The Effectiveness of UKL-UPL Implementation on the Project of Railway Elevated Construction from Railway Station of Solo Balapan to Kadipiro

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Abstract. Every construction work inevitably has some impacts for environment and society. One of construction works is the construction project of Elevated railway construction from railway station of Solo Balapan to railway station of Kadipiro. Therefore some measures are needed to remove negative impacts by planning the project by utilizing an analysis of Effort of environmental management and effort of environmental monitoring (UKL-UPL) in careful and proper way. The UKL-UPL is used to mitigate negative effects such as pollution, damage, and environmental disruption. The aim of this study is to identify significant and insignificant impacts due to the construction project, identify the UKL-UPL implementation, identify the effect of implementation and monitoring of construction to the society's activities and to analyze the level of effectiveness of UKL UPL implementation on the project of railway construction. The primary data used were the results of questionnaire, interview and observation. Samplings were taken from the impacted society, contractor, consultant, working agency, and related parties within the construction project of double track. The result of analysis demonstrated the significant and insignificant impacts and displayed the consequence of implementing UKL-UPL which was suitable with the construction of double track Palang Joglo. Based on the 78 checklist of monitoring on the construction in the field, there were 13 checklists were not done yet and only 65 checklist were successfully conducted. In term of mitigating the air, water and sound pollutions, the result of test showed that it had met the required quality. The level of effectiveness of the implementing the UKL-UPL on the construction project of elevated railway between railway station Solo Balapan to railway station Kadipiro was categorized as effective with score 1.747.

Keywords: UKL-UPL · Double track · Transportation

1 Introduction

As long as the number of world population rockets, the need of transportation system also elevates now and in the future. The development on the transportation sector is a way to fulfil the necessity of transportation for mobility in the years to come. Nevertheless,

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this massive development on transportation also gives direct and indirect impacts on the environment and around. In term of population number, the city of Surakarta is the third biggest city in south Java island and its position is placed right after Bandung and Malang. The intersection of Joglo which is located in Surakarta is considered the crucial point of congestion. To remove the problem of congestion in that point, the Ministry of Transportation together with Central Java Province, the local government of Surakarta Municipality, and the Ministry of Public works and Housing are collaborating to develop the elevated railway line in the intersection of Palang Joglo. The effort of developing it is aimed to prioritize the traffic safety and remove the problem of congestion. The construction project of elevated railway line from railway station Solo Balapan to railway station of Kadipiro unavoidably changes one of established system of traffic and transportation and causes continuous impact to the activities of inhabitant society. It happens to the three villages located in the district of Banjarsari; they are village Gilingan, village Joglo and village Nusukan. Moreover, there are 523 houses are relocated and compensated.

Based on the aforementioned problems, the government has regulation and policy to maintain the living environment and ecosystem conservation from negative impact of constructions. One of efforts to minimize the negative impact is by applying the effort of environment management and effort of environment monitoring (UKL-UPL) by careful and right way. Those efforts are to make sure that the development of construction with bad impacts such as pollution, damage and other environment disruption can be early managed and removed. The good management potentially maintain the ecosystem from the bad impact during the construction is on going. In other words, the development or construction itself is urgently needed to raise the quality of human's life. This study aims to investigate the significant and insignificant impacts on the construction project of elevated railway lines from railway station Solo Balapan to railway station of Kadipiro. This study also has a goal to identify the effect or impact of the implementation and monitoring of elevated railway line constructions from railway station Solo Balapan to railway station Kadipiro to the activities of society. Moreover, this study also aims to analyze the effectiveness level of implementing UKL UPL during the construction of Elevated railway lines from railway station Solo Balapan to railway station Kadipiro.

2 Literatur Review

2.1 The Definition of AMDAL and UKL UPL

In the government regulation No.27 year 1999 about AMDAL (Analysis of Environmental Impact) article 1 mentions some definitions of it as follows:

a. AMDAL is an analysis of huge and significant impact of an activity which is carried out based on an established plan.
b. The huge and significant impact here means any crucial potential that can change the living environment because of the plan which is conducted.

The attempt of living environment management and the effort of monitoring on living environment (UKL-UPL) are basically management and monitoring on the activities and/or efforts which are not significantly affected to the living environment in the process

of making a decision of applying or executing a plan and/or an agenda. The effort and/or the agenda is all activities which potentially can give a significant transformation on the environment. To take care of the environment from the destruction must be done by early preventive actions. One of preventive action is intensive monitoring on the business/effort/activity that obviously breaks the law.

2.2 The Objective of Arranging AMDAL and UKL UPL

The objective of arranging AMDAL and UKL UPL is to ensure that the construction is done under the framework of environmental friendly. In consequence, the utilization of natural sources is under control wisely and proportionally. To reach that attainment, the planning process must be made carefully by considering the change of environmental condition either positive or negative ones. For construction which has huge impact and significant on the living environment, it needs extra consideration by applying study of environmental proper and eligibility. Therefore, AMDAL has to be arranged very carefully and permit is mandatory before the construction is carried out.

2.3 Significant and Insignificant Impact of UKL UPL

The significant impact of development is something related to the basic change of environment. This kind of impact is mostly used and considered by many parties before executing the development of construction. The significant impact is considered to remove environmental damage after the construction has been done.

The insignificant impact is impact that is not significant to the condition of environment. To determine the level of significant or insignificant impact, it needs a survey involving community around the spot of construction itself. This reason is based on perspective that people live around the construction will get direct impact during and after the construction is being conducted.

3 Objective

3.1 Location and Duration of Research

This research was conducted at the area of construction of elevated railway lines from railway station solo Balapan to railway station Kadipiro. This research was carried out from January 11th up to June 30th in 2022. the location of the research is as Fig. 1 displayed.

3.2 Population and Sample

This research used whole population who live around the location of construction. They were 30 respondents of citizen RW 16 (RT 7 and RT 8) and RW 15 (RT 4 and RT 5). All area were located in district Banjarsari, City of Surakarta. This research also involved contractor and parties who are joining in the committee of land clearing. The sample decision used Slovin formula with n margin of error as 10%.

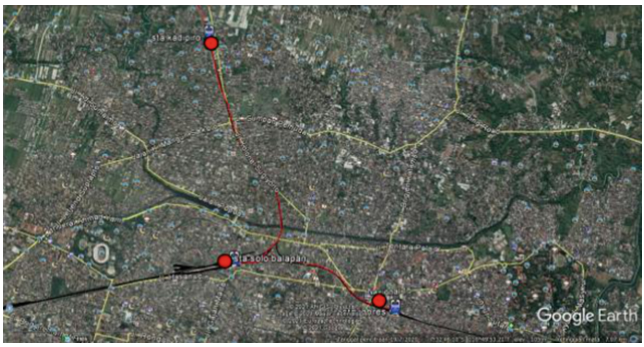

Fig. 1. Location of Research

3.3 Method of Data Analysis

This research used descriptive analysis as the technique of data analysis. The selection of the technique is based on the result of questionnaire. Subsequently, the results of questionnaire are combined and summarized to draw a conclusion and it will be displayed as the result of the research. The result of research can also be utilized to improve and give suggestion for better method in the coming time. In data analysis of observation by the analysis technique inter cases for each case the analysis process uses model of interactive analysis.

4 Result and Discussion

4.1 Significant and Insignificant Impact

The results of test on the significant and insignificant impact were three categories of insignificant impact namely; raising the people's attitude and perception on the survey and socialization agenda, social vulnerability in providing the land, and people's perception on the employees' recruitment. The Significant and Insignifant Impact shows in Table 1.

4.2 The Result of Test on Significant Impact on Air Pollution

The result of test on the air quality at the location of construction Elevated railway lines from railway station Solo Balapan to railway station Kadipiro shows that all parameters have meet the quality standard. Those parameters consist of sulphur dioxide (SO2), Carbon monoxide (CO), Nitrogen Dioxide (NO2), oksidant 9o3), Hydrocarbon (HC), Dust (TSP), Lead (Pb). The result of the test on the air quality is displayed in the Table 2.

Table 1. Significant and Insignifant Impact

No	Source of Impact	Type of Impacts	Significant	Insignificant
1.	Survey and Socialization activities	People's attitude and perception appears	33,3%	66,7%
2.	Land provision	Social vulnerability	16,7%	83,3%
3.	Recruitment of construction's employees	Job opportunity	100%	0%
		People's perception raises	33,3%	66,7%
4.	Base camp activities	People's anxiety	83,3%	16,7%
		Environmental sanitation degradation	100%	0%
5.	Material and heavy equipments/tools mobility	Air quality degradation	100%	0%
		Noise escalates	100%	0%
		Disruption/interference on traffic and safety	100%	0%
		Acute respiration infection	100%	0%
6.	Cleaning and land preparation	Air quality degradation	100%	0%
		Acute respiration infection	100%	0%
		Safety and health problem appears	100%	0%
7.	Physical work on main building and supporting facilities	Air quality degradation	100%	0%
		Noise enhancement	100%	0%
		Acute respiration infection (ISPA)	100%	0%
		Safety and health problem appears	100%	0%
8.	Activities of operating and maintaining	Air quality degradation	100%	0%
		Noise enhancement	100%	0%
		Vibration frequency escalates	100%	0%
		Disruption/interference on traffic and safety	100%	0%

4.3 The Result of Test of Significant Impact on Noise

The noise is measured day and night. The result of test the noise in the day (Ls), noise in the night (Lm) at some locations around the construction project shows that the score in the position of under the threshold/minimum standard score as 85 dB due to KEP 51/Men/1999. The score of noise is as 61,1 up to 64.0 dB (Table 3).

Table 2. The Result of Test on Significant Impact on Air Pollution

No	Parameter	Unit	Result	Std Max	Test Method	Note
1	Sulphur dioxide (SO_2)	$\mu g/Nm^3$	12,6	75	SNI 7119-7 Year 2017	Safe
2	Carbon Monoxide (CO)	$\mu g/Nm^3$	1.275	4.000	GSP W-LAB TS 031	Safe
3	Nitrogen Dioxide (NO_2)	$\mu g/Nm^3$	8,5	65	SNI 7119-2 Year 2017	Safe
4	Oxidant (O_3)	$\mu g/Nm^3$	4,6	100	SNI 7119-8 Year 2017	Safe
5	Hydrocarbon (HC)	$\mu g/Nm^3$	15,0	160	GSP W-LAB TS 094	Safe
6	Dust (TSP)	$\mu g/Nm^3$	33,4	230	SN1-7119-3 year 2017	Safe
7	Lead (Pb)	$\mu g/Nm^3$	0,16	2	SN1-7119-4 year 2017	Safe

Table 3. The Result of Test of Significant Impact on Noise

No	Location	Unit	Result			Quality standard (KEP 51/Men/1999)
			Ls	Lm	Lsm	
1	N-06 (Solo Balapan)	dBA	63,3	44,7	61,6	85
2	N-07 (VillageNusukan, rail edge)	dBA	62,7	46,0	61,1	85
3	N-08 (Simpang Joglo)	dBA	65,6	50,9	64,0	85
4	N-09 (Mojorejo, railway edge)	dBA	63,0	45,6	61,4	85
5	N-10 (Gondang Rejo, railway edge)	dBA	64,2	46,0	62,6	85

4.4 The Result of Test on Impact of Surface Water Pollution

The surface water pollution around the location of construction project of Elevated railway lines from railway station Solo Balapan to railway station Kadipiro was measured by some parameters, they are: physic, chemical content, and microbiology. The result of test shows that all parameters have meet the minimum standard/threshold based on SNI 06–6989.

4.5 The Result of Test on Impact of Groundwater Pollution

Groundwater pollution around the area of construction project of Elevated railway lines from railway station Solo Balapan to railway station Kadipiro was measured by using some parameters they are physic, chemical content and microbiology. The result of the test shows that all parameters fulfilled the minimum standard/threshold determined in SNI 06–6989.

Table 4. The Result of Test Vibration Impact

No	Location	Sample	Point of measurement	Acceleration (m/s2)	Quality standard	Vibration categories	Note
1.	Zona 1 (KM 105 + 650 - 107 + 000)	Water pump	On the top of water pump	0,6	0,2–0,6	Satisfactory (ISO 10816)	Safe
		Generator	On the side of generator body	0,04	≤ 0,6	Good (ISO 10816)	Safe
		Railway	2 m from the edge of railroads.	0,01	≤ 0,315	not uncomfortable (ISO 2631)	Safe
2.	Zona 2 (KM 104 + 000 - 105 + 550)	Excavator	Operator chair	1,4	0,8–1,6	Uncomfortable (ISO 2631)	Safe

4.6 The Result of Test Vibration Impact

The result of vibration test round the location of construction project of double track Palang Joglo have met minimum score based on standard of ISO 10816 and ISO 2631. The results of test on vibration are yielded in the table as follows (Table 4).

4.7 The UKL-UPL Implementation

In this study, there are some checklists to apply monitoring on the executing the construction of double track. Some were well applied the checklist of monitoring, but for some other were not yet. Majority of monitoring implementation in this construction project show that total 78 checklists, 65 checklists were very well applied, but the remaining 13 checklists of monitoring were not conducted yet. The reason for some monitoring checklists were not conducted yet is the certain project didn't start yet. To overcome that problem, the monitoring will be conducted when the project is about to start. These are checklists which are not conducted yet:

a. Monitoring on the entrance notes at the information service post of citizens' complaint due to land clearing.
b. Monitoring by direct checking the installing the recruitment information of construction worker.
c. Monitoring on the entrance note at the information service post of citizens' complaint about the on going recruitment activity of construction worker.
d. Checking the activity of construction worker recruitment to district and village.
e. Observation on activity of cleaning the wheel of truck which loads materials before leaving the location of project site.

f. Monitoring the permanent repair after the activity of unloading the materials based on the type of broken street.
g. Observation on the activity of wet suppression.
h. Observation and monitoring to all vehicles.
i. Observation activity on suggestions from society which are dropped in the available message box.
j. Monitoring the emission test and operation eligibility.
k. Monitoring on the routine maintenance on locomotive machine/engine along with the maintenance on mechanics of wagon or railway
l. Monitoring on the vegetation along the double track Solo-Semarang.
m. Monitoring the routine maintenance on locomotive engine along with the maintenance of railway wagon mechanic.

4.8 The Level of Effectiveness of UKL UPL Implementation

The levels of effectiveness of implementing UKL-UPL on the construction of double track Palang Joglo Surakarta were obtained via analysis of the answers of questionnaire from the respondents. Here below is recapitulation of questionnaire result (Table 5).

Based on the above descriptive analysis, categories were made to determine the indicator of benefits/advantages. The highest score and the lowest score are yielded as follows:

Lowest score (1) = Number of statement × lowest score × number of respondents.
= 20 × 1 × 30 = 600 (score for respondent who answer disagree)
Highest score (4) = Number of statement × highest score × number of respondents.
= 20 × 4 × 30 = 2400 (score for respondent who answers agree)
Range = Highest score – lowest score.
=2400 – 600 = 1800 (quarrel of highest score and the lowest one)
Interval Range = range: number of categories.
= 1800 : 4
= 450 (distance inter categories of respondents' answer)

Very Effective	Effective	Ineffective/not effective	Strongly ineffective
2400	1950	1500	1050

Based on the calculation above, the implementation of construction of Elevated railway from railway station Solo Balapan to railway station Kadipiro is considered effective due to result of effectiveness score as 1.747 and it is within 1.500–1.950.

Table 5. The Level of Effectiveness of UKL UPL Implementation

No	Item of Statement	Score of answer								Score
		4		3		2		1		
		F	%	F	%	F	%	F	%	
1	P1	5	16,67	18	60,00	6	20,00	1	3,33	87
2	P2	8	26,67	15	50,00	6	20,00	1	3,33	90
3	P3	6	20,00	17	56,67	4	13,33	3	10,00	86
4	P4	4	13,33	14	46,67	7	23,33	5	16,67	77
5	P5	3	10,00	12	40,00	14	46,67	1	3,33	77
6	P6	7	23,33	11	36,67	6	20,00	6	20,00	79
7	P7	6	20,00	14	46,67	7	23,33	3	10,00	78
8	P8	6	20,00	14	46,67	7	23,33	3	10,00	78
9	P9	5	16,67	18	60,00	2	6,67	5	16,67	78
10	P10	6	20,00	16	53,33	6	20,00	2	6,67	86
11	P11	6	20,00	18	60,00	4	13,33	2	6,67	88
12	P12	11	36,67	12	40,00	6	20,00	1	3,33	93
13	P13	8	26,67	17	56,67	4	13,33	1	3,33	92
14	P14	6	20,00	15	50,00	8	26,67	1	3,33	86
15	P15	9	30,00	16	53,33	3	10,00	2	6,67	92
16	P16	12	40,00	13	43,33	4	13,33	1	3,33	96
17	P17	8	26,67	17	56,67	4	13,33	1	3,33	92
18	P18	9	30,00	16	53,33	4	13,33	1	3,33	93
19	P19	11	36,67	12	40,00	5	16,67	2	6,67	92
20	P20	8	26,67	16	53,33	6	20,00	0	0,00	92
	Actual score									1.747
	Ideal Score									
20 x 4 x 30									2.400	

5 Conclusion

Based on the research above, the conclusions are made as follows:

1. Significant impact people have directly are the air quality degradation, noise elevates, broken road, congestion, social vulnerability caused by the existence of basecamp. In addition, insignificant impact during the construction going is job opportunity and people's perceptions on worker recruitment, socialization activity, and survey which was done before the construction is started.

2. The implementation of UKL-UPL in this development of construction is well conducted due to fulfilling the quality standard. The result which meets the quality standard is obtained via some test namely test of noise, air pollution, groundwater and vibration measurement. It is done to measure the impact of potential risk of this job.
3. The process during the construction project of Elevated railway lines from railway station Solo Balapan dan railway station of Kadipiro was by using checklist of monitoring. The result yields that from total 78 checklist for points measured, 65 checklist is well implemented. Moreover, 13 checklists were not conducted yet. The remaining checklists are prospective to apply right the construction project is done.
4. The construction of railway routes of Elevated railway from railway station Solo Balapan to railway station Kadipiro is effective to do monitoring. Based on the questionnaire given to respondents who involved in the construction project, it shows that result of Implementing indicators UKL-UPL is positively effective and the score of effectiveness as 1.747 within 1.500–1950.

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