

IDEF-0 Framework: Developing New Method of Self-Managed Procurement Type1 in Construction Project

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Abstract. Indonesia Public Procurement has introduced a new method of Self-managed Procurement Type-1 for construction projects. This method is designed specifically for small to medium-sized construction projects that can be managed independently. The research aims to develop a conceptual framework using the IDEF-0 analytical method. The method uses qualitative descriptive and data collection from a case study analysis of a government project. The result is a conceptual framework model of the New Self-managed procurement method. It comprises three stages which generate a process model including preparation, implementation, and supervision. The framework could be implemented and adopted by the industries, as well as the institutions and government agencies.

Keywords; *Self-Managed Procurement; IDEF-0; Construction Project.*

I. INTRODUCTION

Selecting the appropriate procurement method is essential to ensure success in construction projects. Indonesia's government has amended the Public Procurement Regulation to determine the most suitable public procurement method. For instance, in 2021 the Educational local authority used Traditional Procurement according to the terms and procedures of the National Public Procurement Agency (LKPP) (Article 9(2), Institutional Regulation of LKPP). In the following year, it was amended to Self-Managed Procurement Type-1. The amendment stipulated under the Ministry of Education Regulation No. 3 of 2022, article 8(2), which allows for the application of Traditional and/ or Self-Managed Procurement methods. This implies that the authorities may use a customized procurement method traditional procurement and self-managed procurement, known as self-managed procurement type-1.

The authority then applied Self-managed procurement Type-1 which has been started from 2022. There are some opportunities to use the new method in construction projects. Firstly, Project delays could bring more challenges in construction. The new method could bring in faster methods due to simple procurement

processes which could be managed by the authorities independently. For instance, in construction project funded by DAK (The Specific Allocation Fund) has encountered a project delay according to the project's

duration[1]. Hence, the new method could bring the projects on time and reduce delays.

Secondly, self-managed procurement type 1 could use professional participants to monitor the projects. The past Self-managed procurement method has challenges in terms of project quality due to unqualified human resources[1]. However, the government had amended the procurement method by Presidential Decree Number 12 of 2021 Concerning Goods/Services Procurement. It has a provision to use a professional certificate for the procurement's stakeholders to give more skills in specific needs such as infrastructure projects.

The third reason is the involvement of local values by local society participants[2]. The method can improve Local economic growth through community empowerment by local workers participating in construction projects. It reflects a sustainable economy by encouraging job opportunities in line with Sustainable Development Goals (SDGs).

However, Since the application was still new, there was an obstacle due to a lack of understanding of the new method. The adoption is still new and needs guidelines to apply the procurement methods, especially in construction projects.

Subsequently, this research will analyze and propose a conceptual framework for addressing the procurement mechanisms in implementing the New Method of Self-Managed Procurement Type-1.

II. SELF-MANAGED PROCUREMENT

A. Self-managed Procurement

There are two public procurement methods in Indonesia, Traditional Procurement and Self-managed Procurement (Institutional Regulation of LKPP). Traditional procurement is acquiring goods and services from providers or service providers, the contractor,

subcontractors, agents, and the cloud service provider under the contract [3]. Self-managed procurement or In-House procurement is the procurement method, which is managed independently by Ministries, Institutions, Regional Apparatuses, civil society, or community groups (Article 1, Paragraph 23 of the Institutional Regulation LKPP Number 3 of 2021).

According to the regulation of LKPP No.8 of 2018, there are four types of Self-managed procurement:

1. *Self-managed Procurement Type-1*

Self-managed procurement method that is organized independently by the government authority, encompassing planning, implementing, and supervising.

2. *Self-managed Procurement Type-2*

Self-managed procurement Type 2 is the procurement process which is planned, planned and supervised by the government institutions but implemented by another institution.

3. *Self-managed Procurement Type-3*

Self-managed procurement Type-3 is the procurement process which is planned and supervised by government authority but implemented by Community Groups.

4. *Self-managed Procurement Type-4*

Self-managed procurement Type-3 is the procurement method which is planned by government institutions but carried out and supervised by Community Groups. Requirements for Type IV Self-Management Organizers include a Letter of Confirmation issued by an authorized official

This study is focused on the Self-managed Procurement Type-1 method in the local authority. It was selected as the adoption in the educational local authority was still new and problems identified in the procurement implementation include time, cost, and quality[4]. The limitation of time identified in the projects and it is essential to have better teamwork by improving communication and coordination [5]. In addition, it is difficult to maintain a construction project to obtain a reasonable project cost [6]. The poor management and skills to construct the building are identified as the project quality challenge. Inadequate planning and poor execution caused problems with cost overruns and project delays [7].

B. Procurement Regulations

The regulation of Self-managed procurement goods and services in Indonesia is regulated under the Institutional Regulation of LKPP. The regulation consists of primary rules and derivative regulations. The primary rules are explained to be more technical and detailed under the derivative regulations[8]. However, procurement regulation is different according to the project type and resources. Self-managed procurement Type-1 in

the Educational Local Authority project has several regulations, which is explained in Table 1.

Table 1 Self-managed procurement regulation

The Primary Rules (Government Procurement Regulation of Republic Indonesia)	
Presidential Regulation No. 12 of 2021 (latest)	
Amended	
Presidential Regulation No. 16 of 2018	
Restricted	
Presidential Regulation No. 4 of 2015 (4 th amendment)	
Presidential Regulation No. 172 of 2014 (3 rd amendment)	
Presidential Regulation No. 70 of 2012 (2 nd amendment)	
Presidential Regulation No. 35 of 2011 (1 st amendment)	
Presidential Regulation No. 54 of 2010	
Derivative Regulations	
Traditional Procurement (Contract by Provider)	Self-Managed Procurement (In-house Procurement)
Institutional Regulation No. 12 of 2021 (Operational Procedures on Government Procurement by Provider)	Institutional Regulation No. 3 of 2021 (Procedures on Self-Managed Procurement)
Amended	
Institutional Regulation No. 9 of 2018	Institutional Regulation No. 8 of 2018

C. Procurement Organization and Stakeholders

There are four stakeholders in Self-managed procurement Type-1:

1. PA/KPA(Proxy of Budget User)
2. Commitment Making Officer (PPK)
3. Facilitator
4. Procurement officer/ organizer which consists of three procurement project teams including Preparation Team, Implementation Team, and Supervisory Team. The procurement organization structure is shown in Figure 1.

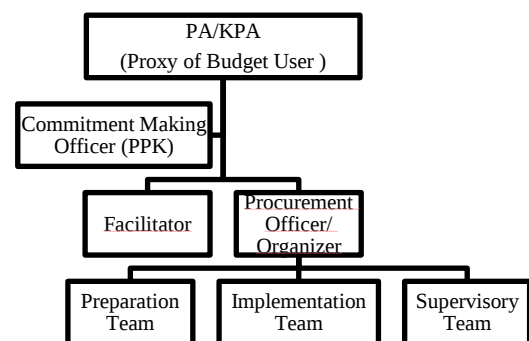


Fig. 1. General Elements of IDEF-0 Modelling Approach

D. Self-managed Procurement Processes

According to the Institutional regulation of LKPP, there are terms and procedures for Self-managed procurement Type-1 processes. The following details and explanations will be provided in the regulation on Article 2 which comprises: Planning the method; Preparation;

Implementation; Supervision; and Project hand-over. Globally, there are three main stages of Self-managed procurement:

1. Preparation

Firstly, PPK coordinates the preparation of type I Self-managed procurement after the establishment of the DIPA/DPA by considering the determination of targets set by the PA/KPA. Secondly, preparing the planning documents which include work breakdown structure, Implementation schedule, and review of technical specifications/TOR. The third is to carry out a contract document including HPS, contract design, and technical specifications/ TOR.

2. Implementation

The implementation stage includes the construction stage. Firstly, the documents will identify and analyse the problems which might arise[9]. According to the regulation of LKPP No.3 of 2021, the implementation stage includes: determining the project by PPK, Submitting local workers' participation, using an expert who understands the construction project, preparing the project's report, and payments by PPK according to the progress of the project.

3. Supervision

According to the institutional regulation of LKPP, the supervision stage is carried out by the supervisory team. The Team reports and provides recommendations to the PPK, preparation team or implementation team to immediately take corrective action according to the supervision result.

III. METHODS

This research uses a descriptive qualitative case study to analyze the implementation of a Self-Managed Procurement Type 1 approach within the Local Authority of Indonesia. The case study of Indonesia Local authority provided to understand the implementation of the New Self-managed procurement method. It investigated a public construction project which was a School project, including the reconstruction of a School Mosque, the Construction of Toilets, and the Construction of a Health facility. The data was collected through semi-structured interviews with government representatives, such as PPK (Procurement Making Officer), and stakeholders such as providers, and official employees.

The results of semi-structured interviews will be analyzed by the IDEF-0 analytical method to produce a conceptual framework. IDEF-0 is a graphical method which was initially created by the US Air Force to identify documents of processes system[10]. Selecting the IDEF-0 as the analytical technique due to the language of IDEF0is standardized with respect to syntax and semantics[11].

This structured approach allows users to better comprehend the relationships between different components and functions within an organization[12]. IDEF-0 is represented by four arrows (ICOM) which are input, output, control, and mechanism[13]. The following figure shows the graphical concept of the IDEF-0 analytical method, which includes four arrows: input, output, control, and mechanism.

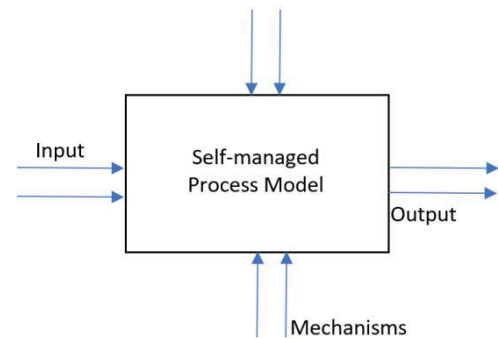


Fig. 2. General Elements of IDEF-0 Modelling Approach

The next step is to produce a more complex framework including three procurement stages, including preparation, implementation, and supervision. It is represented in Figure 3. There are three main activities which represent the first level of the IDEF-0 model. Prepare the project (A1), implement the project (A2) and supervise the project(A3). In giving the detailed system, each activity will be explained in detail by the second level of IDEF-0.

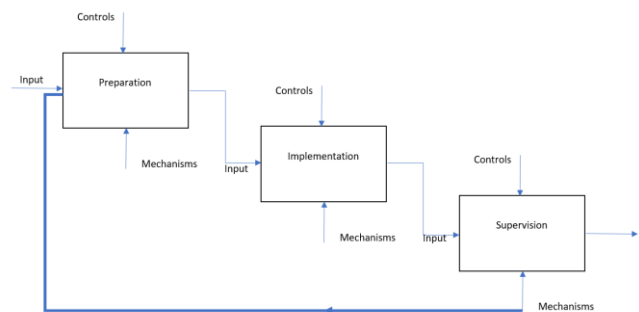


Fig. 3. IDEF-0 Structural model by n=3

IV. RESULTS AND DISCUSSION

The conceptual framework aimed to address the procurement mechanism processed model of Self-managed procurement Type-1 in understanding the mechanisms of the new procurement method. The IDEF-0 conceptual framework draws on data gathered through case study analysis, which was analyzed across four key elements: input (project requirements), control (project regulation and procurement), mechanisms (procurement

management by project team), and output (project processes).

The development of the IDEF-0 conceptual framework for Self-managed procurement is using Microsoft Visio to construct the IDEF-0 Process Model. The Framework consists of three levels. The first level is the (A0) node which is a basic element of procurement processes. It is illustrated in Figure 4.

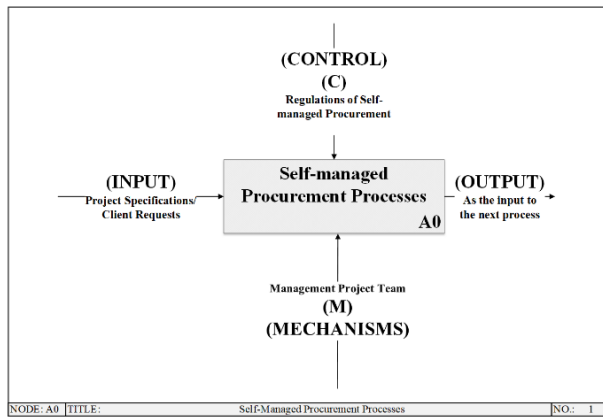


Fig. 4. IDEF-0 basic elements of Self-managed procurement system

The second level of the IDEF-0 conceptual framework is the detail of (A0) and it consists of three activity boxes, including (A1) Prepare the Project; (A2) Implement the Project; (A3) Supervise the Project. produced in three-layer process stages. It is illustrated in Figure 5. The hierarchical structure of the first level and the second level is illustrated in Figure 5.

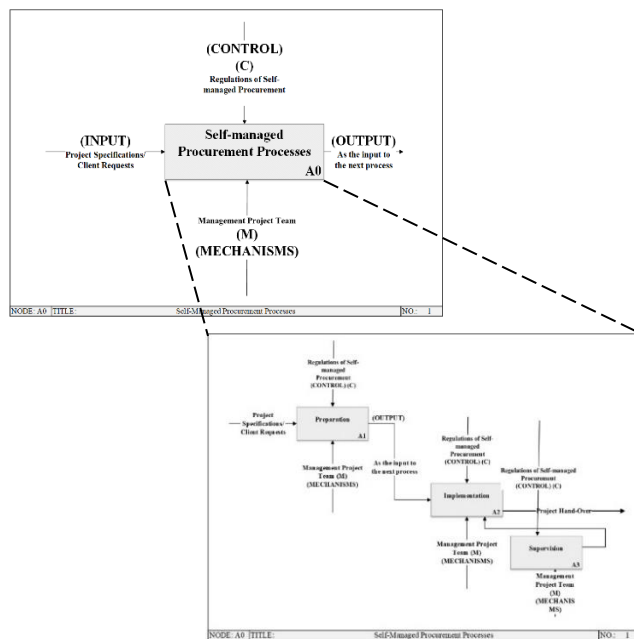


Fig. 5. (A0) Processes ID Mechanism

The third layer of the IDEF-0 model provides detailed information about process ID. For instance, the Preparation process (A1) is broken down into three activity boxes, labeled (A1.1), (A1.2), and (A1.3). The decomposition structure of the IDEF-0 model begins with the first layer continues through to the second layer and is detailed with the third layer.

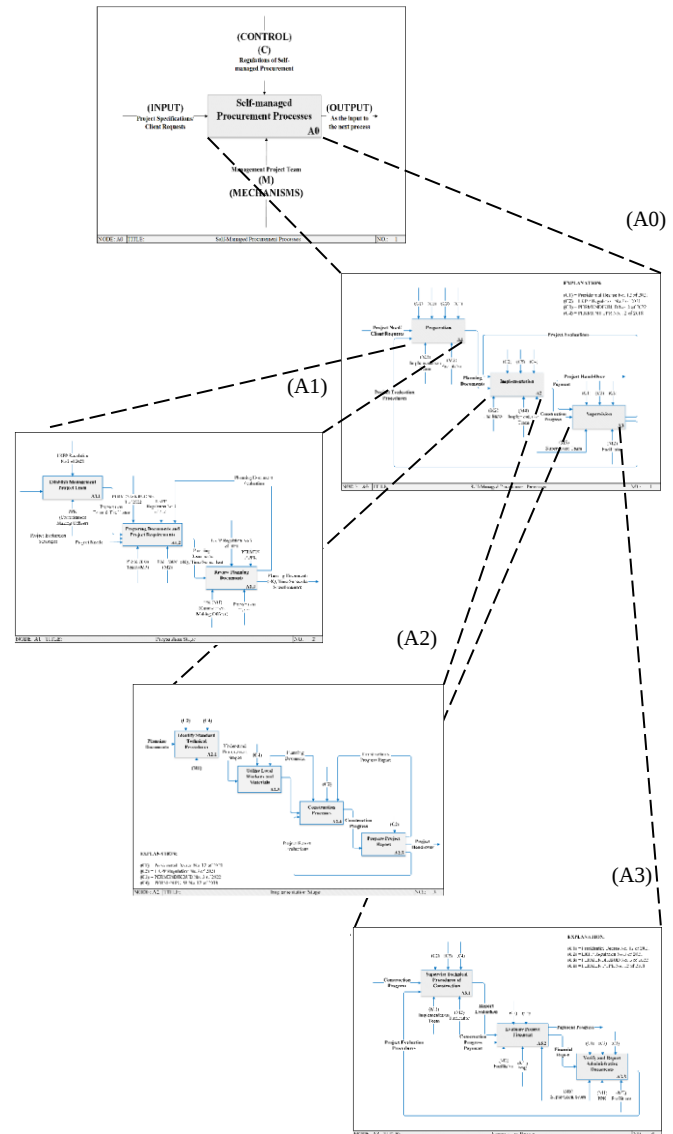


Fig. 6. Decomposition of IDEF-0 Conceptual Framework

The whole IDEF-0 structural model was developed by four frameworks:

1. "A0" Self-managed procurement process. It consists of three activity boxes: prepare the project (A1), implement the project (A2) and supervise the project (A3).
2. "A1" Prepare the project which consists of: Establish a management team (A1.1), Preparing Project

Document (A1.2), Review Planning Documents (A2.3).

3. "A2" Implement the project, consisting of: Identify standard technical procedures (A2.1), Utilize local workers and materials (A2.2), Construct the buildings (A2.3), Prepare project report (A2.4).
4. "A3" Supervise the project, consists of: Supervise technical procedures (A3.1), Evaluate project financial (A3.2), Verify and report administrative documents (A3.3).
5. The IDEF-0 hierarchical structure is showed in Figure 6. The first level detailed in (A0) which is the second level of IDEF-0 framework. The third level is the explanation of (A0), comprises of (A1), (A2), and (A3).

A. Self-managed Procurement Process Model (A0)

The A0 Diagram of the Self-Managed Procurement Process model consists of three activity boxes: Prepare the Project (A1), Implement the Project (A2), and Supervise the Project (A3). The main output from each activity serves as the input for the next activity.

Specifically, the output of Prepare the Project (A1) is project documents, which then serve as the input for Implementing the Project (A2). The primary output of Implement the Project (A2) is building progress, which becomes the main input for Supervise the Project (A3). The progress of the building, as the output of A2, is evaluated and supervised by A3. Ultimately, the final output of the procurement project is the building handover. A0 Diagram of the Self-managed procurement process is illustrated in Figure 7.

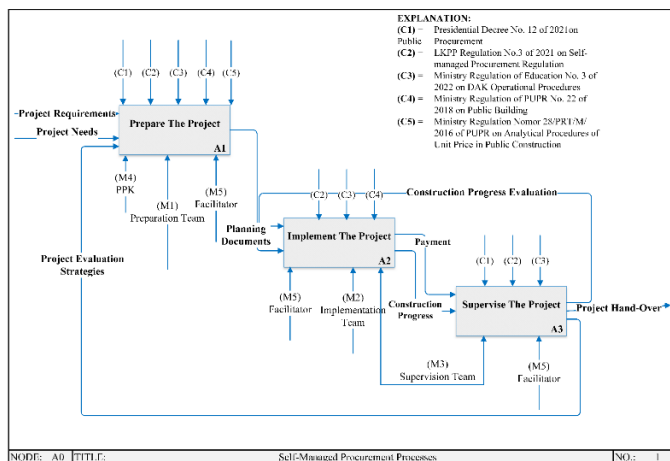


Fig. 7. Decomposition of IDEF-0 Conceptual Framework

The (A0) Framework consists of three main activity boxes which explain the whole procurement process of Self-managed procurement Type-1. There are five procurement stakeholders who have their responsibilities in each

procurement stage. The Preparation Team (M1) prepares the project (A1); the Implementation Team (M2) implements the project (A2). It is obliged to construct the building and report the progress of construction; The Supervision Team (M3) supervise the project (A3). The other mechanism in the process model is PPK (M5) as the Commitment Making Official and Facilitator (M4) that is obliged to help all procurement processes including preparing, implementing, and supervising the projects.

IDEF-0 model explains the details of process ID. For example, the Preparation process (A1) consists of three activity boxes represented by (A1.1), (A1.2), and (A1.3).

B. Prepare The Project (A1) Diagram

The first activity box in the A0 diagram is "Prepare the Project" (A1). The PPK (M4) and the preparation team (M1) identified the project criteria, specifications, and needs as inputs. These inputs align with the regulations outlined in the Public Procurement standards (C1) and (C2) under Institutional Regulation No. 3 of 2021 for Self-Managed Procurement. Additionally, they reference (C3) PERMENDIKBUD (The Ministry of Education Regulation) No. 3 of 2022 regarding DAK fund guidelines.

The primary activity in the planning process involves the facilitator (M5) collaborating with (M1) to create the main output: the planning document. This process is regulated in accordance with (C3) and (C4) under the Ministry of Public Works and Development (PERMEN PUPR) Regulation No. 12 of 2018, which pertains to Public Building Specifications, as well as (C5) under the Ministry Regulation No. 28/PRT/M/2016 regarding the Analytical Procedures of Unit Pricing in Public Construction. (A1) diagram is showed in Figure 8.

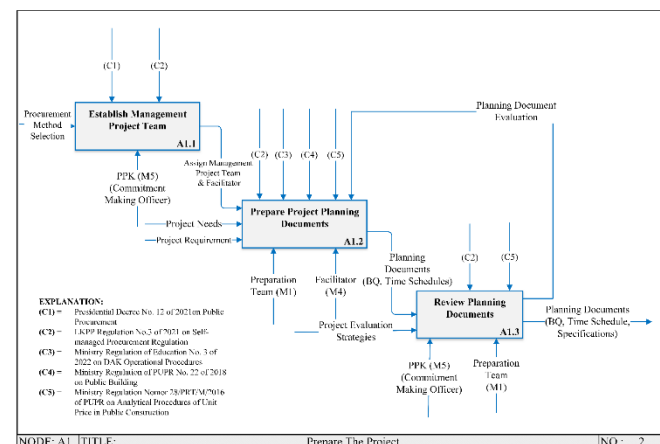
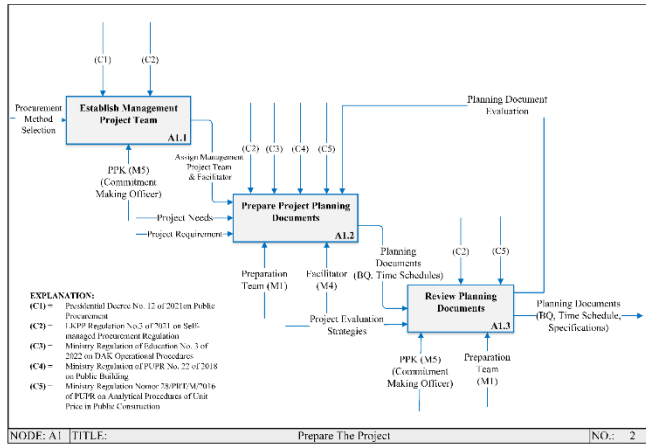


Fig. 8. Prepare the Project (A1)

C. Implement the Project (A2) Diagram

The implementation stage is the construction process. It consists of four activities. The Implementation Stage (A2) Diagram is illustrated in Figure 9.



There are four activities in the Implementation Stage Diagram:

1. (A2.1) Identify Technical procedures.

The activity is based on the Planning Documents which has the output on understanding the Planning Documents. Three stakeholders are responsible for this activity, including PPK, the Facilitator, and the Implementation Team. The activity is controlled under the (C2) Regulation of LKPP No.3 of 2021 and (C4) PUPR Regulation No.22 of 2018 on Public Buildings.

2. (A2.2) Utilize Local Workers and Material

The implementation team and facilitator work together who responsible for utilizing local value. It is based on the (C2) Regulation of LKPP No.3 of 2021 and (C4) The PUPR Regulation No.22 of 2018 on Public Buildings. The output utilises local goods/materials and services.

3. (A2.3) Construct the Building

The activity is based on the Planning Document and the (C2) Regulation of LKPP No.3 of 2021 on Self-managed procurement regulation. The Output is construction progress which becomes the input for preparing the project report. Two stakeholders were responsible for the construction process, including the implementation team and facilitator.

4. (A2.4) Prepare the Project Report

The project report is prepared by the Implementation Team and supervised by the Facilitator. The report will be used for payment according to the construction progresses.

D. Supervise the Project (A3)

The third activity is to supervise the projects (A3), which involves overseeing the construction progress of buildings. The supervision team (M3) is responsible for three key activities:

1. Supervise technical procedures (A3.1)

The first activity is to supervise technical procedures (A3.1), which involves auditing the technical procedures of the construction project. The main responsibilities lie with the Supervision Team (M3), the Facilitator (M4), and the Project Control Officer (PPK) (M5). They are committed to monitoring and evaluating the project by overseeing the technical procedures throughout the construction process.

2. Evaluate project finances (A3.2)

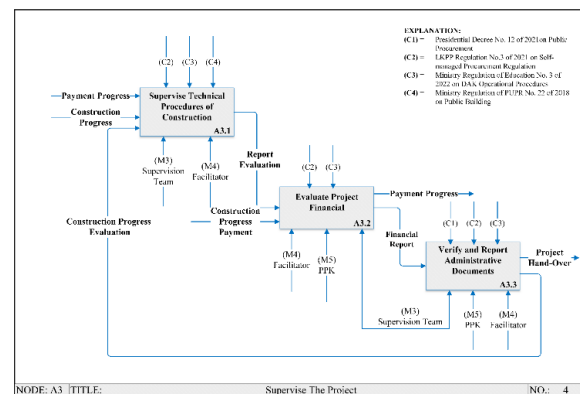
The second activity is to evaluate project finances (A3.2). There are two inputs for supervising the payment report: the first is the evaluation report from the previous stage, and the second is the construction progress payment. Payments are conducted three times based on the progress reports. When the progress reaches 25%, the supervision team (M3) will evaluate the project alongside the payment reports to determine the payment progress. The evaluation of payments is conducted in accordance with the regulations of self-managed procurement and the regulation of the DAK fund (C3).

3. Verify and report administrative documents (A3.3)

The third detailed activity of the Evaluate project (A3) is to verify and report administrative documents (A3.3). This activity culminates in the project's final output: the project handover. All administrative documents, including input from the previous activity regarding the financial report of the project, must be verified.

If construction processes are complete and the administrative and financial reports have been finalized, the Project Manager (PPK) and the Supervision Team will verify the project, preparing it for hand-over to the user, which is the School's party. This process adheres to the regulations of public procurement and the guidelines for DAK funds.

This structured approach ensures effective monitoring and management throughout the project lifecycle. (A3) Diagram of Supervised the Project is shown in Figure 10.



V. CONCLUSION

In conclusion, the research has examined the Conceptual framework model using the IDEF-0 analysis method by producing the framework processes model in three stages, including preparation, implementation, and supervision of the project. It also substitutes to explain the frameworks in detail by explaining the activity box in three hierarchical structures. Each activity box is detailed on the four arrows by ICOM'S (Input, Output, Control, Mechanism).

The framework was developed from a case study analysis of Self-Managed Procurement Type-1 in a public construction project by Educational Local Authority. The data was generated by semi-structured interviews with the procurement stakeholders who participated in the project.

The development of the IDEF-0 framework concept model contributed to understanding the whole processes of Self-managed procurement comprehensively. It contributed to other authorities, as well as government agencies to adopt Self-managed procurement Type-1 as the procurement method selection.

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