

# State of the Art Optimization Model Role of Construction Management in Improving Performance Construction Design and Design and Build in Project Building Area of Emergency Ambulans Buildings in Provincial Health DKI Jakarta

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**Abstract** : DKI Jakarta Provincial Government through Governor Regulation No.144 of 2010 stipulates the Emergency Ambulance of DKI Jakarta Provincial Health Office (AGD DINKES) as a Public Service Agency must be updated in the hope of improving the performance that has been running to be more optimal and more accountable, which can ultimately improve the pre-hospital emergency care. Therefore, the Provincial Health Office of DKI Jakarta requires Construction Management Services, so it is necessary to procure Construction Management Consulting Services of Design and Build Building of AGD Building of DKI Jakarta Provincial Health Office. Required roles and performance of a measurable Construction Management consultant by analyzing schedules, daily reports, interviews with project owners, relevant journals for construction projects to be completed on time with an optimal design design in accordance with the project owner's wishes. To improve the performance of the Management Consultant in the Emergency Ambulance Building Building Project in DKI Jakarta Provincial Health Office is through the quality of education, the quality of work experience, the certification obtained and the scope of tasks undertaken.

**Index Terms** : model, role, construction management, performance, design and build

## I. INTRODUCTION

The Emergency Ambulance Building is currently located on Jl. Sunter Permai Raya Kav. 1 Sunter Podomoro. The location is prone to flooding is an obstacle for the Emergency Room Ambulance Emergency of DKI Jakarta Provincial Health Office in providing the best service for the people of Jakarta. Therefore, a new building is needed that can facilitate the health service in the form of ambulance building so that it can run more effectively and efficiently. The construction of the Emergency Ambulance building of the new District Health Office requires good development supervision so that it can run smoothly. Therefore, the Provincial Health Office of DKI Jakarta requires Construction Management Services, so it is necessary to procure Construction Management Consultancy Services of Design and Build Development of Ambulance Emergency Building Building of DKI Jakarta Provincial Health Office.

Where the Construction Management Consultant should be able to supervise the construction planning and the implementation of physical construction simultaneously so that the implementation and financing time is well under control. As the Design and Build project procurement model is still new and all devices are unfamiliar with it, it will create many new problems that could affect performance for the Construction Service Providers including Construction Management Consultants in it.

The purpose of this research is to analyze the work of Construction Management Consultant on design and build project of Ambulance Emergency Room of DKI Jakarta Provincial Health Office. By knowing the work of Construction Management so that it can manage the implementation of integrated work of AGD building construction (Emergency Ambulance) Sub-District and Village Health Office of DKI Jakarta Province so as to get optimal result as per requirement.

## II. RESEARCH PROBLEMS

Problems to be solved in this research are:

- What is the role of Consultant MK in the process of Design and Build Integrated Construction on the project of Ambulance Emergency Room building building in DKI Jakarta Provincial Health Office?
- What is the size of the performance of the construction process undertaken by the Consultant of the Constitutional Court on the project area of Ambulance Emergency buildings building in the DKI Jakarta Provincial Health Office?
- What are the factors and variables of the role of Consultant of the Constitutional Court in the process of construction of Design and Build (Integrated Design and Build) on the project of Ambulance Emergency Room building building in the Health Office of DKI Jakarta Province?

### III. LITERATURE REVIEW

The literature study analyzed in this research are:

#### 3.1 The Role of Construction Management

Construction management has several roles, among others, acting as a companion of the work process starting from controlling the planning stage and controlling the implementation phase, as a Quality Control to maintain the suitability between planning and implementation, anticipating the change of uncertain field conditions and overcoming the constraints of limited implementation time, and progress of the project that has been achieved, it is done with daily (weekly and monthly), evaluation results can be made decision-making action to the problems that occur in the field, managerial role of management is a good information system to analyze the performance of the field (Wulfram, 2006). Relationship of construction planning and construction implementation in design and build in the form of diagram can be seen below:

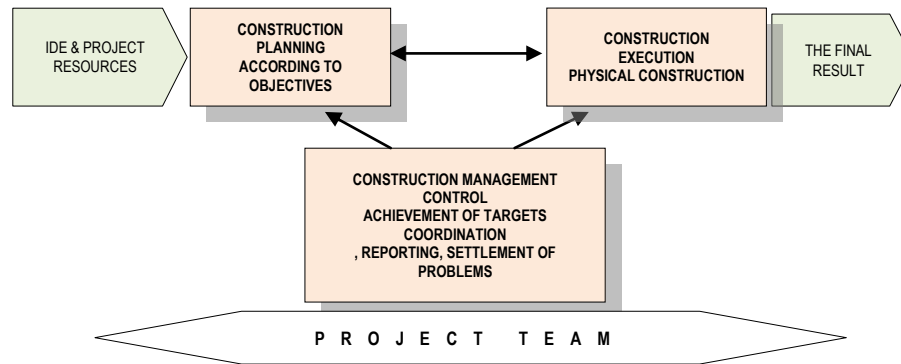


Figure 1. Relationship of Construction Planner and Construction Implementation on Design and Build

#### 3.2 Construction Process

Construction work according to UUKJ No.2 Year 2017 is the whole or part of a series of planning and/or implementation activities and supervision which covers the architectural, civil, mechanical, electrical, and environmental work of each and each of its equipments, to realize a building or other physical form .

#### 3.3 Project Performance

Measures of performance can be seen in terms of cost, time, and quality where these three are furthermore said to be the dimensions of productivity (Alinaitwe, 2008). Construction project workers have a major role or task to combine inputs with specific techniques or skills through a project plan both strategic and operational planning to subsequently produce a construction project. As for the components in construction projects related to the definition of productivity are technology, human resources, performance, cost, time and quality. (Soeharto, 1995).

#### 3.4 Project Development with Design and Build Method

Based on Attachment I of the Regulation of the Minister of Public Works and People's Housing No. 19/PRT/M / 2015 on Standards and Guidelines for Procurement of Design and Build Integrated Construction Works are all work related to the execution of building construction or other physical form, where the planning or design drawing and concurrent construction work. Design stage in Design and Build method includes two sub-stages: first, Pre-Design stage (Preliminary Design) The result of this stage is used to participate in the tender of Design and Build project. Second, Development stage Design (Design Design)/ Detail Design (Detail Design). Which is the development stage of the pre-approved draft is then made in more detailed calculations.

Then done Procurement Process, on Design and Build Method is after the election of Construction Management Consultant, then held the process of Procurement Contractor as executor. Usually the tender for the design and build project is the Contractor who has KSO (Cooperation of Operations) with the Planner. Entering the Construction Process is the realization of the building required by the project owner and has been designed by the Planner within the agreed cost and time limits, and with the required quality. Activities undertaken at this stage are planning, coordinating and controlling all operations in the field.

#### 3.5 Building

The building of building according to the Law of the Republic of Indonesia Number 28 Year 2002 is a physical form of the result of construction work which is united with its place of position, partly or wholly located above and / or in the soil and / or water, which serves as a place for human to do its activities either for shelter or shelter, religious activities, business activities, social activities, culture, or special activities

Because the project under study is a building belonging to the Ministry of Health it includes a State Building that is not simple, which in its sense is a building for official purposes that becomes / will become state property such as office buildings, school buildings, hospital buildings, warehouses, and and / or other legitimate acquisitions, of an office building with no prototype design, or office building with an area above 500 m2, or a multi-storey office building of more than 2 floors .

### 3.6 Project Control

Control by R.J. Mockler, as cited by Soeharto (1999: 228) is a systematic effort to set standards in accordance with the goals of planning, designing information systems, comparing execution with standards analyzing the possibility of deviations between implementation and standards, then taking the necessary corrective actions to effectively utilize resources and efficient in order to achieve the target. The control process runs throughout the project life cycle to achieve good performance in every stage. Planning is made as a reference for the implementation of the work. The reference material will then become the implementation standard for the project concerned, including technical specifications, schedule and budget. So to be able to do the necessary control of the planning. In the control of the project are known some tools to control the implementation of construction works, such as Project Time Control, Project Cost and Project Quality.

### 3.7 Portrait of Ambulance Emergency Building Building at DKI Jakarta Provincial Health Office

Provincial Government of DKI Jakarta through Governor Regulation No.144 of 2010 establishes Emergency Ambulance of DKI Jakarta Provincial Health Office (AGD DINKES) as a Public Service Board is expected to improve the performance that has been running to be optimal and more accountable, which in turn can improve pre-hospital emergency care.

AGD DINKES service is oriented to hospital pre-service, medical evacuation from the scene (traffic accidents, fire, disaster and other extraordinary events) to hospital and hospital to hospital and handling poor family patient (GAKIN) and SKTM . With the formation of AGD DINKES will provide answers to cases that occur at this time so that the impact of decreased morbidity, mortality and disability due to cases of pre-emergency hospital emergency for the community in the province of DKI Jakarta and surrounding areas.

Emergency Ambulance Building Area currently located on Jl. Sunter Permai Raya Kav. 1 Sunter Podomoro. This flood-prone location becomes an obstacle for AGD DINKES in providing the best services for the people of Jakarta. Therefore, it is needed new building location which can facilitate health service such as ambulance so that it can run more effectively and efficiently.

Development of new AGD Dinkes Building requires good development supervision so that it can run smoothly. Therefore, the Provincial Health Office of DKI Jakarta requires Construction Management Services, so it is necessary to procure Construction Management Consultancy Services of Design and Build Building of AGD Building of DKI Jakarta Provincial Health Office.

### 3.8. Relevant Research Results

The following are the supporting studies used in this study:

No	Research Title	It's relevant
1	<i>Empirical Comparison of Design/Build and Design/Bid/Build Project Delivery Methods</i> ( Darren R. Hale, P.E; Pramen P. Shrestha, P.E; G. Edward Gibson Jr., P.E, dan Giovanni C. Migliaccio, Michael Meyer, American Society of Civil Engineering ASCE, 2009)	Comparing the performance of Design Build and Design-Bid-Build to see if the project's project method is superior in terms of time and cost.
2	<i>Strategies for Design-build in Korea Using System Dynamics Modeling</i> ( Moonseo Park,; Sae-Hyun Ji; Hyun-Soo Lee,; and Wooyoung Kim, ASCE, 2009)	Design-Build has become the preferred construction project of its workmanship system, outperforming other systems in terms of cost
3	<i>Procurement of Design-build Services: Two-Phase Selection for Highway Projects</i> ( G. C. Migliaccio,; G. E. Gibson, F.; and J. T. O'Connor, ASCE, 2009)	Using the Design-build method for road projects, the results are more satisfying. Previously using traditional design-bid-build methods
4	<i>Determining the Appropriate Proportion of Owner-Provided Design in Design-build Contracts: Content Analysis Approach</i> ( Bo Xia; Albert Chan; Keith Molenaar,; and Martin Skitmore, ASCE 2012)	Statistical analysis of several design and build projects is undertaken to explore the relationship between design proportions provided by owners and supervisors as well as other project information, including project type, advertising time, project size, contractor selection methods, procurement process, and contract type.
5	<i>Design managemen in Design-build Megaprojects: SR 99 Bored Tunnel Case Study</i> ( Umberto C. Gatti; Giovanni C. Migliaccio; and Linea Laird, ASCE, 2014)	Although the use of design-build is widespread, there is still little lack of information on how to plan and implement effectively the construction management procedures
6	<i>Comparing the Performance Quality of Design-Bid-Build and Design-build Delivery Methods</i> ( Tao Yu; Geoffrey Qiping Shen, Ph.D.; Qian Shi, Ph.D, American Society of Civil Engineering ASCE, 2016)	Use existing economic theory to develop models to test the quality of construction management performance and project advantages of both methods.
7	<i>Performance of Design-build and Design-Bid-Build Projects for Public Universities</i> ( Pramen P. Shrestha, Ph.D., dan James D. Fernane, American Society of Civil Engineering ASCE, 2016)	Statistical tests were conducted to determine whether the metrics associated with the cost, schedule, and order changes differ significantly from each other in both types of projects. The results show that the Design and Build project significantly outperforms the Design-Bid-Build project in terms of savings schedules
8	<i>Dynamic Management of Risk Contingency in Complex Design-build Projects</i> ( Alberto De Marco,	With the aim of studying the dynamics and major influences involved in the contingency risk management process of a

	Ph.D.; Carlo Rafele; and Muhammad Jamaluddi Thaheem, Ph.D, ASCE, 2016)	design-build project (DB)
9	<i>Impact of Design Risk on the Performance of Design-build Projects</i> ( Junying Liu; Qunxia Xie; BoXia; dan Adrian J. Bridge, American Society of Civil Engineering, ASCE, 2017)	The exploratory factor analysis shows that these success factors can be categorized into six groups: the correct design team, designer responsibility, designer experience and education, inaccuracy or delays in third party information, appropriate design schemes, and the risk of design changes and company reviews, as well as the assignment of the project owner.
10	<i>Identification and Analysis of Owner-Induced Problems in Design-Build Project Lifecycle</i> ( Mahya Hoseingholi and M. Parchami Jalal, ASCE, 2017)	The basis of their work in interviews with experts - including designing questionnaires, distributing questionnaires, gathering, and analysis of responses suggests that the most significant problems arising from such an implementation system do originate in project ownership.

Figure 2. Relevant Journals

**IV. RESEARCH METHODOLOGY**

**4.1. Optimization of Research Framework Model**

Optimization model of this research framework is done by menentukan step keangka research with the sequence as follows:

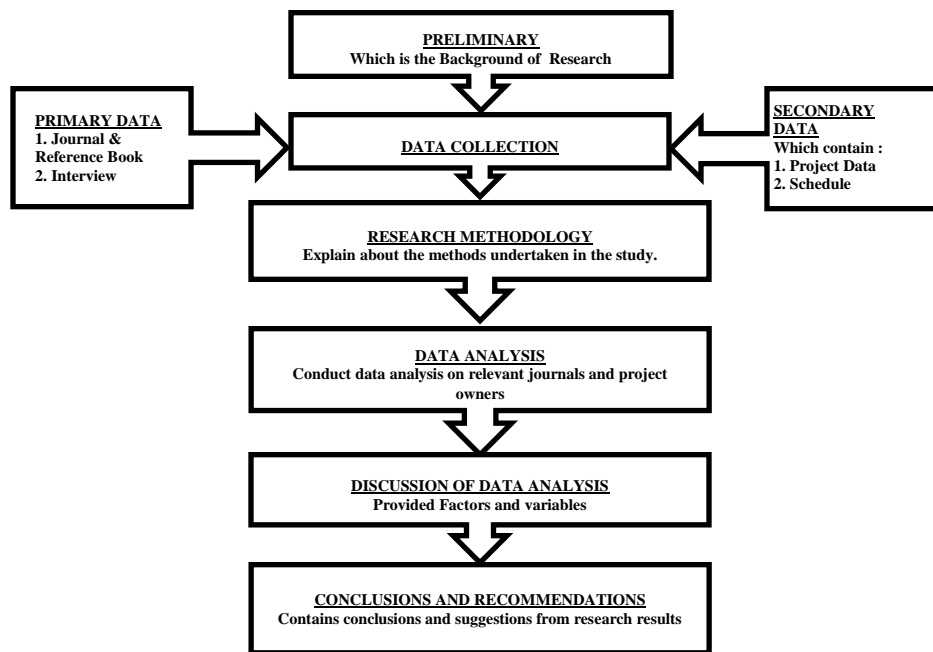


Figure 3. Model of Research Framework

**4.2 Research Process**

Research Process which is the sequence of the stage of research implementation in accordance with the problems and accurate analysis to achieve research objectives. The stages of research conducted are as follows:



Figure 4. Research Process

**4.3 Research Instruments**

Research instrument in research there are three that is: (a) Pimer data, source of research data obtained from interview with project owner and study from relevant journal. Finally, four (4) factors are (1) Education, which according to Carter V. Good, education is proes of the development of one's skills in the form of attitude and behavior prevailing in society. Where a person is influenced by a guided environment within the school environment so as to achieve social skills and can develop his personality. (2)

Experience, experience is also the experience used to refer to the knowledge and skills about something acquired through involvement or related to it over a certain period (wikipedia). (3) Certification. Professional certification is a determination given by a professional organization to a person to show that the person is capable to perform a specific job or task (wikipedia). (4) Scope of Task, the definition is the Limitations of tasks that must be executed (wikipedia). Of the four factors are obtained research variables are:

No	Factors	Variables	Relevant Journal Resources
1	Education	1) Terms of Education	1. <i>Determining the Appropriate Proportion of Owner-Provided Design in Design-build Contracts: Content Analysis Approach</i> 2. <i>Performance of Design-build and Design-Bid-Build Projects for Public Universities</i> 3. <i>Impact of Design Risk on the Performance of Design-build Projects</i>
		2) Formal Education Strata	
		3) The duration of graduation	
		4) IPK value	
		5) Intellectual Intelligence (IQ)	
		6) Emotional Intelligence (EQ)	
		7) Quality	
		8) Informal Education	
		9) Knowledge	
		10) Mindset	
2	Experience	1) Long of the work	1. <i>Impact of Design Risk on the Performance of Design-build Projects</i> 2. <i>Design manajement in Design-build Megaprojects: SR 99 Bored Tunnel Case Study</i> 3. <i>Identification and Analysis of Owner-Induced Problems in Design-Build Project Lifecycle</i>
		2) Training	
		3) References	
		4) Ability to solve problems	
		5) Design change	
		6) The ability to use tools	
		7) Presence	
		8) The method use	
		9) The accuracy of the method used	
		10) Responsibility	
3	Certification	1) Profession	1. <i>Empirical Comparison of Design/Build and Design/Bid/Build Project Delivery Methods</i> 2. <i>Design manajement in Design-build Megaprojects: SR 99 Bored Tunnel Case Study</i> 3. <i>Identification and Analysis of Owner-Induced Problems in Design-Build Project Lifecycle</i>
		2) Institutional	
		3) Type	
		4) Levels	
		5) Term	
		6) Expertise Field	
		7) Scope of Activities	
		8) Year of Manufacture	
		9) Fuction/for purpose	
		10) Value	
4	Scope of Assignment	1) Quality Control	1. <i>Empirical Comparison of Design/Build and Design/Bid/Build Project Delivery Methods</i> 2. <i>Performance of Design-build and Design-Bid-Build Projects for Public Universities</i> 3. <i>Identification and Analysis of Owner-Induced Problems in Design-Build Project Lifecycle</i>
		2) Time Control	
		3) Cost Control	
		4) Procurement of tender / tender	
		5) Assistance planning	
		6) Supervision of Work Preparation	
		7) Supervision of Construction Implementation Works	
		8) Maintenance Supervision	
		9) Project Administration Control	
		10) Coordination, discussion and communicationi	

Figure 5. Factor, Variable and Source Table

The second research instrument is (b) The secondary data in this study obtained through the project data and schedule specified by the Construction Management consultant. The third is (c) Measure Tool. In this study researchers used quantitative research using Likert Scale tool.

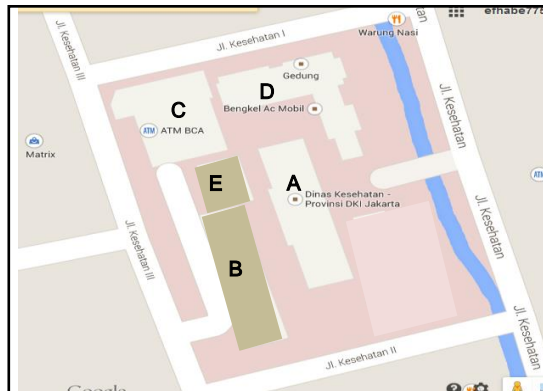
#### 4.4 Research Sites

The research was conducted at Emergency Ambulance Building (AGD) of DKI Jakarta Provincial Health Office, located in Ex Building Block B of Dinas Kesehatan, Jl. Kesehatan No. 10, Jakarta.

This research was conducted on the role of Construction Management at Emergency Ambulance Building (AGD) of DKI Jakarta Provincial Health Office, located in Ex Building Block B of the Health Office, Jl. Kesehatan No. 10, Jakarta. With Implementation Time: 9 Calendar Month, consisting of :

- Preparation Phase : 1 Month Calendar
- The auction stage : 2 Months Calendar
- Design stage : 5 Months Calendar (fast track with Construction)
- Construction Phase : 5 Months Calendar

- Maintenance Period : 180 Calendar Days



Width of Existing Buildings :

1. Gedung A :	7.520 m <sup>2</sup>
2. Gedung B :	3.456 m <sup>2</sup>
3. Gedung C :	2.500 m <sup>2</sup>
4. Gedung D :	2.028 m <sup>2</sup>
5. Gedung E :	864 m <sup>2</sup>
Total :	16.368 m <sup>2</sup>

Figure 6. Location

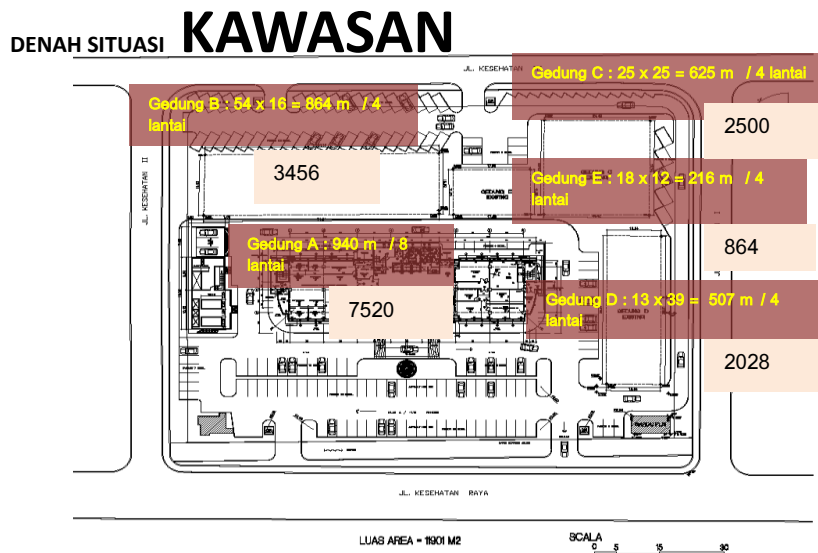


Figure 7. Plan Area Situation

#### 4.5 Respondents Research

In this study, respondents are people who are asked to provide information about a fact or opinion, namely through relevant journals and poryek owners. The description of the fakat or opinion will be reviewed to be submitted in writing form, ie when filling in a questionnaire, or verbal, when answering the interview.

#### 4.6 Research Methods

The research method used is quantitative research method which is one type of research that is more systematic, specific, well structured and well planned from the beginning to get a conclusion. Quantitative research emphasizes the use of numbers that make it more detailed and clearer. In addition, the use of tables, graphs, and also diagrams is very easy to read. In this quantitative method there are several supporting methods, namely descriptive method, survey, comparison, action research, exposure, and correlation.

### V. ANALYSIS & DISCUSSION

#### 5.1 Analysis

Prior to conducting the analysis in this study, data collection is drawing of construction design drawings, Daily Project reports for design planning and construction implementation, project schedule, direct interviews to project owners, and analyzing relevant journals. In addition, the analysis of the role of Construction Management consultant in the process of Design and Build Integrated Construction on the project of Ambulance Emergency Building in DKI Jakarta Provincial Health Office can be seen from the implementation schedule made by Construction Management consultant and construction design drawing, in accordance with the schedule and the results in accordance with the wishes of the project owner.

To determine the performance measures of Construction Management consultants can be seen from the schedule, project daily reports and interviews with project owners to find out the project owner's desire on the performance of Construction Management consultants. In determining the factors and variables in the role of Construction Management Consultants in addition to interviews with project owners, an analysis of the journals relevant to the research topic was conducted.

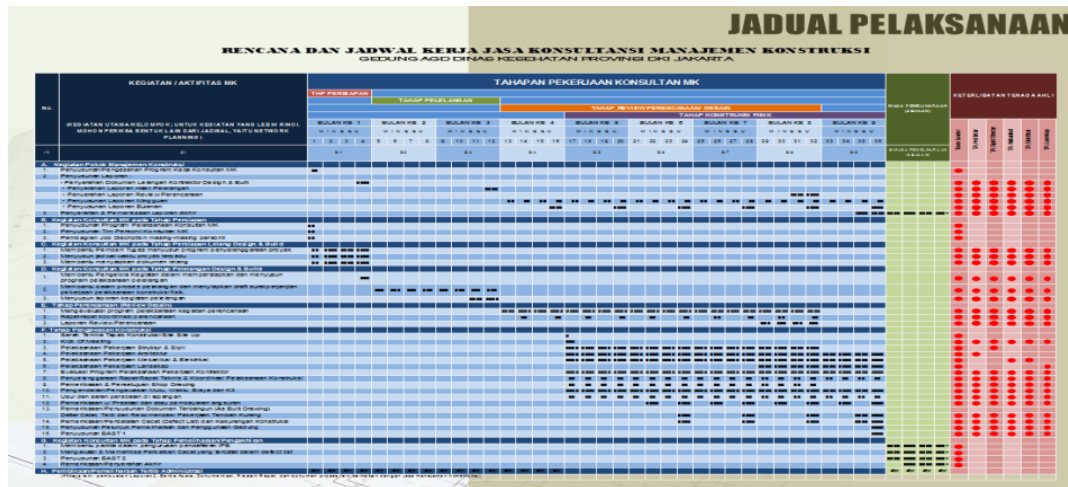


Figure 8. Project Implementation Schedule Design And Build Building Area Ambulance Emergency Building In DKI Jakarta Provincial Health Office

### 5.1 Discussion of Research Results

To be able to answer the problems that exist in this research analysis results obtained are (a) the role of Construction Management consultants in the process of Integrated Construction Design and Build on the project area of buildings Ambulance Emergency buildings in DKI Jakarta Provincial Health Office must be tailored to the wishes (b) to measure the performance of the Construction Management consultant in the Design and Build Integrated Construction process of the Ambulance Emergency Building project in the DKI Jakarta Provincial Health Office should be visible on schedules and daily reports, in which the construction project is completed on time with an optimal design design. By analyzing the relevant journals and interviews to the owner of the pot obtained factors and variables for the role of Construction Management consultants in the process of Design and Build Integrated Construction on the project area of the building of Emergency Room Ambulance at DKI Jakarta Provincial Health Office, that is :

Factors and Variables			
1. Education	2. Experience	3. Certification	4. Scope of Assignment
1. Terms of Education	1. Long of the work	1. Profession	1. Quality Control
2. Formal Education Strata	2. Training	2. Institutional	2. Time Control
3. The duration of graduation	3. References	3. Type	3. Cost Control
4. IPK value	4. Ability to solve problems	4. Levels	4. Procurement of tender / tender
5. Intellectual Intelligence (IQ)	5. Design change	5. Term	5. Assistance planning
6. Emotional Intelligence (EQ)	6. The ability to use tools	6. Expertise Field	6. Supervision of Work Preparation
7. Quality	7. Presence	7. Scope of Activities	7. Supervision of Construction Implementation Works
8. Informal Education	8. The method use	8. Year of Manufacture	8. Maintenance Supervision
9. Knowledge	9. The accuracy of the method used	9. Fuction/for purpose	9. Project Administration Control
10. Mindset	10. Responsibility	10. Value	10. Coordination, discussion and communicationi

Figure 9. Factors and Variables of Analysis Results

## VI. CONCLUSION & SUGGESTIONS

### 6.1 Conclusions

The conclusion of the role of Construction Management in improving the performance of integrated construction Design and Build on the project of Emergency Ambulance Building Building Building at DKI Jakarta Provincial Health Office is determined by

the project owner's desire on the performance of the consultant through the quality of education, quality Work experience, certification obtained and the scope of the task performed. All of which is a factor to be examined through a variable that has been determined.

## 6.2 Suggestions

Based on the conclusions outlined above, suggestions or suggestions that can be recommended from the results of this study are the questions in the questionnaire for the respondents ie the project owner must show the synergy between the project owner's desire and the performance of the Construction Management consultant so as to facilitate the role of Construction Management consultant in conducting project supervision design and build.

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