Research Implications

This study is subjected to the following parties:

1.4.1. Academic

The research is a very useful object of reference in the academic field, when ideas of improvement in the object arises for study. This is not actually the first and last of this research. Certainly they'll be more research done on this object. What the next researcher would need is a point of reference. All copyrights will be reserved therefore its use will be strictly for reference.

1.4.2. Practical

The practical use of the object is subject that will depend entirely on the needs of similar institutions needs. The platform when used by other hospitals would

increase efficiency and effectivity in pathology reporting. But all consultation for distribution of this system will depend on the amount of work that will be put into analyzing the ongoing pathology lab reporting systems of the hospitals that want the system.

1.4.3. Others

The object here can be put on any other platform that may support its improvement in its functionality. With technology and the internet on the rise in their usage, the object will have all possibilities of being projected into those platforms. All stakeholders involved in the use of the system must be consulted before carrying out projects for elevation as a lot of analysis and development would be needed to satisfy the projection.

1.5. Limitations of Study

To clarify the time limit and the ability of the researcher, the discussion of this study, disseminate the restrictions to the development of the automated pathology lab reporting system for Gerehu General Hospital.

1. **Administration**

   To perform easy access and accurate verification to make sure the patients are accepted for registration. Managing staff and patients by providing better services and decisions.

2. **Staff**

   To perform easy access to record, report, approve and disapprove patient information when using the hospital facilities from using hospital services. Information are processed accurately and delivered to the patients. Use of the facilities are maintained to the procedure from the hospital requirements.

3. **Patient**

   To perform easy access to view lab test reports and updates. The patient is only required to get registered and use the hospital and its services. The patient has to be on site to perform all mentioned above.

1.6. Research Time

The research location was set at Indonesia Computer University (UNIKOM), Bandung, West Java, Indonesia.

The schedule of the research is as follows:

Table 1.1. Research Time Table

SCHEDULE	MONTH																			
	MARCH 2018				APRIL 2018				MAY 2018				JUNE 2018				JULY 2018			
1. Identification of Needs	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Observing																				
Interview																				
Collect Data																				
Document Analysis																				
2. Creating and Fixing Prototype																				
The Design Process																				
Design Database																				
Make Program																				
3. Testing the Prototype																				
a. Black Box Testing																				
4. Implementation																				
a. Implement																				
5. Maintenance																				
a. Maintain System																				

1.7. Thesis Outline

This is the chapter outlines of the research background, problem identification, research objectives, research usability and limitations of the research:

CHAPTER 1: INTRODUCTION

Chapter one contains a description of the background information and the importance of the research; problem identification and formulation, the main objectives and purposes of the project, and the benefits of the research. Furthermore, this chapter includes the limitations or restrictions of the project, the location and time of the research and the systematic writing.

CHAPTER 2: LITERATURE REVIEW

This chapter indicates the theory upon which the study is based on. That is, the understanding of information system, pathology lab reporting, PHP Programming, Unified Modeling Language (UML), Database, HTML, MySQL, Object-Oriented Analysis and Design (OOAD), etc. It contains a literature review of relevant previous work and background information relevant to this research.

CHAPTER 3: OBJECT AND METHODS

Chapter three describes the object of the research and the approach and methods used in this research. That includes, the object's organizational structure with job descriptions, method and system development approach used is the object-oriented type and method of data collections (primary data source and secondary data

source). The method the researcher used in the systems approach is the Object-Oriented Systems Approach and is visualized with Unified Modeling Language (UML) diagrams such as Use Case Diagrams, Activity Diagrams, Sequence Diagrams, Object Diagrams, Class Diagrams, and Deployment Diagrams. Further analysis of the current system consisting of document analysis, analysis of current procedures with the use of Use Case Diagram, Use Case Scenario and Activity Diagram of each use case, and the evaluation of the current system.

CHAPTER 4: RESULTS AND DISCUSSION

This chapter describes the design and construction of the systems, testing results and discussions about the designed system. That is, it includes; description of the system design and its objectives, overview of the proposed system consisting of Use Case Diagram, Use Case Scenarios, Activity Diagrams, Object Diagram, Class Diagram, Deployment Diagram, and Component Diagram. Further, is the testing that includes; testing plans, test cases and results, and conclusions of the test results. Finally, the Implementation phase includes the software implementation, hardware implementation, database implementation, interface implementation, program installation implementation, and user guide.

CHAPTER 5: CONCLUSIONS AND SUGGESTIONS

The last chapter contains the conclusion of the research, and the suggestions made to further review and redevelop the system.