




Implementation of Spiral Modeling in the Design and Construction of the Paperless Office System for ITCC ITPLN Activity Documents

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Abstract

The Information Technology Certification Center (ITCC) currently uses a manual system for creating financial accountability reports. This process is time-consuming and often leads to errors. Furthermore, because the necessary data is not centralized, data loss is a frequent problem, hindering the creation of accurate reports. To address these issues, the author developed "lpjkita," an application designed to streamline and improve the financial reporting process. The development employed the spiral model, which integrates risk management with iterative development and prototyping, while incorporating the structured approach of the waterfall model. This methodology allows for rapid development and gradual software improvement. The resulting application, "lpjkita," enables faster creation of financial accountability reports at ITCC, minimizes errors, and improves data recording. In addition to these benefits, the application also contributes to environmental sustainability by reducing paper consumption at ITCC, thereby mitigating the impact of global warming.

Keywords: Spiral Modal, ITCC, Financial Report, dan Certification

Abstract

ITCC menggunakan sistem manual untuk membuat laporan akuntabilitas keuangan, yang memakan waktu dan seringkali menyebabkan kesalahan. Untuk mengatasi masalah ini, peneliti mengembangkan "lpjkita," sebuah aplikasi yang dirancang untuk merampingkan dan meningkatkan proses pelaporan keuangan. Pengembangan menggunakan model spiral, yang mengintegrasikan manajemen risiko dengan pengembangan iteratif dan pembuatan prototipe, sambil menggabungkan pendekatan terstruktur dari model waterfall. Aplikasi yang dihasilkan, "lpjkita," memungkinkan pembuatan laporan akuntabilitas keuangan yang lebih cepat di ITCC, meminimalkan kesalahan, dan meningkatkan pencatatan data. Selain manfaat ini, aplikasi ini juga berkontribusi pada keberlanjutan lingkungan dengan mengurangi konsumsi kertas di ITCC, sehingga mengurangi dampak pemanasan global..

Kata-kata kunci: Model Spiral, ITCC, LPJ Keuangan, dan Sertifikasi.



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1. Introduction

The *Information Technology Certification Center (ITCC)* is one of the laboratories dedicated to carrying out Certification activities, especially in the field of Information and Technology. This laboratory is under the auspices of the PLN Institute of Technology [1] [2]. In carrying out its duties, ITCC is required to relate to data, both qualitative and quantitative data. Various activities are carried out at ITCC such as preparation before certification, simulation of certification activities, certification training, certification exams and reporting after certification activities are held. Based on the results of my observations, the implementation of reporting activities after certification is still carried out manually, namely using a computer but not based on an information system.

The spiral model itself is a model that pairs iterative control with a *prototype* model and systematic aspects taken from the *waterfall* model [3] [4]. So that this model provides rapid development with software that has an *increment* version (growing). This model is suitable for developing large-scale software systems because it has a risk analysis process so that it can provide the best quality assurance for large-scale applications but the time and cost targets are not too high, because every change in application specifications must be at risk of delay in work time and inflated project costs [5].

Rapid advances in technology and information have changed the world, including the adoption of the paperless office concept that has grown in the last 30 years, as the paper industry impacts global warming. Traditional offices that used to rely on paper-based processes are now switching to more efficient systems with digital documents. Document Management Systems (DMS) simplify document flow and automate paperless office activities [6]. This study examines the implementation of a paperless office solution at One Heart Worldwide in Kathmandu, Nepal, as well as the role of DMS, its opportunities, and challenges. The results of this study provide insights to help organizations adopt digital technology and create a more efficient and sustainable work environment [7].

2. Method

2.1 Problem Identification

The problem in this study is how to develop *Paperless Office* on Financial Accountability Reports (LPJ) at ITCC ITPLN with a Web-based Spiral Model and how to implement *Paperless*

Office on Financial Accountability Reports (LPJ) at ITCC IT-PLN with a Web-based Spiral Model.

2.2 Literature Studies

At this stage, look for information and read the references needed such as references from books, references from journals related to the design of *paperless office* systems using spiral modeling to be able to be a reference in conducting research in the preparation of the ITCC Financial Accountability Report [8].

2.3 Data Collection

This data collection method has been included in the first and second stages of the spiral model, namely *customer communication* and *planning*. At this stage, the researcher collects data to support the analysis and evaluation process of the existing system. At the *customer communication stage*, the first data collection technique is observation. Observation was carried out by directly reviewing the activities carried out at ITCC, especially in the financial department. Observations are carried out starting from the preparation process, training, exams to making reports after certification activities. The second technique is interviews. The interview was used to obtain supporting data to the Head of ITCC, Mr. Hendra Jatnika, S.Kom., M.Kom and ITCC assistants, namely the ITCC Assistant Coordinator for the 2020/2021 Period and the Person in Charge of the ITCC Finance Section for the 2020/2021 Period. The last data collection technique is literature study [9].

2.4 Data Analysis Methods

The data analysis method in this study consists of *planning*, risk analysis, and engineering.

2.4.1 Planning

At this planning stage, the researcher also makes an estimate of the work and scheduling for the work on each part of the system. The estimate can be seen in the following table:

Table 1. *Estimated Application Work*

No	Part	Iteration	Information	Kingdom Information
1.	Home	1	In the first iteration (1), software development includes building basic software features. After iteration 1 is complete, an evaluation will be carried out by the customer.	2 weeks
2.	User			
3.	Change Password			
4.	Registration			
5.	Login			
6.	Agenda of activities	2	The second iteration (2) is a further stage which contains the data that will be input. Input for activities and LPJ will go here. After the 2nd iteration is complete, an evaluation will be carried out by the customer.	2 Months
7.	Report Accountability			
8.	Accidental Project			
9.	Program Work list	3	In the final iteration of this application development, we entered the stage of creating a summary of the data results. Including the results of generating LPJ and reports for activities and finances. After that, there will still be a customer evaluation.	1 Month
10.	Results of Responsibility Report			
11.	Report			
12.	Logout			

2.4.2 Risk Analysis

This stage aims to analyze and estimate every risk both in terms of system and management. This risk analysis is reviewed in terms of the web work of the LPJKITA application as well as the probabilities and effects that occur on the current running system [10]. The following is a risk analysis that has been made by researchers:

Table 2. Risk Analysis

No	Risk	Probability	Effects for the Running System
1	Faster processing time	Tall	Increase
2	of the system that is running now	Currently	Tolerable
3	Changes to system specifications	Low	Increase
4	Estimated work costs	Currently	Are you serious
5	There is an error in the module	Currently	Are you serious
6	coding	Low	Tolerable
7	Error in database design	Low	Are you serious
8	which causes the data to not be processed	Low	Are you serious
9	Development error	Currently	Are you serious
10	interfaces	Tall	Increase

In probability, there are high, medium and low scales that are taken based on the value obtained from the results of the respondents' answers in the interview to determine the risk that occurs in each variable. Here are the values of each scale is presented in **Table 3**.

Table 3. Risk Analysis Probability Scale

Scale	Results
Height	3
Low	2
Medium	1

2.4.3 Engineering

In this stage, an analysis of the running system and problems found in the system is also carried out to further provide a proposed system design [11].

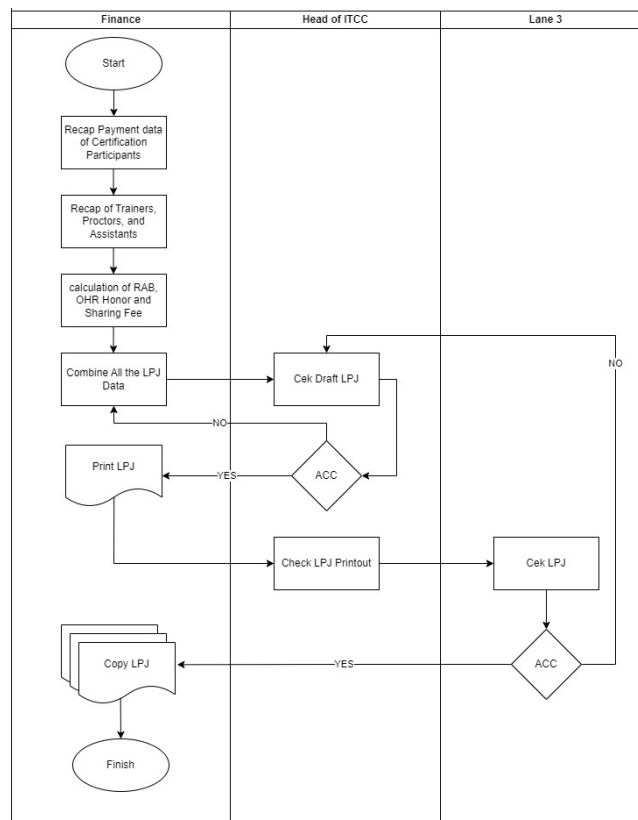


Figure 1. Running System

In the image above, it can be seen that the system that is running now is still manual. Starting from data input to merging files, it is still very manual. So it takes a long time to work and the estimated cost for printing and photocopying LPJ is quite large. Based on the above, the researcher made a proposal system for the work of the Financial LPJ at ITCC. The following is a flowchart of the proposed system made by the researcher.

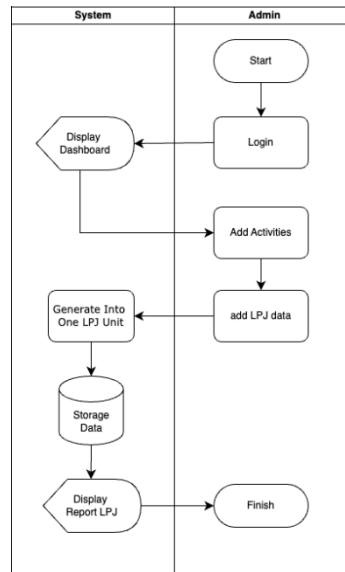


Figure 2. System Design Scenarios

Based on events in the field, the financial LPJ at ITCC has important data that can only be accessed by certain users. Therefore, the researcher initiated the existence of a user hierarchy or user level of this application and the access rights they can obtain. The following is a hierarchy table of users based on OHR who can access data in ITCC.

Table 3. Access Rights and User Hierarchy

Owned Access	Financial department	Head of ITCC	ITCC Coordinator	Leader
Owned Access	Super Admin	Super Admin	User	User
User Level	Yes	Yes	Yes	Yes
Login	Yes	Yes	No	No
Account Registration	Yes	Yes	Need Confirmation From Admin	Need Confirmation From Admin
Change Password	CRUD	CRUD	Just Read	Just Read
Agenda of activities	CRUD	CRUD	Just Read	Just Read
Accountability Report	CRUD	CRUD	Need Confirmation From Admin	Just Read
Work Program	CRUD	CRUD	Need Corfirmation From Admin	Just Read
Activity	CRUD	CRUD	Need Confirmation From Admin	Just Read
Accidental Project	CRUD	CRUD	Just Read	Just Read
LPJ Financial Collection	CRUD	CRUD	Just Read	No
List User	CRUD	CRUD	User	Just Read

3. Results and Discussion

3.1 Result

Explaining from the *Construction and Release* stage of the Spiral Model, here an explanation will be given about the design of application results/ prototypes in the form of *hardware* and *software implementation*, dataflow implementation, interface implementation and function implementation of the LPJKITA application. The following is an overview and explanation of the lpjkita application.

1. Testing Page

A test page is a page for testing data. On this page, users can test by uploading a data file to be tested. After uploading data, users can fill in the caption and press the save button. Then automatically the *uploaded* data will be stored in the test database.

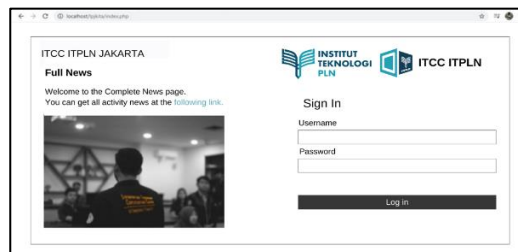


Figure 2. Login Page

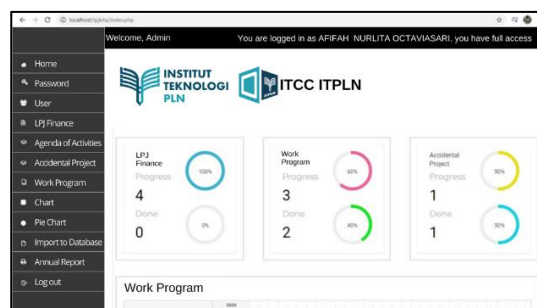


Figure 3. Dashboard Home

The Work Program Menu is used to make a *plan* for work activities for 1 (one) period.

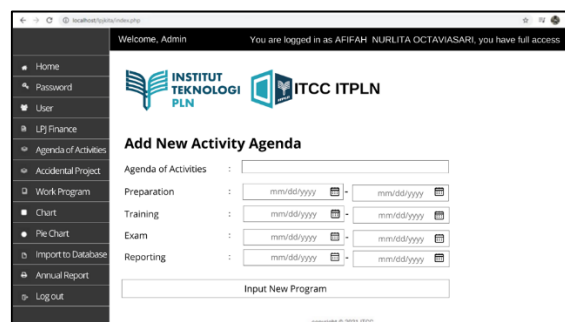
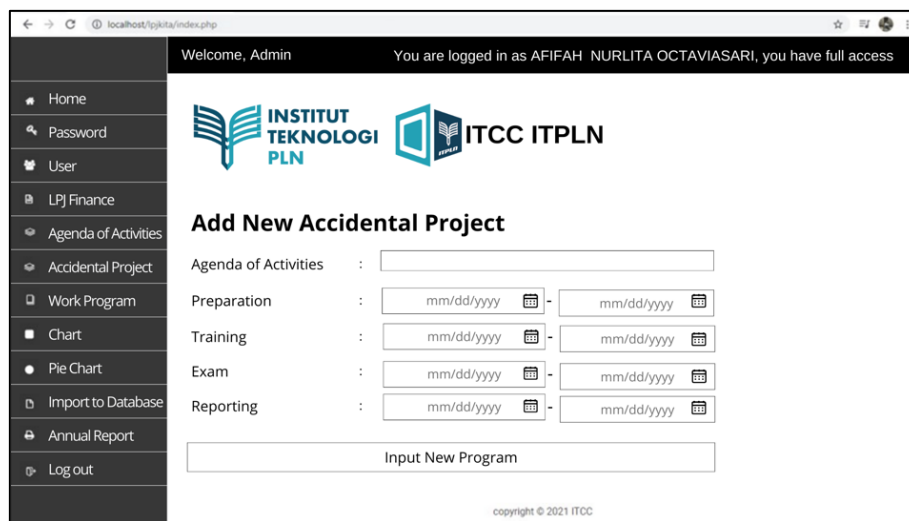


Figure 4. Add Activity Agenda

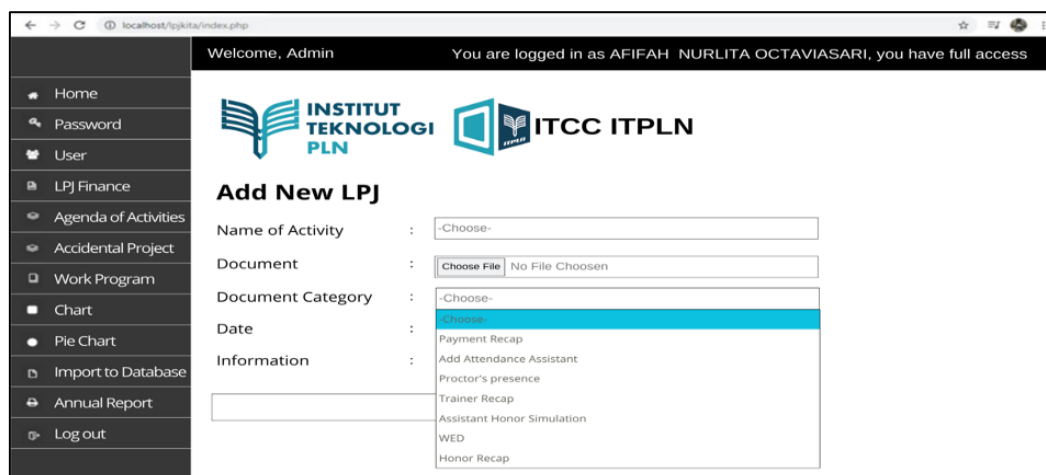
The Activity Agenda menu is used to control the activities that will run.



The screenshot shows a web browser window with the URL 'localhost/pjkit/index.php'. The page header displays 'Welcome, Admin' and 'You are logged in as AFIFAH NURLITA OCTAVIASARI, you have full access'. The main content area features the logos for 'INSTITUT TEKNOLOGI PLN' and 'ITCC ITPLN'. The title of the form is 'Add New Accidental Project'. The form includes several input fields: 'Agenda of Activities' (a text box), 'Preparation' (two date pickers), 'Training' (two date pickers), 'Exam' (two date pickers), and 'Reporting' (two date pickers). At the bottom of the form is a button labeled 'Input New Program'. A copyright notice 'copyright © 2021 ITCC' is visible at the bottom right of the page.

Figure 5. Add Accidental Project

Add *Accidental Project* is input if the activity being carried out is not listed in the Work Program that has been input beforehand.



The screenshot shows a web browser window with the URL 'localhost/pjkit/index.php'. The page header displays 'Welcome, Admin' and 'You are logged in as AFIFAH NURLITA OCTAVIASARI, you have full access'. The main content area features the logos for 'INSTITUT TEKNOLOGI PLN' and 'ITCC ITPLN'. The title of the form is 'Add New LPJ'. The form includes several input fields: 'Name of Activity' (a dropdown menu with '-Choose-' selected), 'Document' (a file upload field with 'Choose File' and 'No File Chosen' buttons), 'Document Category' (a dropdown menu with '-Choose-' selected), 'Date' (a date picker with '-Choose-' selected), and 'Information' (a text area with a list of options: 'Payment Recap', 'Add Attendance Assistant', 'Proctor's presence', 'Trainer Recap', 'Assistant Honor Simulation', 'WED', and 'Honor Recap').

Figure 6. Add LPJ Finance

The added LPJ is used to input the data needed for the creation of the LPJ. The data that can be selected above are Payment Recap data, Assistant Attendance, Proctor Attendance, Trainer Recap, Assistant Honor Simulation, RAB (Cost Budget Details) and Honor Recap. In addition to this data, there is also a date for the input of LPJ data. After filling in all the fields or aspects needed, new data can be *uploaded*.

3.2 Discussion

The final stage of the Spiral model is *Customer Evaluation*. At this stage, the system will be tested based on the system functionality using the *blackbox User Acceptance Testing (UAT)* method based on *customer evaluation*[12]. In this case, the functionality of the system will be

tested by the Head of ITCC and the ITCC Finance Section for the 2020/2021 Period. Based on the results of the test, it is stated that our LPJ application can help make it easier to make ITCC Financial LPJ and can be applied at ITCC.

4. Conclusion

The conclusion section contains a summary of the results of the research or research findings, which correlates with the research objectives written in the introduction. Then, state the main points of the discussion. A conclusion generally ends with a statement about how the research work contributes to the field of study as a whole (showing how the progress of current knowledge is progressing). A common mistake in this section is to repeat the results of the experiment, abstract them, or present them in a very large list. The conclusion section should provide clear scientific truth. In addition, the conclusion can also provide suggestions for future experiments.

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