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Design and Development of an IT Support Services Model and Applications Based on ITIL V4

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ABSTRACT: The ICT request process at PT. Energi Mega Persada (EMP) Bentu Limited–Korinci Baru Limited is still carried out manually using paper forms, resulting in delays in processing, recording errors, and difficulties in monitoring request status. This study aims to design an IT support service based on the ITIL V4 Service Value Chain (SVC) and to develop an ICT Request mobile application as a service support tool. The application was developed using the Extreme Programming (XP) method, which includes the planning, design, coding, and testing phases. The system was built using Flutter as the mobile framework, CodeIgniter 4 for the backend, MySQL as the database, and REST API for client-server communication. Key system features include request submission, approval, technician assignment, status tracking, notifications, data management, and reporting. Testing was conducted using Blackbox Testing and User Acceptance Testing (UAT) with 40 respondents. The test results showed that all system functions operated as required, while the UAT results yielded an average score of 91.4% in the "Strongly Agree" category. The research findings indicate that a mobile-based IT Support service can help make the ICT Request process more effective, structured, integrated, and easily monitored in real-time.

KEYWORDS: ITIL V4, Service Value Chain, IT Support, Mobile Application, Extreme Programming

I. INTRODUCTION

Technological advancements in the Industrial Revolution 4.0 era are driving digital transformation across various sectors, including the service industry. Information technology plays a crucial role in enhancing efficiency, transparency, and the integration of business processes, enabling operational activities to be carried out more quickly and effectively [1].

PT. Energi Mega Persada (EMP) Bentu Limited–Korinci Baru Limited has an ICT (Information and Communication Technology) division responsible for information technology services through the ICT Request Standard Operating Procedure (SOP). These services include hardware maintenance, software installation, employee email setup, network management, document requests to the DCRM (Document Control and Record Management) division, and the procurement of information technology equipment. However, the ICT Request process is still carried out manually using paper forms, leading to challenges such as delays in processing, recording errors, and difficulty in monitoring request status. These conditions highlight the need to digitize services through a mobile-based application.

Mobile applications are considered capable of improving service efficiency and flexibility because they allow users to submit requests, receive notifications, and monitor progress in real time via mobile devices. Previous research indicates that mobile-based systems can improve efficiency, transparency, and communication between divisions [2], while mobile apps also support faster and more flexible interactions within organizations [3]. In addition, other studies show that mobile apps have high levels of effectiveness and user acceptance, including in work environments with limited access to services [4], [5]. Furthermore, previous research on the e-Reminder Services application demonstrated that service digitalization can improve work effectiveness and organization through automated notifications, centralized data management, and real-time activity monitoring. The study highlighted that integrated digital services contribute to better service quality, improved efficiency, and easier monitoring of user activities [6].

To support integrated ICT services, this study adopts the Information Technology Infrastructure Library (ITIL) framework, which is an information technology service management framework focused on improving quality, efficiency, and user satisfaction. The implementation of ITIL has been shown to help organizations standardize service procedures and accelerate problem resolution [7]. Other studies have also shown that implementing ITIL can increase problem resolution speed by up to 26% [8].

In the application development process, this study employs the Extreme Programming (XP) methodology, which is part of Agile Software Development. XP emphasizes intensive communication, rapid iteration, and continuous testing,

making it suitable for dynamic business environments [9]. Previous research has shown that applying XP to mobile applications can enhance development flexibility and result in systems that better align with user needs [10].

Based on the above, this study aims to develop a more integrated, efficient, and digitized ICT Request service through the implementation of a mobile-based application. The development of this service adopts the Information Technology Infrastructure Library (ITIL) framework as a guideline for IT service management. The developed application serves as a support tool for IT Support services so that the service request process can be faster, more integrated, more efficient, and easier to monitor.

II. LITERATUR REVIEW

A. Mobile Application

Mobile applications are software programs that run on smartphones and are widely used because they are easily accessible, flexible, and practical in various fields, particularly education and healthcare. Mobile applications can provide learning materials, information, and services quickly without relying on traditional methods *[11]*. In addition, mobile applications can also support health-related activities, such as medication reminders and the provision of health information for the elderly, thereby improving medication adherence *[12]*.

In the field of mental health, mobile apps help users manage their emotions, reduce stress, and improve their well-being through education and self-monitoring [3]. Mobile apps are also used to counter misinformation; for example, the COVID-Iran app provides accurate information and education about COVID-19 with a high level of usability [13].

B. *ITIL SVC (Service Value Chain)*

ITIL (Information Technology Infrastructure Library) is a framework that outlines best practices for managing information technology services to make them more effective, efficient, and aligned with business needs *[14]*. Its evolution began with ITIL V2, which focused on the relationship between IT services and business, then progressed to ITIL V3 with the Service Lifecycle concept, and finally to ITIL V4, which is more adaptable to modern technologies such as cloud computing, Agile, and DevOps *[15]*. ITIL V4 emphasizes the concept of value co-creation, which involves the joint creation of value between service providers and users through the Service Value System (SVS).

One of the key components of SVS is the Service Value Chain (SVC), which is a series of core activities that transform demand into valuable services [15]. The SVC consists of six main activities: Plan, Engage, Design and Transition, Obtain/Build, Deliver and Support, and Improve. The Plan activity determines the direction of the service, Improve ensures continuous improvement, while Engage focuses on communication and user needs. Furthermore, Design and Transition ensures that services can be implemented effectively, Obtain/Build relates to service development, and Deliver and Support ensures that services operate in accordance with user needs. With this approach, ITIL V4 is able to support IT service management that is more flexible, measurable, and user-oriented.

ITIL V4 has been implemented across various sectors to improve the quality of information technology services. Research shows that applying ITIL to chatbot-based technical support services can increase user satisfaction [7]. Additionally, the implementation of ITIL V4 has been shown to improve helpdesk response rates from 64% to 90% [8]. The application of ITIL principles is also utilized in the healthcare sector, pharmaceutical services, and AI based applications [2], [4], [5], [16], [17], [18]. This demonstrates that ITIL V4 and SVC can support more responsive, integrated, and sustainable services across various sectors.

C. *Extreme Programming*

Extreme Programming (XP) is an Agile Software Development method that emphasizes flexibility, communication, iterative development, and continuous testing. This method is well-suited for projects with frequently changing requirements, such as mobile applications and public service systems. Research shows that XP is effective for rapid development because it directly involves users in the application development process *[19]*. Additionally, Pressman states that XP focuses on communication, rapid feedback, and adaptation to changes in user needs *[20]*.

The phases of Extreme Programming include: (a) **Planning**: The phase of gathering user requirements and prioritizing features. Previous research conducted this phase through interviews with stakeholders to determine system requirements *[9]*. (b) **Design**: The phase of designing the system in a simple and flexible manner to facilitate development. A modular design is used so that the system can be developed incrementally *[21]*. (c) **Coding**: The phase of implementing features based on the results of planning and design. Development is carried out in stages according to user needs priorities *[22]*. (d) **Testing**: The testing phase to ensure the system runs as required. Testing was conducted using Black Box Testing *[22]* and User Acceptance Testing (UAT), with 92.82% of the results categorized as excellent *[21]*.

D. *Unified Modeling Language (UML)*

The Unified Modeling Language (UML) is a standard modeling language used to visualize, document, and design object-oriented software systems *[23]*. UML is widely used in software development to describe system structures and processes. According to Sommerville *[24]*, there are several commonly used UML diagrams, including: (a) **Use Case Diagram**: A Use Case Diagram is used to describe the interactions between actors and the system, as well as the functions available within the system. (b) **Activity Diagram**: An Activity Diagram is used to model the flow of activities or business processes within a system, including decision-

making processes. (c) **Sequence Diagram**: A Sequence Diagram depicts interactions between objects in a specific temporal sequence through the exchange of messages to execute a process. (d) **Class Diagram**: Class Diagrams are used to model the static structure of a system, consisting of classes, attributes, methods, and relationships between classes.

For example, research *[10]* utilized Use Case Diagrams and Activity Diagrams in the development of a mobile application for monitoring sales team visits at PT. Sanggabuana Berjaya Indonesia (SBI) and achieved a result of 92.82%, categorized as "very good."

E. *Blackbox Testing*

Blackbox testing is a software testing method that focuses on testing system functionality without examining the internal structure or source code. Testing is conducted by providing specific inputs and evaluating the resulting outputs to ensure compliance with system specifications *[24]*. Blackbox testing is used to identify errors in functionality, interfaces, database access, performance, as well as system initialization and termination *[20]*.

F. *User Acceptance Testing (UAT)*

User Acceptance Testing (UAT) is a software testing process conducted by end users to ensure that the system meets functional requirements and is ready for use in real-world conditions. This testing focuses on the system's alignment with user needs and expectations based on specifications established during previous development stages *[25]*.

In practice, UAT can use the Likert scale to measure respondents' opinions, attitudes, and perceptions regarding a statement in a study. Respondents are asked to indicate their level of agreement with a statement using a graded scale, as shown in Table 1 *[26]*.

Table 1. Likert Scale

Level of Agreement	Value
Strongly Agree (SA)	5
Agree (A)	4
Neutral (N)	3
Disagree (D)	2
Strongly Disagree (SD)	1

According to research conducted by Setiono and Riwinoto [27], the following formula can be used to calculate the total score and index value (%) for Likert scale measurements:

Total Respondent Value = $(TR_{SA} \times N_{SA}) + (TR_A \times N_A) + (TR_N \times N_N) + (TR_D \times N_D) + (TR_{DS} \times N_{DS})$

Notes: TR = Total Respondents N = Value

$$Index(\%) = \frac{Total\ Respondent\ Value}{TN_{Max}} \times 100\%$$

Notes: TN_{Max} = Maximum total value of respondents

The formula for calculating the index value (%) is used to summarize the responses or reactions of the majority of respondents to a phenomenon based on the Likert scale intervals shown in the table below [26].

Table 2. Likert Scale Interval

Level of Agreement	Interval
Strongly Agree (SA)	0% - 19,99%
Agree (A)	20% - 39,99%
Neutral (N)	40% - 59,99%
Disagree (D)	60% - 79,99%
Strongly Disagree (SD)	80% - 100%

III.METHODOLOGY

A. *Data Collection*

The first stage is data collection. Data collection is conducted in several ways, which are:

1) Direct observation of the ICT Request process currently in use at the Company. Observation helps identify challenges in manual processes, such as delays in handling, recording errors, and a lack of transparency regarding request status.
2) Discussions with ICT Division staff. These discussions aim to identify system requirements, workflows, and service types.
3) A literature review of journals, books, and previous research related to ITIL to understand ITIL concepts and principles, mobile application design, and the implementation of the Extreme Programming (XP) methodology in application development.

B. *Design An IT Support Model Using ITIL SVC Concepts*

Once the necessary data has been collected, the next step is to design an IT Support model for the ICT Request application using ITIL V4 concepts, specifically the SVC (Service Value Chain). The SVC consists of several activities, which are:

1) **Plan**

The Plan activity aims to ensure that the vision, direction, scope of service, and objectives of the IT support service are understood by all parts of the organization. At this stage, the design includes developing a service strategy, aligning the IT support service processes with the company's ICT Request SOP (Standard Operating Procedure), and defining service priorities based on user needs.

2) **Improve**

The Improve activity aims to ensure periodic service improvement through evaluation. This phase involves evaluating service performance and incident response.

3) **Engage**

The Engage activity emphasizes interaction between users and the ICT Division. This is done to ensure user needs are well understood and service expectations align with the service application.

4) **Design and Transition**

In this activity, the ICT Request service is designed to meet user needs in accordance with service quality standards, and can be used without disrupting company operations. In this stage, the author designs the IT Support workflow tailored to the applicable ICT Request SOP (Standard Operating Procedure) and user needs.

5) **Obtain/Build**

The Obtain/Build activity ensures that all service components are developed in accordance with the specified requirements. Application development uses the Extreme Programming methodology, with the following phases:

1. Planning

   This phase is conducted to identify user requirements through observation and interviews, resulting in a list of requirements for the mobile based ICT Request application.

2. Design

   In this phase, the application workflow is designed based on user requirements through the creation of a Usecase Diagram and a System Workflow to illustrate the processes and functionality of the ICT Request application.

3. Coding

   The Coding phase is carried out using the Flutter framework with the Dart programming language to implement the application design.

4. Testing

   Application testing is performed using Blackbox Testing to test system functionality, as well as User Acceptance Testing (UAT) with ICT Division staff and users to ensure the application meets requirements.

6) **Delivery and Support**

The Delivery and Support activities aim to ensure that the ICT Request service can be used and managed effectively in accordance with stakeholder expectations. In this phase, mechanisms for service usage by users, as well as support and management of the service by the ICT Division, are designed from request receipt through to resolution.

IV. RESULT AND DISCUSSION

A. ITIL SVC (Service Value Chain) Based IT Support Model

Figure 1. IT Support Model Based on ITIL SVC

This study designed an ITIL V4 based IT Support model based on the Service Value Chain (SVC). This model is designed to integrate ICT Request service processes to make them more structured, documented, and controlled.

The proposed IT Support model encompasses the six core activities in ITIL V4: Plan, Engage, Design & Transition, Obtain/Build, Deliver & Support, and Improve. Each of these activities is mapped to business processes, user roles, and features within the developed ICT Request system.

Thus, the application is built not only as an operational tool but as an implementation of the ITIL V4 based IT Support model.

a) Plan

The Plan activities in this IT Support model focus on formulating service strategies, managing processes, and determining an IT Support service structure that aligns with the company's operational needs.

1) Purpose And Types of Services

Based on observations and direct discussions with ICT division staff, several issues were identified in the ICT Request process, including:

1. The submission process is still done manually
2. Lack of a centralized tracking system
3. Difficulty in monitoring request status

Therefore, a mobile-based IT Support service is needed to manage this process in a structured manner.

Additionally, the developed IT Support service includes several service categories to facilitate the grouping of service requests, namely:

a. Procurement

Services related to requests for the procurement of IT devices or other supporting needs, such as computers, laptops, printers, and other work equipment.

b. Helpdesk

A service covering the resolution of general issues related to the use of IT devices both hardware and software and network disruptions.

c. Email Setup

A service used to request the creation of new email accounts for new employees.

d. Documents

A service related to document requests within the DCRM (Document Control Record Management) division.

This categorization of service types is also used to streamline monitoring and reporting processes within IT Support.

2) SOP (Standard Operating Procedure) of ICT Request

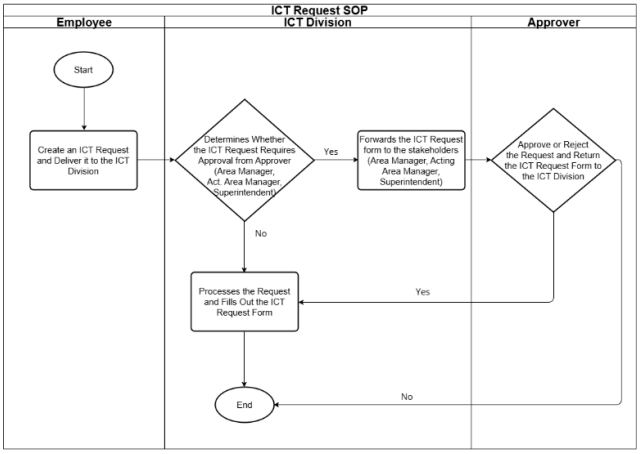

Figure 2. ICT Request SOP

The ICT Request SOP shown in Figure 2 illustrates the workflow from submission to completion of requests, which were previously handled manually using paper-based systems. This process involves several parties, namely Employees, the ICT Supervisor, Approvers (Area Manager, Acting Area Manager, Superintendent), and the ICT Technician. Subsequently, this ICT Request SOP was implemented into a newly developed mobile-based IT Support service, enabling the request management process to be conducted in a more structured, documented, and easily monitored manner.

3) SLA (Service Level Agreement)

A Service Level Agreement (SLA) is used as a guideline for managing IT support services. SLA are generally used to set response time and resolution time targets for each service request.

However, based on observations and discussions with the company's ICT division staff, no SLA based on response time or resolution time are currently in place. This is because the process of handling requests is dynamic and adapts to operational conditions as well as the level of complexity of the issues faced. Additionally, the limited number of human resources within the ICT division staff consisting of only three people is one of the main factors making it difficult to consistently apply standard response and resolution times.

Alternatively, the developed system implements a priority grouping mechanism to determine the urgency level of each service request. These priorities serve as the basis for determining the order in which requests are handled by the ICT division staff. The priority categories used in the system are as follows:

1. Urgent

Requests with a high level of urgency that directly impact the user's or company's core operations and must therefore be addressed immediately.

2. Normal

Requests with a moderate level of urgency that do not directly halt operations but still require resolution within a reasonable timeframe.

3. Low

Requests with a low level of urgency that do not significantly impact operations, so they can be addressed after requests with higher priority have been resolved.

Additionally, the system provides graphical reporting features that allow ICT division staff to monitor the number of incoming and resolved requests over a specific period, such as monthly.

4) Role

In the developed IT Support service, there are several user roles tailored to the company's organizational structure. Each role has different access rights and responsibilities in the ICT Request management process. The IT Support system includes the following roles:

1. Employee

An Employee is a user role that submits IT Support service requests through the system. Employees can create requests, view request statuses, and receive notifications regarding the progress of request handling.

2. Admin (ICT Supervisor)

The Administrator is responsible for managing all requests submitted to the system. The Administrator performs an initial verification of the request, determines whether the request requires approval, and assigns the request to the Technician responsible for handling it.

3. Technician (ICT Technician)

The Technician is part of the ICT team tasked with handling requests assigned by the Administrator. Technicians will resolve issues and update the request status until the request is completed.

4. Approver (Area Manager/Acting Area Manager/Superintendent)

This role serves as the party that provides approval for specific requests requiring authorization. Users with this role have the authority to approve or reject requests in accordance with applicable policies.

5) Workflow Status

The workflow status in the IT Support system is used to indicate the stages or status of each service request from creation to completion. In the developed system, the workflow is divided into two types of status: request status and approval status. This distinction aims to differentiate between the progress of the request's processing and the required approval process.

a. Request Status

The request status is used to indicate the progress of a request being handled by the ICT division team. There are several request statuses in the IT Support system:

1. On Progress

The status when a request is being handled by a Technician.

2. Done

The status when a request has been fully resolved.

b. Approval Status

The approval status is used to indicate the approval process for requests requiring authorization. There are several approval statuses in the IT Support system:

1. Approved

The status when a request has been approved.

2. Rejected

The status when a request has been rejected.

b) Engage

The Engage phase begins with users interacting with IT Support by submitting a request through the mobile app. Users can access the Request feature, fill out the form as needed, and then submit the request through the system. With this app, communication between employees and the ICT division is no longer handled manually but is instead centralized and properly documented. The system also provides automatic notifications regarding changes in request status, such as during the handling process until completion. Additionally, users can monitor the progress of requests in real time via the request details feature, while Admins can verify requests, determine approval requirements, and assign technicians through the same system.

c) Design & Transition

The Design & Transition phase involves designing IT support services based on previously identified needs. This phase focuses on designing service workflows, service mechanisms, and service structures to ensure they are well organized, properly documented, and ready for operation. Additionally, a transition of services from manual processes to a digital-based system is carried out to improve the effectiveness, efficiency, and transparency of ICT Request management. Previously, the request process still relied on paper-based systems, leading to challenges such as decentralized data recording, difficulties in monitoring request status, and the risk of data loss. Therefore, an integrated IT Support service was designed to support more optimal request management.

1) Service Workflow

The IT Support service workflow was designed to provide a comprehensive overview of the service business process, from the submission of a request to its resolution by a technician. This workflow was developed by transforming the previously manual Standard Operating Procedures (SOP) into a more structured service process.

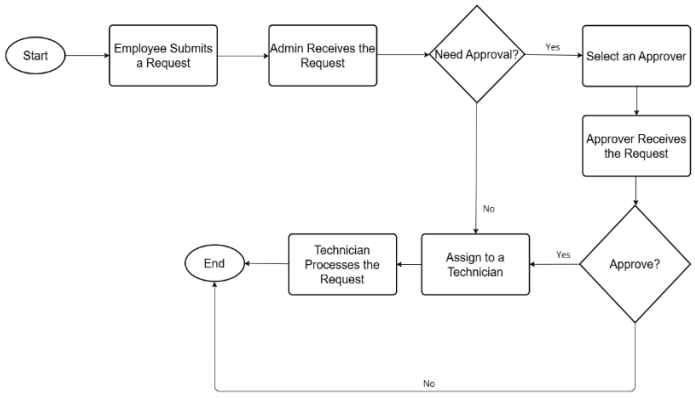

Figure 3. IT Support Workflow

As shown in Figure 3, the IT Support service workflow begins with an employee submitting a request, which is then verified by the Admin. Next, the Admin determines whether the request requires approval. If so, the request is forwarded to an approver, such as an Area Manager, Acting Area Manager, or Superintendent for approval. Approved requests are assigned to a technician, while rejected requests are closed. For requests that do not require approval, the Admin can directly assign a technician. Once the issue is resolved, the request status is updated to "done" to indicate the completion of the IT Support service process.

2) Service Mechanisms

The IT Support service mechanism is designed to manage the request handling process in an effective and controlled manner. The mechanisms implemented include prioritizing requests based on urgency (urgent, normal, and low), an approval process for specific requests, technician assignment by the administrator, monitoring of request status, and notifications of status changes to users. This mechanism aims to ensure that the service operates in a structured, transparent, and easily manageable manner.

3) Service Structures

The IT Support service structure at this stage outlines the involvement of each role in the designed service workflow. Each role has different responsibilities depending on the stage of the service process, from the submission of a request through to resolution.

Table 3. IT Support Service Structure

No	Role	Role In The Service
1	Employee	Submits service requests and monitors request status
2	Admin	Verifies requests, determines approval requirements, and assigns tasks to technicians
3	Approver (Area Manager/Acting Area Manager/Superintendent)	Decides whether to approve or reject the request
4	Technician	Handles the service request until completion and updates the status

d) Obtain/Build

The Obtain/Build phase involves the development of the IT Support system based on the previous design. This phase includes the development of a mobile app, feature implementation, and system integration to support integrated IT Support services. The mobile app is developed with a backend server connection via API so that the process of submitting, managing, and resolving requests can be carried out effectively. The system development process uses the Extreme Programming (XP) methodology, which consists of the Plan, Design, Coding, and Testing phases.

1) Plan

The planning phase in the XP method is conducted to identify system requirements based on the results of the IT Support service analysis. System requirements are divided into core features and supporting features as the basis for application design and development.

a. Core Features

Core features are the core functions that support the IT Support service process, including:

1. Login, to verify users accessing the system.
2. Submit Request, to submit a service request by filling in the service type and problem description.
3. Set Approval, to determine whether the request requires approval and to designate the person who will approve the request.
4. Approval Process, to handle request approvals by authorized parties.
5. Technician Assignment, to distribute handling tasks to technicians.
6. Status History, to monitor the progress of requests and approval status.
7. Notifications, to inform users of changes in request status.

b. Supporting Features

Supporting features are used to enhance system operations for greater effectiveness, including:

1. User data management by Admins and Technicians.
2. Inventory data management, such as UTP LAN cables, PC, and external hard drives.
3. Reports on the number of requests in chart form to support service monitoring.

2) Design

The design phase involves designing an IT support system based on the requirements identified during the planning phase. During this phase, Unified Modeling Language (UML) modeling, such as Usecase Diagram to describe system functionality, and System Workflow to illustrate the flow of IT support processes implemented within the system, are utilized. Additionally, a system architecture is designed to illustrate the relationships between mobile applications, servers, and databases.

a. Usecase Diagram

A use case diagram is used to illustrate the interactions between actors and the IT Support system, along with their access rights.

As shown in Figure 4, the actors involved include Employees, Admins, Approvers, and Technicians. Employees can submit service requests, view their history, and receive notifications. Admins are responsible for managing requests, determining approval requirements, and assigning technicians. Approvers have the authority to approve specific requests, while Technicians are responsible for handling and resolving assigned requests.

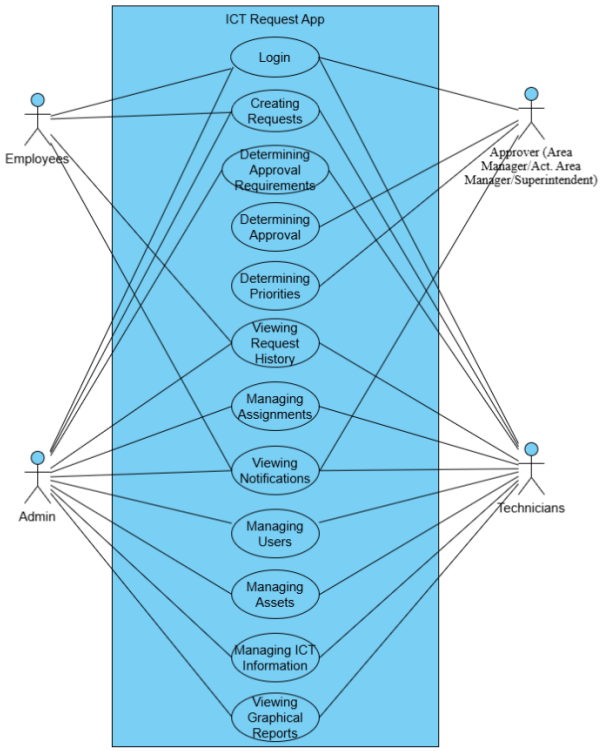

Figure 4. IT Support System Use Case Diagram

b. System Workflow

The system workflow is used to illustrate the entire IT Support service process, from the submission of a request by a user to its resolution by a technician. This workflow shows the interactions between Employees, Admins, Approvers, and Technicians in supporting the management of IT Support services.

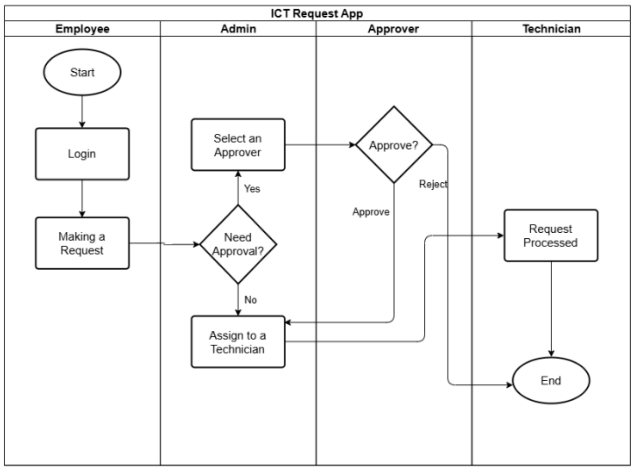

Figure 5. IT Support System Workflow

Figure 5 shows the process, which begins with an employee creating a request. The Admin then verifies the request and determines whether approval is required. If necessary, the Approver makes a decision to approve or reject the request. Next, the Admin assigns the request to a Technician to handle it until the status changes to "done".

c. System Architecture

The IT Support System was developed using a client-server architecture, in which the mobile application serves as the client used by users, while the backend server manages data and business processes.

Figure 6. IT Support System Architecture

Figure 6 shows that users, such as Employees, Admins, Technicians, and Approvers (Area Managers or Acting Area Managers, and Superintendents) access the mobile-based application, which functions as the client used to submit and manage service requests. The application connects to the backend server via the internet.

The backend server processes all requests from the application, including data management, approval processes, technician assignments, and the sending of notifications.

All system data is stored in a database integrated with the server, enabling centralized and structured data storage.

3) Coding

The coding phase is the stage where the design is brought to life or implemented. To do this, several technologies are required, namely:

a) Flutter as a framework for mobile app development

b) PHP with the CodeIgniter 4 framework as the backend server

c) MySQL as the database for storing data

d) REST API as the interface or communication channel between the mobile app and the backend server

1. Feature Implementation

a) Submit request

The request submission feature has been implemented to enable users to submit service requests. Users can fill in the request details as needed before submitting them to the system. The request submission feature is shown in Figure 7.

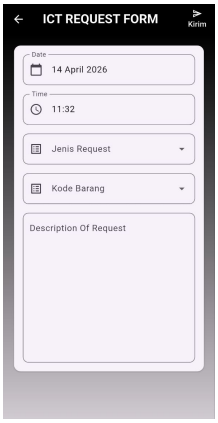

Figure 7. Request Submission Page

b) Set Approval

The Set Approval feature has been implemented to determine whether a request requires approval and to designate the person who will approve the request. This feature is shown in Figure 8.

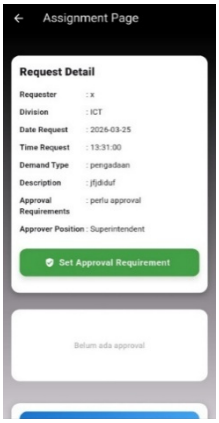

Figure 8. Set Approval Feature

c) Approval Process

The approval process feature has been implemented to display request details and present the approval interface, which includes two options: Approve and Reject. This feature is shown in Figure 9.

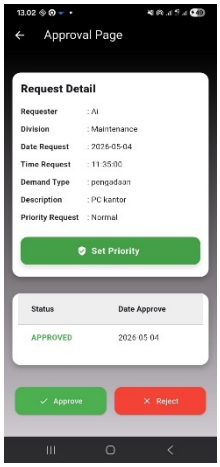

Figure 9. Approval Feature

d) Technician Assignment

The Technician Assignment feature has been implemented to assign tasks to technicians and manage assignments by modifying assignment data. This feature is shown in Figure 10.

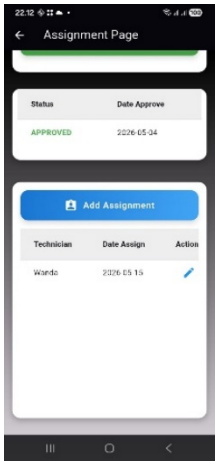

Figure 10. Assignment Feature

e) Status History

The Status History feature has been implemented to display data on requests previously submitted by users. In addition, this feature includes a function to display request details, providing comprehensive information, approval status, and request status so that users can monitor them in real time. This feature is shown in Figure 11.

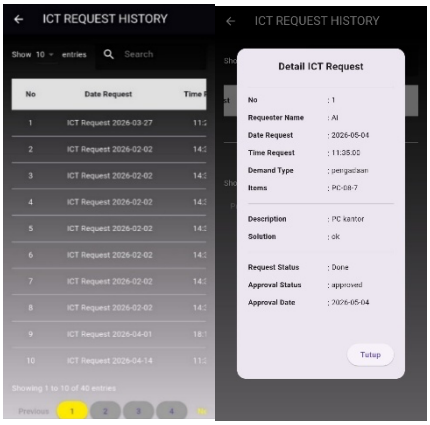

Figure 11. Status History Feature

f) Notifications

The Notification feature has been implemented to inform users of relevant information. This feature is shown in Figure 12.

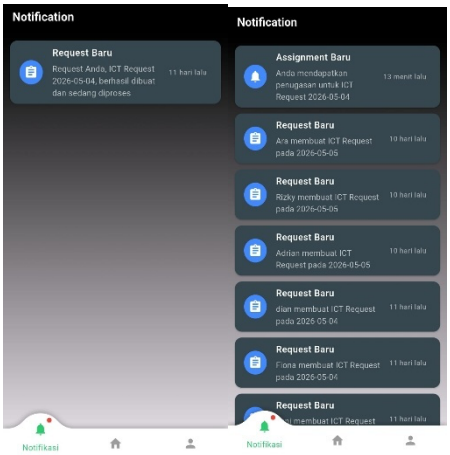

Figure 12. Notification Feature

2. System Integration

The IT Support system was developed using a client-server architecture, in which the mobile app communicates with the backend server via an API through a request response mechanism: the app sends a request to the API, the backend processes the data, and returns a response in JSON format to be displayed in the app.

Every request made by a user is sent to the server for processing; the results are then stored in the database and sent back to the app to be displayed to the user. Thus, all data is stored centrally and can be accessed in real time by every user according to their access rights.

4) Testing

Testing is a phase designed to verify that the developed application functions in accordance with the requirements and design established in the previous phase. Testing is conducted using two methods, which are Blackbox Testing and UAT (User Acceptance Testing).

1. Blackbox Testing

Blackbox testing is a testing method that focuses on testing the functionality of a system or application. Testing is performed on all system features, including both core and supporting features.

Table 4. ICT Request Application Blackbox Testing

Test	Input	Expected Result	Result
Login Successful	Correct username and password	Redirected to the employee dashboard	Pass
Login Failed	Incorrect username and password	Login failed and an error message is displayed	Pass

Create a request	Fill in complete request data	Request sent and saved	Pass
Form validation	Incomplete request data	Displays an error message	Pass
View request history	Click the "Request History" button on the homepage	Request history appears	Pass
View Request Details	Select data	ICT Request details displayed	Pass
Display the Assignment page for a specific request	Click the Assignment-t button	The Assignment page for a specific request appears	Pass
Set approval requirements	Select approval requirement-ts	Approval requirements saved	Pass
Assign to a technician	Select a technician and date	Assignment successful	Pass
Edit Assignment	Edit assignment data	Assignment successfully updated	Pass
View the request data print page	Click the Print button	The Print Data page appears	Pass
Print Request	Click the download icon	PDF file downloaded	Pass
View ICT information	Click the "Info ICT" button on the homepage	Information data displayed	Pass
Viewing Info Details	Select information	Information details displayed	Pass
Create information	Informati-on data	Information saved	Pass
Delete information	Click the delete icon	Data deleted	Pass
View notification	Click the the bell icon button on the homepage	Notification displayed	Pass
View user data	Click the User Management-nt button	User data displayed	Pass
Add user	New user data	Data saved	Pass
Edit user	User data changes	Data updated	Pass
Delete user	Select user	User data deleted	Pass
View inventory data	Click the Inventory Management-nt button	Inventory data displayed	Pass
Add item	New item data	Data saved	Pass
Edit item	Item data changes	Data updated	Pass
Delete item	Select item	Item data deleted	Pass
Display reporting chart	-	Data request graph displayed	Pass
Filter by year and request type	Select year and request type	Data matching the filter displayed	Pass
View Requests Requiring Approval	-	Data displayed	Pass
View the approval page for a specific request	Click the "Lihat Request" button	The request approval page appears	Pass
Approve Request	Click the "Approve" button	Approval status set to Approved	Pass
Reject Request	Click the "Reject" button	Approval status set to "Rejected"	Pass

2. User Acceptance Testing (UAT)

User Acceptance Testing (UAT) is a testing method used to measure the level of user acceptance of the developed system. The testing was conducted by users involved in IT Support services, namely Employees, Administrators, Technicians, Area Managers, Acting Area Managers, and Superintendents.

The evaluation is conducted using a Google Form questionnaire consisting of 10 questions on a Likert scale, including Strongly Disagree (SD), Disagree (D), Neutral (N), Agree (A), and Strongly Agree (SA).

Table 5. Recapitulation of UAT (User Acceptance Testing) Respondent Responses

Code	Question	Rating Scale				
		SD	D	N	A	SA
Q1	Is the system easy to understand when you first use it?	0	0	0	14	26
Q2	Is the app interface user-friendly?	0	0	0	15	25
Q3	Can you use the system without any difficulty?	0	0	1	16	23
Q4	Does the system meet your needs?	0	0	0	19	21
Q5	Are the features in the system easy to understand?	0	0	0	19	21
Q6	Does the system help streamline the IT support process in your work?	0	0	0	12	28
Q7	Does the system run smoothly when in use?	0	0	0	24	16
Q8	Does the app interface look appealing?	0	0	1	16	23
Q9	Do you feel comfortable using this app?	0	0	0	17	23
Q10	Are you satisfied with this system overall?	0	0	2	13	25

After obtaining the respondents' answers shown in Table 8, the total respondent value and the index for each question were calculated. The calculations were performed using the following formula:

Total Respondent Value = $(TR_{SA} \times 5) + (TR_A \times 4) + (TR_N \times 3) + (TR_D \times 2) + (TR_{DS} \times 1)$

Notes: TR = Total Respondents

$$Index(\%) = \frac{Total\ Respondent\ Value}{TN_{Max}} \times 100\%$$

Notes: TN_{Max} = Maximum total value of respondents

Table 6. Results of User Acceptance Testing (UAT) Using a Likert Scale

Code	Total Score	Min Score	Max Score	Index (%)
Q1	186	40	200	93.0%
Q2	185	40	200	92.5%
Q3	182	40	200	91.0%
Q4	181	40	200	90.5%
Q5	181	40	200	90.5%
Q6	188	40	200	94.0%
Q7	176	40	200	88.0%
Q8	182	40	200	91.0%
Q9	183	40	200	91.5%
Q10	183	40	200	91.5%
Average index				91.4%

Based on the results of the User Acceptance Testing (UAT) conducted on 40 respondents, an average index score of 91.4% was obtained. According to the Likert scale, this score falls into the "Strongly Agree" category, as it falls within the 80%–100% range. These results indicate that the developed mobile based IT Support application is very well received by users and is considered capable of assisting in the management of ICT Request services.

e) Deliver & Support

In the Deliver & Support phase, the designed IT Support services are implemented through a mobile-based ICT Request application as the service platform. This phase focuses on the execution and management of services to ensure that the request handling process runs effectively, in a structured manner, and sustainably.

The service involves Employees, Admins, Technicians, Area Managers/Act. Area Managers, and Superintendents, who interact with one another according to their respective roles. Employees submit requests through the app, which are then processed by Admins, forwarded for approval if necessary, and subsequently handled by Technicians until completion.

The service implementation supports several key activities, including service request management, real-time monitoring and tracking of status, automatic notifications of status changes, management of supporting data, and service reporting in graphical form for performance evaluation. All service data is stored in an integrated database, making it easier to search for historical data and minimizing the risk of data loss.

The implementation of the mobile-based ICT Request application has transformed the previously manual IT support process into one that is more effective, efficient, transparent, and easily monitored, thereby enhancing the quality of ICT services within the company.

f) Improve

During the Improve phase, an evaluation was conducted of the IT Support services based on the ICT Request application to identify shortcomings and opportunities for service improvement. The evaluation results showed that the system has helped address issues related to manual submission processes, decentralized data recording, and previously ineffective service status monitoring.

Future developments may include the implementation of time-based Service Level Agreement (SLA), enhancements to automatic notification features, and the development of a more comprehensive service monitoring dashboard. With the Improve phase in place, the IT Support service is expected to continue evolving so that it can consistently provide more effective, efficient, and high quality service.

B. Discussion

This study successfully developed a mobile-based IT support service by adopting the ITIL V4 Service Value Chain (SVC) framework and the Extreme Programming (XP) methodology. The developed system serves as a tool to support the ICT request process, ensuring that services operate in a more structured, documented, and easily monitored manner.

The results of this study align with the research by [2] and [3], which states that mobile applications can improve the efficiency, flexibility, and transparency of services through an integrated system. Additionally, the application of ITIL in this study also supports the research by [7] and [8], which demonstrates that the ITIL framework can enhance the quality and effectiveness of information technology services.

The distinction of this study compared to previous research lies in the implementation of mobile based IT Support services within an oil and gas company environment, featuring the integration of request submission, approval, technician assignment, status monitoring, and service notifications into a single centralized system.

From a system development perspective, the use of the XP method in this study aligns with the research by [19] and [10], which states that XP is effective for mobile application development because it supports flexibility and iterative adaptation to user needs.

The results of Blackbox Testing showed that all system features functioned as intended, while the results of User Acceptance Testing (UAT) obtained an average index score of 91.4% in the "Strongly Agree" category. These results indicate that the developed system is well accepted and capable of helping to improve the effectiveness of ICT Request services within the company.

V. CONCLUSIONS

Based on the results of the research conducted, this study successfully designed an IT Support service model based on the ITIL V4 Service Value Chain (SVC) and implemented it into a mobile-based ICT Request application at PT. Energi Mega Persada (EMP) Bentu Limited–Korinci Baru Limited. The designed service model encompasses the activities of Plan, Engage, Design & Transition, Obtain/Build, Deliver & Support, and Improve, which are used to support the ICT Request service process so that it is more structured, documented, and easily monitored.

The application was developed using the Extreme Programming (XP) methodology, which consists of planning, design, coding, and testing phases. The application was built using Flutter as the mobile framework, CodeIgniter 4 as the backend server, MySQL as the database, and REST API as the communication medium between the application and the server. The developed system supports the processes of request submission, approval, technician assignment, status monitoring, notifications, management of supporting data, and service reporting in graphical form.

The results of Blackbox Testing indicate that all system features, both primary and supporting features, function as intended for each user role: Employee, Admin, Technician, and Approver.

Additionally, based on the results of the User Acceptance Testing (UAT) conducted on 40 respondents, an average index score of 91.4% was obtained, which falls into the "Strongly Agree" category. These results indicate that the mobile-based ICT Request application was very well received by users and is considered capable of helping the IT Support service process become more effective, efficient, integrated, and easier to monitor compared to the previous manual process.

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REFERENCES

1. N. Purba, M. Yahya and N. , "REVOLUSI INDUSTRI 4.0 : PERAN TEKNOLOGI DALAM EKSISTENSI PENGUASAAN BISNIS DAN IMPLEMENTASINYA," *Jurnal Perilaku Dan Strategi Bisnis,* pp. 91-98, 2021.
2. . R. Agudelo, J. Granados, M. Ceballos and J. A. Pereanez, "Design and development of a mobile application for drug information and other health data for users and patients of pharmacies and outpatient pharmaceutical services," *Exploratory Research in Clinical and Social Pharmacy,* pp. 1-8, 2025.
3. M. Eisenstadt, S. Liverpool, E. Infanti, R. M. Ciuvat and C. Carlsson, "Mobile Apps That Promote Emotion Regulation, Positive Mental Health, and Well-being in the General Population: Systematic Review and Meta-analysis," *JMIR MENTAL HEALTH,* pp. 1-18, 2021.
4. M. Kassjański, M. Kulawiak, T. Przewoźny, D. Tretiakow and A. Molisz, "Development and testing of an open source mobile application for audiometry test result analysis and diagnosis support," *Scientific Reports,* 2025.
5. E. Salelew, M. Srahbzu, T. Diges, H. G. Yeniakal, G. Begashaw, T. Tadele, T. Hailu, W. Degef, F. Bazezew, D. Demilew and M. Belachew, " Developing and testing preliminary effectiveness and acceptability of a mental health application in Ethiopia," *Discover Mental Health,* 2025.
6. M. Irsyad, "APLIKASI e-REMINDER SERVICES (LAYANAN PENGINGAT ELEKTRONIK) UNTUK KEGIATAN DOSEN (STUDI KASUS : JURUSAN TEKNIK INFORMATIKA UIN SUSKA RIAU)," *Jurnal Ilmu Komputer,* vol. 3, pp. 1-9, 2017.
7. S. Ahriz, H. Gharbaoui, N. Benmoussa, A. Chahid and K. Mansouri , "Enhancing Information Technology Governance in Universities: A Smart Chatbot System based on Information Technology Infrastructure Library," *Engineering, Technology & Applied Science Research ,* pp. 17876-17882, 2024.
8. D. Setyowibowo, T. Raharjo and A. N. Fitriani, "Project Management Strategy for Chatbot Implementation Based on ITIL v4: A Logistics Company Case," *CommIT Journal 19,* pp. 59-70, 2025.
9. M. F. F. Rahman, K. Darussalam, R. C. Saphira and F. Purwani, "IMPLEMENTASI EXTREME PROGRAMMING DALAM PENGEMBANGAN APLIKASI MOBILE PENGENALAN ORGANISASI PADA MASA ORIENTASI MAHASISWA," *Just IT : Jurnal Sistem Informasi, Teknologi Informasi dan Komputer,* pp. 128-132, 2024.
10. J. Wiratama, F. Y. Theoderic and S. , "UTILIZING EXTREME PROGRAMMING METHODOLOGY FOR DEVELOPING AN ANDROID-BASED SALESMAN VISITATION APPLICATION IN THE WATER TANK INDUSTRY," *Jurnal Sistem Informasi,* pp. 122-127, 2023.
11. J. Zumwalt and A. Keener, " The development of a mobile learning application to aid ECG interpretations among first- and second-year medical students," *Discover Education,* pp. 1-7, 2025.
12. A. Selcuk, S. Soydan, V. Atmis, A. Yalcin, A. Bozkir and M. Varli, "Development of content for a mobile application aimed to increase medication adherence among older adults," *BMC Geriatrics,* pp. 1-7, 2025.
13. R. Salari, F. Fatehi and H. Mehdizadeh, "Development and Usability Evaluation of COVID-Iran: A Mobile Application for MitigatingCOVID-19 Misinformation," *Healthcare Informatics Research,* pp. 312-323, 2024.
14. Office of Government Commerce (OGC), The Official Introduction to the ITIL Service Lifecycle, London: The Stationery Office (TSO), 2007.
15. AXELOS, ITIL Foundation ITIL 4 EDITION, London: The Stationery Office (TSO), 2019.
16. R. A. Bednarczyk, P. M. Frew, D. A. Salmon, E. Whitney and S. B. Omer, "ReadyVax: A new mobile vaccine information app," *Human Vaccines & Immunotherapeutics,* pp. 1149-1154, 2017.
17. Z. F. Alfikri, M. E. Johnson, B. E. Dicianno, C. M. Greco, B. Parmanto, S. R. Piva, R. E. Roos, A. Saptono, G. A. Sowa, L. Zhou and K. M. Bell, "Mobile Health (mHealth) for Chronic Low Back Pain Assessment: Design, Development, and Usability Evaluation," *JOR Spine,* pp. 1-9, 2025.
18. D. Koo, Y. Bang, D. Kim, I. Im, P. Kim and D. Park, "Mobile application-based lifestyle intervention for improving glycemic control and body composition in manufacturing company employees in South Korea," *Diabetology & Metabolic Syndrome,* pp. 1-14, 2025.
19. B. K. Amellia and M. A. Subandri, "Penerapan Metode Extreme Programming (XP) dalam Membangun Aplikasi Penjualan Produk BUMDES Teluk Latak Berbasis Mobile," *Jurnal Teknik Informatika dan Teknologi Informasi,* pp. 582-598, 2025.

20. R. S. Pressman, SOFTWARE ENGINEERING: A PRACTIONER'S APPROACH, SEVENTH EDITION, New York: McGraw Hill, 2010.
21. J. Wiratama, H. Santoso and C. , "Developing a Class Scheduling Mobile Application for Private Campus in Tangerang with the Extreme Programming (XP) Model," *G-Tech : Jurnal Teknologi Terapan,* pp. 484-493, 2023.
22. M. Z. Zoelkifli, S. and H. Santoso, "Design And Construction of Simpang Empat Village Public E-Service Using Mobile-Based Extreme Programming Method," *International Journal of Information System & Technology,* pp. 21-27, 2025.
23. K. Nistrina and L. Sahidah, "UNIFIED MODELLING LANGUAGE (UML) UNTUK PERANCANGAN SISTEM INFORMASI PENERIMAAN SISWA BARU DI SMK MARGA INSAN KAMIL," *Jurnal Sistem Informasi Karya Anak Bangsa (J-SIKA),* pp. 17-23, 2022.
24. I. Sommerville, Software Engineering Ninth Edition, Boston, United States: Pearson, 2011.
25. I. Wahyudi, F. F. Alameka and H. , "ANALISIS BLACKBOX TESTING DAN USER ACCEPTANCE TESTING TERHADAP SISTEM INFORMASI SOLUSIMEDSOSKU," *Jurnal Teknosains Kodepena,* pp. 1-9, 2023.
26. V. H. Pranatawijaya, W. R. Priskila and P. B. A. Anugrah Putra, "Penerapan Skala Likert dan Skala Dikotomi pada Kuesioner Online," *Jurnal Sains dan Informatika,* pp. 128-137, 2019.
27. M. A. Setiono and R. , "Analisa Pengaruh Visual Efek Terhadap Minat Responden Film Pendek Eyes For Eyes Pada Bagian Pengenalan Cerita (Part 1) Dengan Metode Skala Likert," *Jurnal Komputer Terapan,* pp. 95-108, 2015.