

Model of Organizational Effectiveness Project Management on Infrastructure Development in Ministry of Public Works and Housing Republic of Indonesia

Khawali Abdul Hamid¹, Roesdiman Soegiarso¹, Sarwono Hardjomuljadi², Muhammad Ikhsan Setiawan³, Dahlan Abdullah⁴ and Darmawan Napitupulu⁵

¹Tarumanagara University, Jakarta, Indonesia

²Civil Engineering Department, Universitas Mercu Buana, Jakarta, Indonesia

³Department of Civil Engineering, Narotama University, Surabaya, Indonesia

⁴Department of Informatics, Universitas Malikussaleh, Aceh, Indonesia

⁵Research Center for Quality System and Testing Technology, Indonesian Institute of Sciences, Jakarta, Indonesia

*khalawi.ah01@gmail.com

Abstract. Infrastructure that built by Ministry of Public Works and Housing Republic of Indonesia has a central role in the growth of a country's productivity. Nevertheless, the productivity has not yet reached 100%. Performance of the project became one of main reason to achieve maximum productivity. The weakness of the organizational effectiveness on Ministry of Public Works and Housing infrastructure development became one of indication that makes the low of project performance. Therefore, this paper aims to develop models to find relationship between organizational effectiveness of project management and project performance. The method used was a questionnaire that was distributed to the Ministry of Public Works and Housing, contractors and consultants. The model created using multiple linear regression analysis. Models were made on overall respondents either enter the contractor and the consultant in its analysis as well as in each Directorate General in the Ministry of Public Works and Housing. Communication factor is the most decisive factor in the improvement of the project performance in the internal organization of Ministry of Public Works and Housing, while Technical and factor that shows Financial and Technical Audits which carried out at the same time is the most decisive factor in the project organization of the Ministry of Public Works and Housing infrastructure development.

1. Introduction

Ministry of Public Works and Housing have duties and responsibilities in foster, develop, implement and supervise the development of the infrastructure and public housing throughout Indonesia. The infrastructure that was built by the Ministry of Public Works and Housing is the basic needs that have an important role to meet the needs of the citizens. Therefore, quality of the infrastructure must be guaranteed to provide excellent service to the citizens. Infrastructure development at the Ministry of Public Works and Housing is done through the Directorate General of Highways, Directorate General of Water Resources, Directorate General of Human Settlements, and Directorate General of Housing Provision. Each Directorate General has difference responsibilities that led to difference



characteristics. Therefore, each Directorate General has difference factor that can improve their performance to get success in infrastructure development. Some examples of the infrastructure built by Ministry of Public Works and Housing are national roads, sanitation, and the production of clean water. The length of the national road in Indonesia is 47,017 km. National Road with good condition is 59% (27,652 km), while medium condition is 32%, broken condition is 6%, and damaged 3%. For sanitation infrastructure, there are only 74.29% of households in Indonesia which has a shelter that qualify, that has a septic tank. While the increase in the production of clean water is in linier condition and need more improvement to meet the needs of a society more and more. These examples is a description of achievement of the infrastructure development in the Ministry of Public Works and Housing based on infrastructure development plans until the year 2019. Infrastructure development in each Directorate General has a different achievements. Directorate General of Highways has the largest achievement by early 2017 with 67.40%. This achievement means that the Directorate General of Highways must complete the remaining 33.70% infrastructure development until the year 2019. While the Directorate General of Water Resources has achieved 38.46%, Directorate General of Human Settlements has achieved 45.50% and Directorate General of Housing Provision has achieved 22.00%. Achievements of Each Directorate General in Infrastructure Development until Early 2017[1-9].

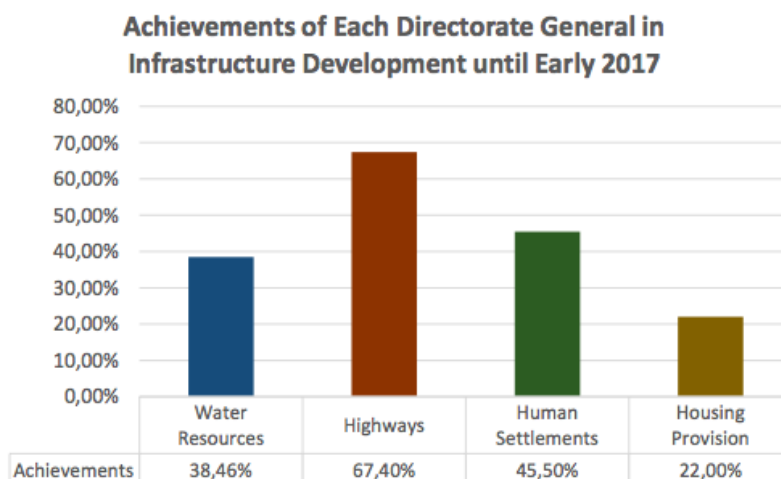


Figure 1. Achievements of Each Directorate General in Infrastructure Development

However, infrastructure development projects still has a low project performance described by delay, quality failures, cost overrun, construction accidents, claims, disputes and fragmentation purpose of each party organizations that joined in a project organization. Weakness indication of project performance is the low success of the organization represented by the organizational effectiveness project management. The effectiveness of organization will affect project performance either direct or indirect[10-16].

2. Experiment Details

To find the problem as the basis of this research, study lilterature was conducted to get factors that can represent organizational effectiveness project management. Study literature yields 9 factors organizational effectiveness project management. Study of literature is also producing the project performance measurement based on four parameters, i.e. cost, schedule, quality, and safety. Factors of organizational effectiveness project management became variable x and project performance parameters became variables y on this research. Each variable is derived from a few literature to ensure validity on any of it [17-24].

Table 1. Research Variables

Variable X			Variable Y	
No	Organizational Effectiveness Project Management factors	Notation	No	Project Performance Parameters
1	Team Leadership	X1	1	Cost
2	Organization Goals and Objectives	X2	2	Schedule
3	Top Management Support	X3	3	Quality
4	Technical and Financial Audit	X4	4	Safety
5	Roles and Responsibility	X5	All the project performance parameters will be integrated into a single value and symbolized by 'Y' on the model	
6	Creativity and Innovation	X6		
7	Task Processess	X7		
8	Organizational Relationship	X8		
9	Communication	X9		

Data collection was done through a survey with questionnaire as the instrument. A survey conducted by an online-based coupled and review directly to the field to get actual condition. Survey was made into two stages. Each survey using a differenet questionnaire. The first stage of the survey aimed at validating factors organizational effectiveness project management. The second stage of the survey aimed to find the relationship between organizational effectiveness project management with the project performance. The results of both surveys were analyzed using Statistical Product and Service Solution (SPSS) software. The first stage of the survey using the analysis of validity and reliability, descriptive analysis, correlation analysis, and factor analysis. The second stage of the survey using the analysis of validity and reliability and multiple linear regression analysis. Research process flow diagram is illustrated on Fig. 2 [17-24].

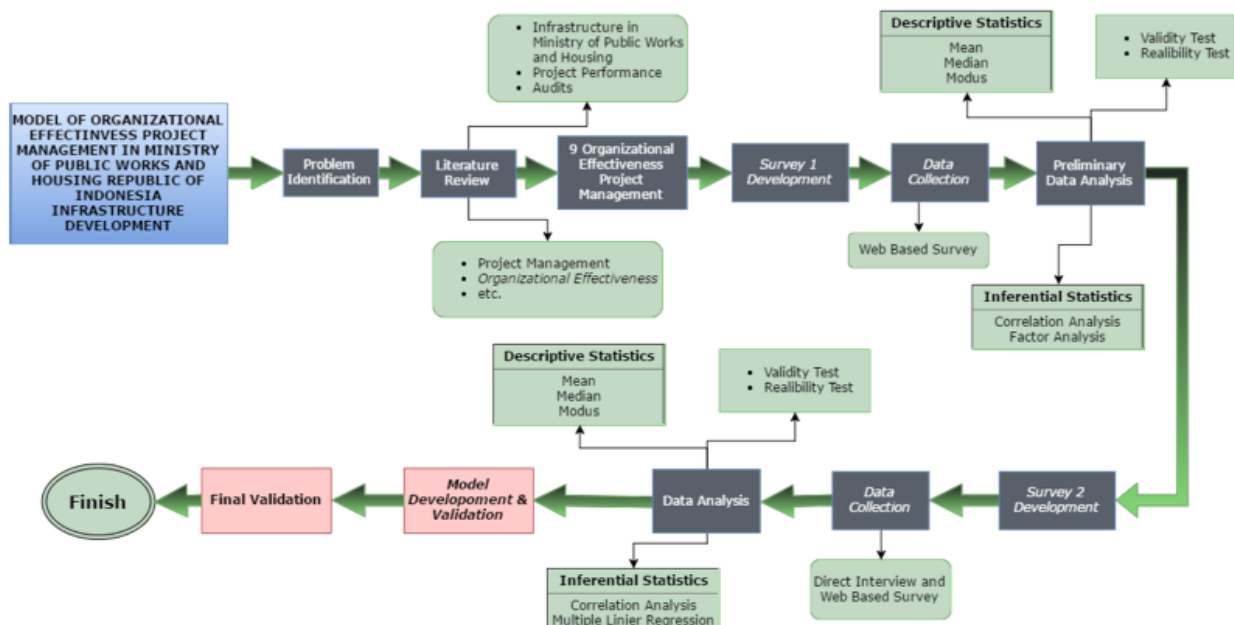


Figure 2. Flowchart Process

The first stage of the survey was done to the employees of Ministry of Public Works and Housing. It was done to 112 respondents. The first stage of the survey only use infrastructure projects at Directorate General of Highways as an object of study since that Directorate General has the most

portion on infrastructure development budget in the Ministry. Contractor and consultant are not involved in the first stage of the survey because it only aims to get the early validates of the organizational effectiveness project management factors. The second stage of the survey was done to employees of Ministry of Public Works and Housing, contractors and consultants. The second stage of the survey conducted at the project level. Therefore, each respondents would represented each projects. In total there are 250 infrastructure development projects in Ministry of Public Works and Housing that became the object of research. The whole project is part of Directorate General of Water Resources as much as 74%, Directorate General of Highways as much as 18%, and Directorate General of Human Settlements and Housing Provision as much as 8%. If the respondents were divided by the composition of employees and non-employees (contractors and consultants) of Ministry of Public Works and Housing, then the number of employees was 70% and non-employees (contractors and consultants) was 30% [25-32].



Figure 3. Respondents in Second Stage Survey

3. Result and Discussion

Analysis on result of multiple linear regression model is divided into three stages: 1) model analysis with respondents of overall employees in Ministry of Public Works and Housing; 2) model analysis with respondents of employees in every Directorate General in Ministry of Public Works and Housing; 3) model analysis with respondents of employees and non-employees (contractors and consultants) Ministry of Public Works and Housing. The separation between the stages of analysis was done to look for a difference of each Directorate- General and intervention made by non-employee of Ministry of Public Works and Housing (contractors and consultants) into the result. The difference will be analyzed by comparing the value of the regression coefficients on each factor in organizational effectiveness project management. The result of the multiple linear regression analysis shows a proportional relationship between organizational effectiveness project management and project performance. Therefore, the greater coefficient of regression will be increasingly project performance. Analysis at this stage represent 70% of the total respondents or equivalent to 176 Ministry of Public Works and Housing infrastructure projects. The results of this stage of the model shows that 'Communication' factor get the greatest value of the regression coefficients with a value of 0.205. Factor that has smallest regression coefficients is 'Top Management Support' with a value of 0.011. The following equation is the result of multiple linear regression model development for this stage. Model Analysis With Respondents of Overall Employees in Ministry of Public Works and Housing:

$$Y = 0.749 + 0.119X_1 + 0.021X_2 + 0.011X_3 + 0.052X_4 + 0.144X_5 + 0.071X_6 + 0.082X_7 + 0.144X_8 + 0.205X_9$$

'Communication' factor becomes important because of great scope of the project and the amount of Ministry of Public Works and Housing projects that runs. Every Directorate General has the

responsibility on each field of construction respectively. Therefore, good communication between every Directorate General should be formed to create the integration of infrastructure development in Indonesia. Infrastructure development related to roads is the responsibility of the Directorate General of Highways. Indonesia has targets in road development up to the year 2019 through the Strategic Plan of the Ministry of Public Works and Housing 2015-2019 so that the Directorate General of Highways held the largest share in the construction of the infrastructure in Ministry Public Works and Housing. Therefore the analysis at this stage represents 74% of total respondents. The results of this stage model shows that 'Communication' factor get the greatest value of the regression coefficients with a value of 0.202. Factor that has smallest regression coefficients is 'Top Management Support' with a value of 0.018. The following equation is the result of multiple linear regression model development for this stage. Model Analysis With Respondents of Employees in Every Directorate General in Ministry of Public Works and Housing (Directorate General of Highways).

$$Y' = 0,693 + 0,104X1 + 0,027X2 + 0,018X3 + 0,029X4 + 0,142X5 + 0,081X6 + 0,097X7 + 0,160X8 + 0,202X9$$

Slight difference showed in the overall employees in Ministry of Public Works and Housing and Directorate General of Highways. It happens because the road construction has the largest budget in Ministry of Public Works and Housing infrastructure development. Road constructions were done on the entire region in Indonesia. It covers with the Balai Pelaksanaan Jalan Nasional (BPJN) and Balai Besar Pelaksanaan Jalan Nasional (BBPJN) which has a duty to carry out the construction of roads across Indonesia. BBPJN/BPJN is part of the Directorate General of Highways organizations. The great scope of the organization and areas of work of the Directorate General of Highways makes the need for communication is important. Directorate General of Water Resources Infrastructure development related to water is the responsibility of the Directorate General of Water Resources. Analysis at this stage represents 18% of total respondents. The results of this stage model shows that 'Communication' factor get the greatest value of the regression coefficients with a value of 0.194. Factor that has smallest regression coefficients is 'Top Management Support' with a value of 0.017. The following equation is the result of multiple linear regression model development for this stage. Model Analysis With Respondents of Employees in Every Directorate General in Ministry of Public Works and Housing (Directorate General of Water Resources).

$$Y' = 1,129 + 0,125X1 + 0,180X2 + 0,017X3 + 0,081X4 + 0,142X5 + 0,027X6 + 0,078X7 + 0,019X8 + 0,194X9$$

Slight difference showed in the result of Directorate General of Highways and the Directorate General of Water Resources. It happens because the characteristic of organizational structure on both the Directorate General has similarities though at this stage it is only represented by 18% of respondents. Water is a very potential resource. The presence of excessive water will cause an overflow. The existence of the less water will cause dryness. Therefore the construction of infrastructure to manage water resources should be done properly so that surplus or shortage of water doesn't happen. The large number of responsibilities of the Directorate General of Water Resources have an impact on the structure of the organization. Infrastructure development related to water in areas in Indonesia is represented by Balai Wilayah Sungai (BWS) and Balai Besar Wilayah Sungai (BBWS). The great scope of the organization and areas of work of the Directorate General of Water Resources makes the need for communication is important. Directorate General of Human Settlements and Housing Provision Infrastructure development related to the development of housing area, drinking water supply systems, waste water management systems, and environment drainage is the responsibility of the Directorate General of Human Settlements. Infrastructure development related to the provision of

housing for peoples is the responsibility of the Directorate of Housing Provision. The merge of results of these both Directorate General represents 8% of total respondents. The results of this stage of the model shows that 'Leadership Team' factor to get the greatest value of the regression coefficients with a value of 0.234. The factor that has the smallest regression coefficients is 'the Organization Goals and Objectives' with a value of 0.007. The following equation is the result of a multiple linear regression model development for this stage. Model Analysis With Respondents of Employees in Every Directorate General in Ministry of Public Works and Housing (Directorate General of Human Settlements and Housing Provision).

$$Y' = 0,163 + 0,234X_1 + 0,007X_2 + 0,085X_3 + 0,142X_4 + 0,026X_5 + 0,107X_6 + 0,136X_7 + 0,040X_8 + 0,210X_9$$

Big difference showed on the results of these two Directorate General compared with Directorate General of Highways and Water Resources. It happens because of the difference characteristics between those Directorate General. Directorate General of Human Settlements and Peneydiaan Perumahan don't have units of work that covers all areas across Indonesia like Directorate General of Highways and Water Resources have with their BBPJN/BPJN and BBWS/BWS. Nevertheless, the scope of work of these both Directorate General remained cover the entire region in Indonesia. The unit of work is only found in the Central Government. Therefore, it takes a good leadership to set the entire region in Indonesia. 'Communication' factor is in the second position with the biggest regression coefficients. This factor has always had an important role in each Directorate General with the first or second position. It shows that these factors play an important role in the work system in Ministry of Public Works and Housing. The great scope of work of the Ministry require between Directorate General has good communication flow so that infrastructure development remain integrated and synergistic. Contractors and consultants have different views towards the success of the project organization on infrastructure development in the Ministry of Public Works and Housing. These differences should be analyzed comprehensively because project organization on infrastructure development not only employees of the Ministry of Public Works and Housing, but including the contractors and consultants. The results of the model in this stage could be made as an input for the project overall organization to raise the project performance in order to increase the achievement on infrastructure development. The total number of contractors and consultants that reach 30% of the total respondents may change the results of the model as a whole. The most dominant factor on the model based on the employees of the Ministry of Public Works and Housing is 'Communication' factor. The results of this model changed the conditions which the most dominant factor is 'Technical and Financial Audit' with a value of 0.173. 'Communications' factor is on the fourth rank as a factor with the largest regression coefficients. The following equation is the result of a multiple linear regression model development for this stage. Model Analysis With Respondents of Overall Employees and Non-Employees (Contractors and Consultants) in Ministry of Public Works and Housing:

$$Y' = 0,830 + 0,109X_1 + 0,070X_2 + 0,032X_3 + 0,173X_4 + 0,044X_5 + 0,120X_6 + 0,093X_7 + 0,078X_8 + 0,104X_9$$

The overarching difference occurs on the model with the respondent of employees in Ministry of Public Works and Housing combined with contractors and consultants. Technical and Financial Audit is crucial factor from the point of view of contractors and consultants. Infrastructure development must not only quickly and within budget, but it should also have good quality because it will affect the age of infrastructure usage. Every work package has to fulfilled the specifications to get the quality that is planned. If the specifications are not met and became the findings in a Technical and Financial Audit, then it must be rework. Rework will be detrimental to the contractors and consultants as it will add

time, effort and expense of working with possibility they don't get adding payment. Not only contractors and consultants, Ministry of Public Works and Housing will also suffer losses of rework due to the dispute and the delay in the construction of infrastructure. Thus, rework is the thing that will be avoided by the project organization. Other factors that get a large regression coefficient after the presence of contractors and consultants is 'Creativity and Innovation'. Contractors and consultants in their work required for efficient and effective especially in time and costs. Creativity will determine the speed and accuracy of work so that efficiency can be done. Whereas, in the perspective of the Ministry of Public Works and Housing as the party that gave the work, the needed of 'Creativity and Innovation' factor are not too high because it is not an executor that required to innovate to produce the most effective and efficient working methods. Technical and Financial Audit Implementation Simultaneously On average, the implementation of Technical and Financial Audit infrastructure development project in Ministry of Public Works and Housing was done separately. Innovation has been carried out by consultants on Eastern Indonesia National Road Improvement Project (EINRIP) in carrying out the audit. Audit on EINRIP done simultaneously. Technical and Financial Audit implementation simultaneously has improved the quality of the audit findings identified and have better results compared to implementation Technical and Financial Audit separately. Based on survey to 250 respondents, 88% of the respondents agree for doing Technical and Financial Audits simultaneously, while 12% were either disagreed. Technical Financial Audit implementation simultaneously has benefits like increase efficiency of cost and time, facilitate the achievement of conformity between the technically and financially, makes easier way to claim, and anticipate external parties criminalization.

Respondents Answer of Technical and Financial Audit Implementation Simultaneously

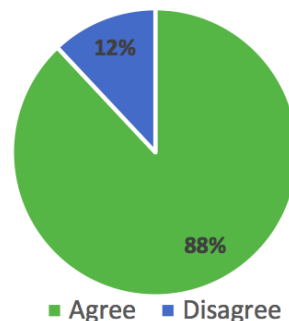


Figure 4. Respondents Answer of Technical and Financial Audit Implementation Simultaneously

Technical and Financial Audits implementation simultaneously will drive the quality of the project at the level it should be. This driven from a thorough audit implementation of a project. Project quality driven due to the implementation simultaneously of the Technical and Financial Audits can be compared to the quality of project that implementing Technical and Financial Audit separately. Projects that have not yet implemented the implementation of Technical and Financial Audits simultaneously does not have the quality as good as the project has implemented the implementation of Technical and Financial Audits simultaneously. Described in Figure 5 where the image on the left is the national road infrastructure projects in Tanah Karo which hasn't a good roughness road. The age of the national roads is still fairly new but the conditions already deteriorating. While the image to the right is national road in Kendari that already implement Technical and Financial Audits simultaneously. The quality of the road still good though its age already long. The drainage is still in good condition as well as the condition of the road roughness.



Figure 5. Comparison National Road Condition Based on Implementation of Technical and Financial Audit

Development of the audit implementation must be carried out as soon as possible because rapid development of the condition. Bad implementation of Technical and Financial Audit will cause rework that make delay and cost overrun. Risk based project work should be applied to avoid delay and cost overrun. Based on these statements, then can be withdrawn a statement that technically and financially it's very related. Therefore, Technical and Financial Audit implementation simultaneously, as has been done on projects EINRIP deserves to be applied on other infrastructure projects on infrastructure development in Ministry of Public Works and Housing.

4. Conclusion

Infrastructure development in the Ministry of Public Works and Housing is the basic needs that have an important role to meet the needs of the citizens. A good project performance required to support the quality of infrastructure. Organizational effectiveness project management is an important variable to increase the project performance which consists of nine factors, i.e.: 1) Team Leadership; 2) Organization Goals and Objectives; 3) Top Management Support; 4) Technical and Financial Audit; 5) Roles and Responsibility; 6) Creativity and Innovation; 7) Task Processes; 8) Organizational Relationship; 9) Communication. The most important factor for improving the project performance in internal of Ministry of Public Works and Housing is 'Communication'. The great scope of work makes this factor becomes important to be owned by employees of the Ministry of Public Works and Housing. The most important factor for improving the project performance in overall project organization include contractors and consultants is 'Technical and Financial Audit'. The quality of work that do not fit will cause the rework that will be detrimental to the contractors and consultants in terms of time and cost. Technical and Financial Audit implementation simultaneously will increase the quality of findings that impact the quality of the project.

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