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Comparison Analysis of Organizations in the Implementation of DED School Projects with Implementation of Design and Build Office Building Project

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ABSTRACT: The development project with a design and build system has never been carried out in Tangerang City Government. The implementation of DED (Detail engineering Design) on the Cipondoh 3 SDN Building construction project in Kota Tangerang, the planning process was arranged a year before the construction was carried out, while the design and build on the Banten Provincial PUPR Office Building procurement and design and build process was carried out within 1 (one) fiscal year, with an implementation period of 7 (seven) months. The implementation of Detail Engineering Design (DED) is the process of compiling Detail Engineering Design (DED) products in development planning until the construction is carried out. Implementation of Design and Build is the process of implementing a building, the design work is integrated with the construction. In the flow / stages of design and build, the auction is only done once. The construction of the design and build can be carried out after the shop drawings have been completed as a reference for the construction. From the results of design and build work research more effective and efficient in terms of time, flow / stages of implementation, and costs. The design and build system requires parts in organizations that focus on design and budget reviews, so they must always review images and adjust to the existing budget. Vertical and horizontal communication and coordination must be carried out so that problems arising in the field can be immediately followed up. The research method used in this study is a descriptive method with a qualitative approach.

KEYWORDS: DED (Detail Engineering Design), Design and Build, Project Organizational Structure, Job Description.

I. INTRODUCTION

In carrying out development, each Regional Government needs accurate planning and is expected to be able to evaluate the development that it does. Development planning proposed by the Regional Work Unit must be included in the Regional Work Unit Work Plan (Renja-SKPD) which is prepared every once a year.

The implementation of Detail Engineering Design (DED) is the process of compiling Detail Engineering Design (DED) products in development planning until the construction is carried out. Detail Engineering Design (DED) is a document for preparing work reports in the form of pictures, Work Plans and Terms (RKS) in full which consists of various scales of images and specifications of materials / materials to be used. Implementation of Design and Build is the process of implementing a building, design work is integrated with the implementation of construction.

In the Cipondoh 3 Elementary School Building Construction Project in Tangerang City, DED is arranged a year (1st year) before the construction is carried out (2nd year). while the Banten Provincial PUPR Office Building Procurement Project planning and construction process is carried out in 1 (one) fiscal year, with a 7 (seven) month implementation period. There are no regional regulations governing the implementation of the DED and the implementation of the

International Journal of Innovative Research in Science, Engineering and Technology

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Visit: www.ijirset.com

Vol. 8, Issue 3, March 2019

construction is carried out in 1 (one) fiscal year. If the implementation of the DED and the implementation of construction can be carried out in 1 (one) fiscal year, it will save budget, time and energy.

II. LITERATURE REVIEW

Law No. 25 of 2004 concerning the National Development Planning System mandates that each region must prepare a regional development plan systematically, directed, integrated and responsive to change (Article 2 paragraph 2), with a long-term (25 years), medium-term (5 years) planning level or short or annual (1 year). Each region (province/district/city) must establish a Regional Long Term Development Plan (RPJPD), Regional Medium Term Development Plan (RPJMD) and Regional Government Work Plans (RKPD).

According to Minister of Public Works Regulation No. 11/PRT/M/2013 concerning Guidelines for Price Analysis of Public Works Field Units, in general, a DED document is a document for preparing work reports in the form of pictures, Work Plans and Terms (RKS) in full consisting of various image scales and material specifications/ what materials will be used.

For design and build projects, the type of work is more specific to construction work and public buildings, contractors can collaborate with consultant planners in carrying out work, or involve the contractor's own planning staff if the company has in-house consultants. In the design and build scheme, the job owner will usually involve a consultant to oversee the contractor's work.

According to the Minister of Public Works and Public Housing Regulation Number: 12/PRT/M/2017 concerning Standards and Guidelines for the Procurement of Integrated Construction Works Design and Build, Integrated Construction Work Design and Build are all related work with the construction of a building or making another physical form, the design work is integrated with the construction.

Criteria for Integrated Construction Work Design and Build include:

- a. complex work; or
- b. certain job.

Complex work includes work that:

- a. requires high technology;
- b. have a high risk;
- c. use specially designed equipment; and / or
- d. jobs worth more than Rp. 100,000,000,000.00 (one hundred billion rupiah).

Certain jobs are jobs that are urgent to be utilized immediately.

Human resource management is the art of regulating relationships and the role of labor in order to be effective and efficient to help realize the goals of the company, employees and society. In general, the function of human resource management is to regulate and manage human resources to the maximum and effective extent possible to obtain maximum performance. Meanwhile, MalayuHasibuan classifies human resource management into two different functions, namely managerial functions and operational functions (Rachman, 2016).

The word organization comes from an organization that means "association" or "union". The people in the association agree to act in order to realize the common goal. Organizations are associations of people who have gained recognition and activities to achieve goals (Karyoto, 2016).

Organizational structure is a formal pattern of grouping people and jobs. The organizational structure provides an explanation of the structure (form) of the organization, which is the development of the goals to be achieved by the organization. The shape of the organization is influenced by the size, bureaucracy, and technology used. Organizational structures are usually illustrated through organizational charts (Robbins and Judge, 2014).

The performance of a project is closely related to the achievement of project objectives. Project goals are limited by 3 constraints (triple constraints), namely (Mingus, 2006):

1. Budget,
2. Schedule,
3. Quality.

If following a division of UNIDO, the cycle of a project has three stages, namely (Soeharto, 1995):

1. Conceptual Stage,

International Journal of Innovative Research in Science, Engineering and Technology

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Vol. 8, Issue 3, March 2019

2. Stage of Definition or Stage of Planning and Stabilization (PP),
3. Implementation Phase.

III. RESEARCH METHODOLOGY

The research method used in this study is a descriptive method with a qualitative approach. In this study, data collection was taken from the study of literature, journals, real projects in the field, and interviews (in-depth interviews). In journals and literature studies, data are obtained that support the analysis study of this study. In the case of real projects in the field, the project data can be compared. The research object of the work pattern and organizational structure reviewed was located in the Cipondoh 3 Elementary School Building Construction Project in Tangerang City and in the Banten Province PUPR Office Building Procurement Project (Jalan SyehNawawi Al-Bantani, Sukajaya, Curug, Serang City, Banten Province / KP3B).

Interviews were conducted for several people who were directly involved in the implementation of the DED and the implementation of the design and build. Data obtained from interviews and data collection produce data that can provide information about work patterns and organizational structures used.

IV. STUDY AND DISCUSSION

Project Analysis

The Constraint of Building Cipondoh 3 Elementary School in Tangerang City is the implementation of the DED (Detail Engineering Design) carried out a year before the construction of Cipondoh 3 Elementary School Building in Tangerang City (2 budget years) so that if there are problems applying inappropriate images in the field must be re-coordinated with the consultant the planner and it takes much longer, many volume changes are not in accordance with the DED, resulting in CCO (Change Contract Order), a change in SSH (Standard Unit Price) during the construction work that causes a change in volume resulting in CCO (Change Order Contract). Technical constraints faced are access to far and narrow entrances. While the advantages are extensive school land facilitates the process of making foundation work and structures.

Constraints in the implementation of the Procurement Office of the Banten Province PUPR Building Project in Serang City are:

1. The new design and build system was first applied, so that the planner drawing approval system became a picture of the contractor's work it took time to learn to find the right system.
2. Because of the design and build system, harmonious integration with the planner is needed in relation to the design applied in accordance with the stipulated budget. The design and build system requires parts in organizations that focus on design and budget reviews, so they must always review images and adjust to the existing budget.
3. A relatively short implementation time for both construction planning and implementation. Contract May to December 2017.

While the advantages of the implementation of the Banten Province PUPR Office Building Procurement Project in Serang City are:

1. The design and build system provides benefits for the assignor/ owner, namely a relatively short tender system (planning and construction tenders in 1 stage).
2. In terms of the design of the building building, the PUPR office of Banten Province is very modern and differentiates it from the surrounding buildings.
3. In the process of implementing the design and build system, the planning and construction time is reduced by a common system (DED implementation) because the planning stage is in the implementation stage.

Analysis of Flow/ Implementation Stages

Comparison of the flow/ stages of the implementation of the DED (Detail Engineering Design) in the Construction Project of Cipondoh 3 Elementary School Building in Tangerang City with the implementation of Design and Build on the Procurement Project Building of the PUPR Office of Banten Province in Serang City can be seen in Figure IV.1.

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 8, Issue 3, March 2019

FLOW/ STAGES OF DED IMPLEMENTATION



FLOW/ STAGES OF DESIGN & BUILD IMPLEMENTATION



Fig IV.1: Comparison of flow/ stages of DED implementation with design and build implementation

In the flow/ stages of design and build, the auction is only done once. The construction of the design and build can be carried out after the shop drawings have been completed as a reference for the construction.

Analysis of Organizational Structure

In project A there are 2 organizational structures (in year 1), and 3 organizational structures (in year 2) involved in the implementation. While in project B there are 3 organizational structures (1 budget year) involved in the implementation. Seen from the project organization consultant project planning DED implementation and Design and Build implementation, this form of project organization (Winoto, 2014) is included in the line organization structure and staff. Staff are added to the work unit that needs it. Staff in the form of experts who provide input in making decision.

The construction contractor organization chart implementation of DED and the implementation of Design and Build, this form of project organization (Winoto, 2014) is included in the form of a functional organization. Functional organizations already have a composition of work units with specific tasks and authorities. Each staff is responsible for the leadership of each unit.

Strengths and Weaknesses of DED Implementation with Design and Build Implementation

Based on project analysis, literature review, the results of the research are about the advantages and disadvantages of DED implementation with the implementation of Design and Build as in table IV.1 below.

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 8, Issue 3, March 2019

Table IV.1: The advantages and disadvantages of implementing DED with the implementation of design and build

No	Implementation	Advantages	Disadvantages
I	DED		
1.1	Time	<ul style="list-style-type: none"> The DED preparation time is relatively sufficient, so the DED results are more detailed Compilation of DEDs a year before construction to determine the budget 	<ul style="list-style-type: none"> Implementation is carried out in 2 budget years If there is a problem, the application of images in the field must be re-coordinated with the planning consultant and requires time
1.2	Volume	X	Many changes in volume are not in accordance with the plan/ DED, resulting in CCO (Change Contract Order)
1.3	Cost	X	The change in SSH (Standard Unit Price) at the time of the construction work causes a change in volume resulting in CCO
2.4	Inflexibility	X	There is a limited scope for employers to make changes according to the requirements of the employer and the contractor's proposal after it has been agreed upon, otherwise the cost consequences will be higher
2.5	Time	Speed of execution time. Employees of engineering design are faster to implement because the tender process is carried out only once. The physical implementation of the work can be carried out overlap with the design process, without having to wait for the overall design process. Work completion is faster, will correlate to cost reduction	<ul style="list-style-type: none"> The drawing planner approval system becomes a picture of the contractor's work takes time to learn to find the right system Relatively short implementation times for both construction planning and implementation so that implementation must be on schedule so that there is no delay
2.6	Organizational structure	It's easier to place responsibility	It's easier to put in place Demands a part in an organization that focuses on design reviews and budgets, so they

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 8, Issue 3, March 2019


			(Change Contract Order)				must always review the image and adjust to the budget that is responsible
1.4	Flow/stages	There is a feasibility study stage to assess the feasibility of implementing the project	The implementation was carried out a year before the construction	2.7	Potential conflict	The existence of a unity between planners and contractors as well as intense communication, the potential for conflict is less	Potential conflicts with the existence of a combination (planners & implementers) that limits the provision of architectural design services
2	Design and Build			2.8	Single responsibility	The executor of the work implements the design while carrying out the physical work. Job executors have a single responsibility for the quality, costs and timing of work, and can make decisions quickly	✘
2.1	Communication	<ul style="list-style-type: none"> • Good communication between parties • Direct communication between owners and contractors & saving project time and costs. Greater profit / savings potential 	The employer must have the skills (including soft skills) because the owner must be able to communicate well with the executor of the work in translating the design made by the contractor to meet the required specifications	2.9	Buildability	As executors responsible for design and construction, construction will follow buildings that tend to be "buildable" (ease of implementation)	✘
2.2	Quality	<ul style="list-style-type: none"> • There is a unity between planners and contractors in designing more innovative buildings • There is integration with the planner in relation to the design applied according to the budget • The sole responsibility of executing work to produce quality products and the right performance of the project 	Perception among some architects, design and build is not in accordance with the appropriate procurement method, for jobs whose design quality is a very high priority. Usually the compromises made always result in the quality desired by the architect not being reached				

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

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Vol. 8, Issue 3, March 2019

2. 3	Cost	<ul style="list-style-type: none"> • Cost savings. Job executors can evaluate material and work methods that are effective and accurate, so that it will minimize the occurrence of job changes (change order) • Price certainty. Lower construction costs due to economic design, so the potential for profits is greater 	If the project owner (owner) wishes to take independent expert personnel as advisors in the design process, not included in the development contract, or innovation from the design team for the contractor, the employer must pay an additional fee	2.1 0	Claim	Claim. Claims will be minimized as a result of that single responsibility. In design and build, design errors are the responsibility of the executor of the design and build work	
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In Depth Interview Activities

From the recapitulation of the results of in-depth interviews above, it was found that the important thing was:

- a. Regulations on development projects implemented by Projects A and B are the Republic of Indonesia Presidential Regulation Number 16 Year 2018 concerning Government Procurement of Goods/ Services and Republic of Indonesia Minister of Public Works and Public Housing Regulation Number 12/PRT/M/2017 concerning Standards and Guidelines for Procurement of Integrated Construction Works Design and Build
- b. Project B applies the rule that the Design and Build Integrated Work includes: certain jobs. Certain jobs are jobs that are urgent to be utilized immediately.
- c. Project A and B speakers agree that it is more effective and efficient to use the Design and Build system. The contractor holds control in terms of material prices that will determine the direction of design from the planner, for the owner design and build to be more efficient and effective in terms of time and budget spent, for design and build planners effective in shorter work times but inefficient in the amount of power or HR that works because they have to prepare a full dedicated team for one project so that the operational costs of the planner in a company will increase.
- d. Making an organizational structure must consider the type and complexity of the project at hand. The division of the job desk is based on the competency of each personnel and considers what types of work are in the project.

Finalize the Design and Build Project Organizational Structure Design

Based on the analysis, literature review and interviews that have been carried out, that the design and build system is more effective and efficient, the design of the organizational structure for design and build projects is obtained as shown in Figure IV.2.

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 8, Issue 3, March 2019

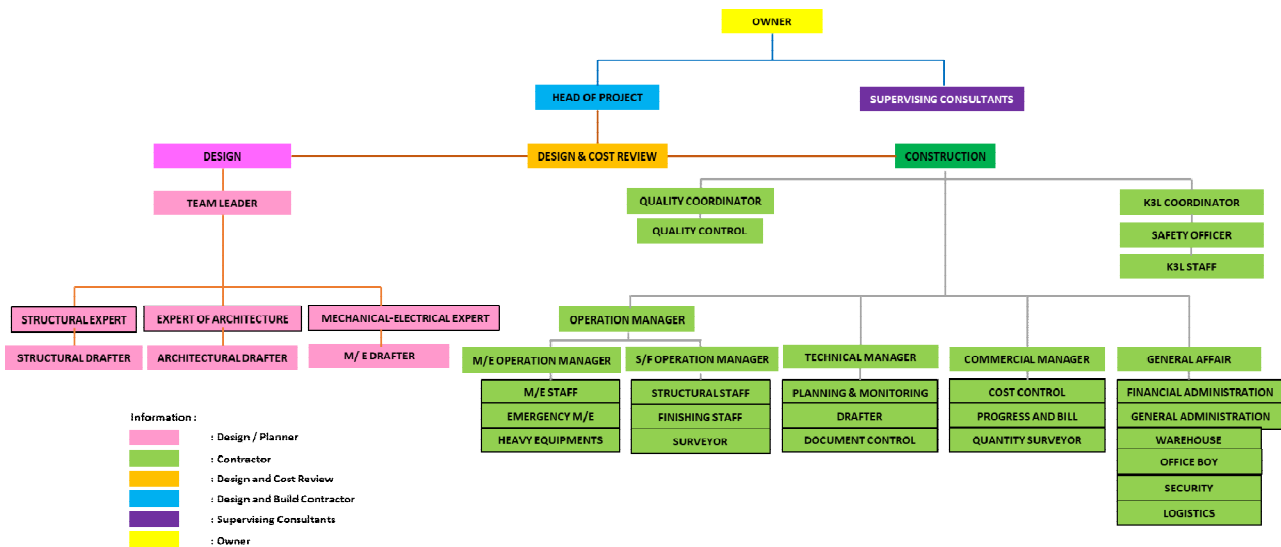


Fig IV.2: Design and build project organizational structure design

The design and build system requires harmonious integration with the planner in relation to the design applied according to the set budget. The design and build system requires parts in organizations that focus on design and budget reviews, so they must always review images and adjust to the existing budget. Owners and supervisory consultants can monitor design and cost through project design and build heads and design and cost review teams.

Job Description in the Design and Build Project Organizational Structure

From the design of the project organizational structure that has been compiled in Figure IV.2 above, the job description of each position in the organizational structure of the design and build project is explained in table IV.2.

Table IV.2: Job description of the design and build project organizational structure

No	Organizational Structure	Job Description
1	Head of Project	Give direction, monitor, evaluate project implementation
1.1	Design and Cost Review	Review pictures and adjust to the existing budget
DESIGN		
2	Team Leader	<ul style="list-style-type: none"> Coordinate the planning team Coordinate with the head of the project
2.1	Structural Expert	Responsible for structural planning and implementation in the field
2.1.1	Structural Drafter	Make planning/ structural drawings according to structural expert directives
2.2	Expert of Architecture	Responsible for building design and implementation in the field
2.2.1	Architectural Drafter	Make architectural planning / work drawings according to expert of architecture directives
2.3	Mechanical Elektrical Expert	Responsible for M/ E planning and implementation in the field
2.3.1	M/E Drafter	Make mechanical/ electrical planning/ work drawings according to M/ E expert directives

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 8, Issue 3, March 2019

CONSTRUCTION		
3	Quality Coordinator	Responsible for established quality standards
3.1	Quality Control	Apply quality standards that have been set by quality coordinators in the field
4	K3L Coordinator	Responsible for occupational safety and health procedures in the project environment
4.1	Safety officer	Manage equipment and admin safety and health work in the project environment
4.2	K3L Staff	Controlling K3L procedures is carried out on the project
5	Operation Manager	Responsible for the speed and accuracy of implementation and efficiency of use
5.1	M/ E Operation Manager	<ul style="list-style-type: none"> • Together with planning & monitoring compiling mechanical electrical planning • Coordinate the provision of M/ E subcontractors
5.1.1	M/E Staff	Responsible for the installation of mechanical electrical according to planning
5.1.2	Emergency M/E	Responsible for the installation of mechanical electrical (not permanent)
5.1.3	Heavy Equipments	<ul style="list-style-type: none"> • Maintain equipment for easy search • Handle damage to project equipment
5.2	S/FOperation Manager	Responsible for structural work and finishing
5.2.1	Structural Staff	Control the structure work
5.2.2	Finishing Staff	Control finishing work
5.2.3	Surveyor	Together with the planning team determine the project's starting point reference with a safe working method
6	Technical Manager	Responsible for volume, time, quality, work costs
6.1	Planning dan monitoring	Adjust volume, time, quality, work costs
6.2	Drafter	Make shop drawings and as built drawings
6.3	Document control	Control the completeness of project documents, drawings, project progress reports
7	Commercial Manager	<ul style="list-style-type: none"> • Evaluate subcontracting costs, material expenditures, borong wage costs, equipment usage costs • Ensure project implementation as planned
7.1	Cost control	Evaluating project performance in terms of costs
7.2	Progress and bill	Make progress reports and project billing documents
7.3	Quantity surveyor (QS)	Analyze unit prices, calculate work volume
8	General Affair	Responsible for completeness and administration, general, staffing, project finance records
8.1	Financial Administration	Carry out cashier functions and financial administration
8.2	General Administration	Carry out secretariat functions, administration, document archiving
8.3	Warehouse	Control the entry and exit of material and placement
8.4	Office boy	Maintain a clean office environment
8.5	Security	Securing the project area
8.6	Logistics	<ul style="list-style-type: none"> • Search for offers, equipment • Make requests for goods to suppliers/ subcons • Conduct periodic evaluations of suppliers

V. CONCLUSIONS AND SUGGESTIONS

Conclusion

The conclusions obtained from the results of this study are:

1. Form of organization of project implementation of DED A project

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 8, Issue 3, March 2019

- a. The form of project organization consultants planning DED implementation is included in the line organization structure and staff. Staff are added to the work unit that needs it. Staff in the form of experts who provide input in decision making.
- b. The form of the DED construction contractor organization is included in the form of a functional organization. Functional organizations already have a composition of work units with specific tasks and authorities. Each staff is responsible for the leadership of each unit.

In project A there are 2 organizational structures (in year 1), and 3 organizational structures (in year 2) involved in the implementation.

2. The organizational form of the project is implementing the Design and Build project B
 - a. The form of project organization consultant Design and Build implementation planning is included in the line organization structure and staff. Staff are added to the work unit that needs it. Staff in the form of experts who provide input in decision making.
 - b. The form of construction contractor project organization implementation of DED and implementation of Design and Build is included in the form of functional organizations. Functional organizations already have a composition of work units with specific tasks and authorities.

Each staff is responsible for the leadership of each unit.

In project B there are 3 organizational structures (1 budget year) involved in the implementation. Work design and build is more effective and efficient in terms of time, flow/ stages of implementation, and costs. Faster implementation. The saving time for implementation is obtained from the tender process which is carried out only once. In addition, the physical implementation of the work can be carried out overlap with the design process, without having to wait for the completion of the overall design process. The construction of the design and build can be carried out after the shop drawings have been completed as a reference for the construction. Linkages with the implementation of work that can be completed more quickly will correlate to cost reduction.

The contractor holds control in terms of material prices that will determine the design direction of the planner. For the owner/ assignor, design and build are more efficient and effective in terms of time and budget spent. For planners, design and build is effective in shorter work times but is not efficient in the number of employees or HR who work because they have to prepare a full dedicated team for one project. This makes the operational costs of planners in a company will increase.

3. Making an organizational structure must consider the type and complexity of the project at hand. The division of the job desk is based on the competency of each personnel and considers what types of work are in the project. The design and build system requires harmonious integration with the planner in relation to the design applied according to the set budget. The design and build system requires parts in organizations that focus on design and budget reviews, so they must always review images and adjust to the existing budget. Owners and supervisory consultants can monitor design and cost through project design and build heads and design and cost review teams.

Suggestions

1. It is recommended to the owner/ government that the development project must refer to the latest regulations that apply at that time.

The Tangerang City Government can carry out development projects with a design and build system by referring to the Republic of Indonesia Minister of Public Works and Housing Regulation No. 12/PRT/M/2017 concerning Standards and Guidelines for the Procurement of Design and Build Integrated Work. Mentioned in Chapter II Procurement Preparation Part One Criteria and Requirements for Integrated Construction Works Design and Build that the Criteria for Integrated Construction Works Design and Build as referred to in Article 4 include:

- a. complex work; or
- b. certain job.

Complex work includes work that:

- a. requires high technology;
- b. have a high risk;
- c. use specially designed equipment; and / or
- d. jobs worth more than Rp. 100,000,000,000.00 (one hundred billion rupiah).

International Journal of Innovative Research in Science, Engineering and Technology

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Vol. 8, Issue 3, March 2019

Certain jobs are jobs that are urgent to be utilized immediately.

2. It is recommended to design and build contractors to add parts in organizations that focus on design and budget reviews, so they must always review images and adjust to the existing budget.
3. Vertical and horizontal communication and coordination must be carried out frequently so that problems arising in the field can be immediately followed up.

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