

## **The Influence of Implementation Management on The Effectiveness and Efficiency of The Implementation of National Road Maintenance with the Long Segment Scheme**

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### **Abstract**

The reason of this take a look at turned into to analyze the influence of assignment management, productiveness, outside elements, human resources, Occupational fitness and safety (OHS), and costs at the effectiveness and efficiency of the implementation of the preservation of the Bungku-Bahodopi-Sultra Border national avenue the use of a long phase agreement scheme, and to identify the factors that maximum impact the effectiveness and efficiency of the implementation of the preservation of the Bungku-Bahodopi-Sultra Border country wide avenue the use of an extended segment settlement scheme. The form of research used is explanatory studies, the facts series system used in this study includes statement, questionnaires, and documentation, facts analysis is finished thru multiple linear regression assessments. The outcomes of the examine imply that challenge control elements, productiveness, external factors, human resources, Occupational health and safety (OHS), and fees each concurrently and in part have a sizable impact at the effectiveness and performance of the implementation of the protection of the Bungku-Bahodopi-Sultra Border countrywide road the usage of an extended phase settlement scheme

**Keywords:-** Effectiveness, Efficiency, Implementation, Management, Maintenance

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### **I. INTRODUCTION**

Strategically, country wide roads assist the boom and economic connectivity of a place[1]. ok national roads are an essential a part of the country wide transportation machine to facilitate the drift of products and offerings, boom regional accessibility, and inspire equitable development[2]. The Bungku-Bahodopi-Border of Southeast Sulawesi section is one of the most important national roads in primary Sulawesi Province. This phase has a high stage of mobility as it connects industrial regions, financial centers, and settlements[3]. In an ongoing effort to improve the high-quality of national road infrastructure, the Ministry of Public Works and Public Housing (PUPR) is imposing an extended segment scheme in enforcing street projects. This scheme combines diverse styles of paintings, inclusive of reconstruction, rehabilitation, and renovation, in a broader settlement to optimize avenue construction and upkeep[4]. it's miles very critical to put in force a protracted phase scheme at the Bungku-Bahodopi-Border of Southeast Sulawesi course due to the fact the route is experiencing multiplied visitors because of the growth of the Morowali enterprise and mining. An implementation strategy that can assure the sturdiness and fine of the street within the long time is needed due to the fact heavy car hobby can boost up avenue harm. however, further studies is needed to ensure that this scheme is effective and green. this is in particular related to the consequences completed, the restrictions within the subject, and how it influences avenue customers and the surrounding surroundings[5].

Innovation via combining conventional contracts with overall performance based completely settlement (percent) contracts, known as lengthy phase contracts. In lengthy phase contracts, street preservation dealing with is completed inside the limits of 1 non-stop phase duration (may be multiple phase) that is implemented with the intention of acquiring uniform street situations, specially constant and popular roads during the phase. The implementation of this prolonged section is expected to increase the effectiveness of avenue protection managing, mainly in terms of budget, and allow contractors to make investments extra money in gadget and expert hard paintings[6].

It is hoped that the lengthy section coverage will exchange the manner contractors manipulate roads that have to this point most effective executed creation work in order to carry out road rehabilitation and preservation. long segment activities can even consist of preventive preservation so that the finances is used greater efficiently

than simply wearing out road floor renovation. that is due to the fact road rehabilitation will lessen fees substantially[7].

Enumerous national roads have began enforcing street conservation policies with a protracted segment gadget. one of them is the Bungku-Bahodopi national avenue, which is about 42 km lengthy and connects imperative Sulawesi Province and Southeast Sulawesi Province. Bahodopi countrywide street-Border of Southeast Sulawesi Province, which is about 66 km long, and connects imperative Sulawesi Province and Southeast Sulawesi Province, has a stable condition of about ninety five% of the duration of the phase[8].

In this situation, the programs covered in it are long segments. but, about ten kilometers after and after the IMIP employer requires special maintenance. this could include repairing the street body and repairing drainage that will be diverted immediately to the ocean. The implementation of this long section street device is anticipated to enhance offerings, facilitate the go with the flow of products and people, and growth accessibility for all facilities that bypass through it.[1]

The implementation of this lengthy segment is expected to growth the performance and effectiveness of avenue preservation dealing with, specially in terms of price range. within the context of cutting-edge venture management, effectiveness and performance are the principle factors that decide whether a mission can achieve its goals on time, inside finances, and with the anticipated excellent[9]. Effectiveness refers to the quantity to which the venture is able to meet the deliberate goals and outputs, at the same time as efficiency pertains to the top-quality use of sources, so that there is no waste of time, cash, or energy. in many instances, poorly managed tasks will face the hazard of delays, price range overruns, and reduced fine of labor, which in the long run effects inside the failure of the project as a whole.[10]

The significance of effectiveness and efficiency is increasingly more felt in huge-scale tasks involving many stakeholders, along with the Bungku-Bahodopi-Sultra Border countrywide street protection challenge with the lengthy phase Scheme. challenges along with price range constraints, area dynamics, technical constraints, and weather and social factors require every stage of the assignment to be designed and run with excellent and included management.[11]The effectiveness and performance of project implementation are significantly inspired by way of different factors, each from inner and external.

## **II. LITERATURE REVIEW**

Effectiveness and efficiency are two factors associated with the utilization of resources, centers and infrastructure in a certain amount which can be consciously determined earlier to obtain paintings that is in accordance with expectancies[1]. whilst someone talks about effectiveness and efficiency as a piece orientation, it manner that the focal point of interest is the success of various predetermined targets on time by means of the usage of certain sources that have been used ought to be determined earlier and by using utilizing those sources, positive effects ought to be achieved inside the time that has been determined. Effectiveness and performance inside the implementation of creation tasks are very vital to attain venture success. Effectiveness refers to attaining challenge desires in accordance to devise, while efficiency pertains to most fulfilling use of resources to decrease waste. The implementation of exact construction management, such as careful planning, value and time manipulate, and using suitable technology, can increase the effectiveness and performance of the undertaking. consider a production challenge[2], if the task could be very powerful in building road pavements that meet specs, but fees two times the finances and takes twice as long as scheduled[3], the undertaking may not be taken into consideration a hit ordinary although it could be very effective in reaching its dreams. however, if the assignment is finished on time and on budget, but the fine of the building is underneath standard, then the task is likewise not considered successful even though it is green in the use of resources[4]. From this phenomenon we will see that correct overall performance calls for a balance among effectiveness and performance, in different words that effectiveness and performance may be interpreted as the extent of success or ordinary achievement of a task, specially associated with creation tasks.[1]

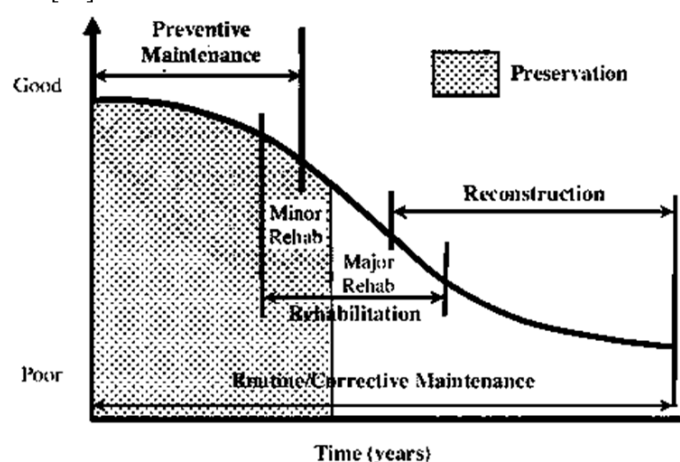
The signs of the effectiveness of production undertaking implementation used can vary relying at the sort of mission, the dimensions of the challenge, and the targets of the mission[5]. choosing the right signs will help creation companies degree venture achievement, become aware of regions that want development, and make higher decisions in the destiny. by taking note of those indicators, construction initiatives have a more danger of reaching success and providing premiere advantages for all events concerned[6]. Effectiveness and efficiency are crucial components of assignment success. task managers need to be capable of stability the 2 to ensure that the mission achieves its preferred goals in an most fulfilling and efficient manner. A holistic technique to mission management, which takes into account each effectiveness and performance, will increase the chances of average task fulfillment.[7]

Task success does no longer rely upon a single thing, however is the end result of the interplay of diverse interrelated elements. careful planning, ok sources, powerful verbal exchange, true danger control, and strong management are the keys to accomplishing undertaking success[8]. with the aid of information and handling these

factors properly, the task has a more threat of success and handing over fine outcomes[3]. In a avenue maintenance device with a protracted section agreement method, the provider provider is liable for making sure that the condition of the road remains stable at some stage in the yr with the aid of calculating the fee for the work based totally at the wide variety of reduced in size work gadgets. street sections are property that should be maintained[9]. those assets are commonly goods or some thing that has financial, industrial, or change price owned via an employer, enterprise, or character. In this situation, street sections are goods that have economic, commercial, or alternate value owned by the u s a and have to be maintained so that their value does now not lower.[10]

The mechanism for gratifying the level of carrier inside the lengthy section contract approach is accomplished through the technical director who observes every street phase and bridge segment each week. The consequences of those observations, sections of roads and bridges that don't meet the carrier stage criteria need to be repaired by the service provider with the provisions of the repair reaction time stipulated within the agreement. If the carrier provider cannot meet the level of service of the street and bridge that has been set primarily based on the specified repair response time, the carrier provider could be concern to financial sanctions in the form of fines in accordance with relevant provisions[11].

The implementation of the long phase agreement technique avenue protection gadget coverage on country wide street preservation the use of overall performance signs as a reference at some point of the implementation duration and maintenance period is some thing new that changed into not formerly carried out to the traditional road upkeep device technique. lengthy phase maintenance is asset management via carrying out upkeep, rehabilitation and reconstruction sports with the most effective and efficient prices acquired from improvements in production technology and procurement systems. the road maintenance sports can be visible inside the following parent.[12]



**Figure 1** Road Preservation Activities

### III. RESEARCH METHODOLOGY

This kind of studies is explanatory studies. The determination of the kind of explanatory studies is that explanatory studies is supposed to give an explanation for the position of the variables studied and the relationship among one variable and every other[1]. Explanatory studies, similarly to being a examine that highlights the relationship between research variables, also checks the previously formulated hypothesis, so this sort of studies can be referred to as speculation checking out studies. the primary purpose this researcher makes use of the explanatory research approach is to test the proposed hypothesis, so it is expected that this look at can give an explanation for the connection and have an impact on between the impartial and structured variables inside the hypothesis[13]. The observe place is on Jalan Nasional Ruas Bungku-Bahodopi-Batas Sultra, Morowali Regency, critical Sulawesi.



**Figure 2.** Research location

On this study, the writer narrows the population by means of calculating the pattern length the usage of the Slovin approach. This have a look at makes use of the Slovin formula due to the fact in sampling, the wide variety should be representative so that the studies results may be generalized and the calculation does no longer require a sample size table, but may be performed with a easy formula and calculation. The Slovin formula for figuring out the pattern is as follows:[14]

$$n = \frac{N}{1 + N(e)^2}$$

Description:

n = pattern size/wide variety of respondents

N = populace size

e = percentage of tolerance for sampling mistakes accuracy that may nonetheless be tolerated.

in the Slovin formulation there are the following provisions:

cost e = 0.1 (10%) for a massive population

fee e = zero.2 (20%) for a small populace

So the sample range that may be taken from the Solvin method is among 10-20% of the research population. The population in this examine turned into 111 human beings, so the percentage of tolerance used become 10% and the calculation consequences may be rounded to acquire suitability. with the intention to discover the research pattern, with the subsequent calculations:

$$n = 111 / (1 + 111 \cdot (0.1)^2)$$

$$n = 111 / (1 + 111 \cdot (0.01))$$

$$n = 111 / 2.111$$

$$n = 52.61$$

Based on the calculations above, the sample that have become respondents on this study grow to be adjusted to 52.sixty one in order that it changed into rounded up to 53 people or around 47.seventy five% of all

parties concerned in the street maintenance venture, this became executed to facilitate statistics processing and for higher check consequences. In figuring out those respondents, the researcher used a purposive sampling approach, especially sampling or purposive sampling respondents is a statistics supply sampling technique with certain issues. while the researcher's attention in choosing respondents in this take a look at became based on the following criteria. folks that recognise the achievements of undertaking implementation in phrases of effectiveness and efficiency, and understand the boundaries skilled in the course of implementation[15]

Multiple linear regression evaluation is a linear relationship between or more impartial variables with a structured variable. To show the fact of the have an effect on of unbiased variables and established variables, regression assessment is used in which the independent variables are work structures (X1), productiveness (X2), external factors (X3), human resources (X4), Occupational fitness and safety (K3) (X5), and price range availability (X6) on the effectiveness and efficiency of venture implementation (Y). The a couple of linear regression model is as follows

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + e$$

Description:

Y: Effectiveness and efficiency of project implementation

X1: Work system

X2: Productivity

X3: External factors

X4: Human resources

X5: Occupational Health and Safety (K3)

X6: Budget availability

a: Constant value

b (1, 2, 3, ...) : Regression coefficient value

e: Standard Error

Within the model improvement degree in multiple linear regression trying out, there is a hypothesis test to decide whether or not the regression version is feasible to use and whether or not the unbiased variables are good sized inside the version. The speculation tests used in a couple of linear regression testing are the F take a look at and the T check. The determination coefficient take a look at (R<sup>2</sup> take a look at) ambitions to degree the volume to which the impartial variables can provide an explanation for the variant of the established variable, each partly and concurrently.

The coefficient of willpower is used to test the goodness-match of the regression version. The price of this coefficient of willpower is between zero and one (0 method that the capability of the unbiased variables to provide an explanation for the variant of the based variable is very limited. but, if the price is close to one, then the impartial variables offer nearly al the information needed to predict the variation of the dependent variable. Multiple linear of linear regression analysis is an association analysis this is used concurrently to observe the impact of or more impartial variables on one established variable with an c language scale. The equation version for calculating a couple of linear regression is:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + \dots + b_nX_n + e$$

Description:

Y: Dependent or Bound Variable

X (1, 2, 3, ...): Independent or Free Variable

a: Constant value

b (1, 2, 3, ...): Regression coefficient value

e: Standard Error

Inside the model constructing stage in multiple linear regression testing, there is a speculation check to determine whether or not the regression version is possible to apply and whether the independent variables are big in the model. The hypothesis checks used in a couple of linear regression testing are the F check and the T check. This F check is used to determine whether or not the impartial variables considerably have an effect on the dependent variable collectively. In different phrases, to decide whether the regression model shaped is feasible to use or now not. The F take a look at in regression testing is often called the overall test. The multiple linear regression formula for the calculated F from this test is as follows:

Then the calculated F cost is as compared with the F take a look at desk price with ranges of freedom numerator = k-1 and denominator = n-ok (where ok = variety of impartial variables and n = variety of samples). The hypothesis of the version isn't appropriate to be used can be rejected if the calculated F value is more than the F table.

The partial take a look at objectives to determine whether or not the independent variables inside the

model fashioned affect the based variable partly. This check is accomplished for every unbiased variable in the model. The more than one linear regression formula to find the calculated t fee is stated as follows: Where  $b_i$  is the predicted value of the parameter  $B_i$  and  $se(b_i)$  is the usual errors of  $b_i$ . The hypothesis of the independent variable is not tremendous within the model can be rejected if the fee of  $|t_{hit}|$  is extra than the cost of the t table

#### IV. RESULT AND DISCUSSION'

The submitting creator is answerable for acquiring settlement of all coauthors and any consent required from sponsors before filing a paper. it's miles the obligation of the authors to quote applicable prior paintings. The effects of this look at have been obtained from statistics series thru the distribution of questionnaires with respondents who contributed to the implementation of the countrywide street mission in imperative Sulawesi Province, specially at the Bungku-Bahodopi-Southeast Sulawesi Border street phase. individuals who are at once involved within the making plans, implementation, and supervision of the assignment with a protracted section scheme. Validity testing is used to degree the validity of a questionnaire. A questionnaire will be stated to be legitimate if the questions on the questionnaire are capable to show some thing in order to be measured by the questionnaire, Ghozali (2018). The validity check in this look at makes use of the Pearson product moment correlation take a look at with the availability that the calculated r value > the table r value, then the query item is stated to be legitimate. The calculation is finished by evaluating the calculated r value with the desk r for degree of freedom ( $df = n - 2$ ), in this case n is the range of samples. on this take a look at, there have been 53 respondents as samples, so that the fee ( $df = 53 - 2$ ) became received, the r-desk price with df of 51 at a significance degree of zero.05 acquired an r-table price of zero.2706 (See Appendix four). The outcomes of the questionnaire validity test on the unbiased variables related to the elements that have an impact on the effectiveness and efficiency of creation undertaking implementation (X) can be visible within the following desk: table

**Table 1.** Recapitulation of Dependent Variable Validity Test (Y)

No Questionnaire	Indikator	Criteria t-Table	Pearson Correlation (r-Calculate)	Note
32	Y1	0,2706	.691	Valid
33	Y2	0,2706	.586	Valid
34	Y3	0,2706	.587	Valid
35	Y4	0,2706	.606	Valid
36	Y5	0,2706	.648	Valid
37	Y6	0,2706	.531	Valid
38	Y7	0,2706	.662	Valid

From Table 1. above, it can be seen that each statement item for the dependent variable (X) has a value of r-calculation (pearson correlation) greater than the r-table criterion of 0.2706. So it can be concluded that statistically each statement indicator for the variable is valid and suitable for use as research data.

The Reliability check is a measurement on this have a look at executed by using calculating the Cronbach alpha. A variable is stated to be reliable if it has a Cronbach alpha coefficient of extra than zero.60 The effects of the reliability take a look at are offered as follows:

**Table 2.** Recapitulation of Reliability Test Results

Variabel	Criteria	Cronbach Alpha	Description
Work system (X1)	0,60	0,719	Reliabel
Productivity (X2)	0,60	0,809	Reliabel
External Factors (X3)	0,60	0,799	Reliabel
Human Resources (X4)	0,60	0,815	Reliabel
Occupational Health and Safety (OHS) (X5)	0,70	0,828	Reliabel
Budget availability (X6)	0,70	0,817	Reliabel
Effectiveness and Efficiency of Project Implementation (Y)	0,70	0,749	Reliabel

In desk 2 it is able to be visible that the paintings device variable (X1) has a Cronbach's alpha price of zero.719, the productivity variable (X2) has a Cronbach's alpha cost of zero.809, the external factor variable (X3) has a Cronbach's alpha price of 0.799, the human sources variable (X4), has a Cronbach's alpha fee of 0.815, the Occupational fitness and protection (K3) variable (X5) has a Cronbach's alpha cost of zero.828, the price range

availability variable (X6) has a Cronbach's alpha cost of zero.817, and the effectiveness and performance of venture implementation variable (Y) has a Cronbach's alpha value of 0.749. The dependable price of all variables has a price greater than the Cronbach's alpha criterion price of zero.60, so it can be said that every one variables are dependable and suitable for use as research facts. Normality test is a take a look at performed with the intention of assessing the distribution of data in a collection of information or variables, whether the distribution of the facts is usually allotted or now not. on this have a look at, the normality take a look at uses the Kolmogorov-Sminorv take a look at, specifically if the importance indicates extra than zero.05, it manner it's far commonly allotted.

**Table 3** Results of Normality Test Using P-Plot Results of Normality Test with Kolmogorov-Smirnov Test

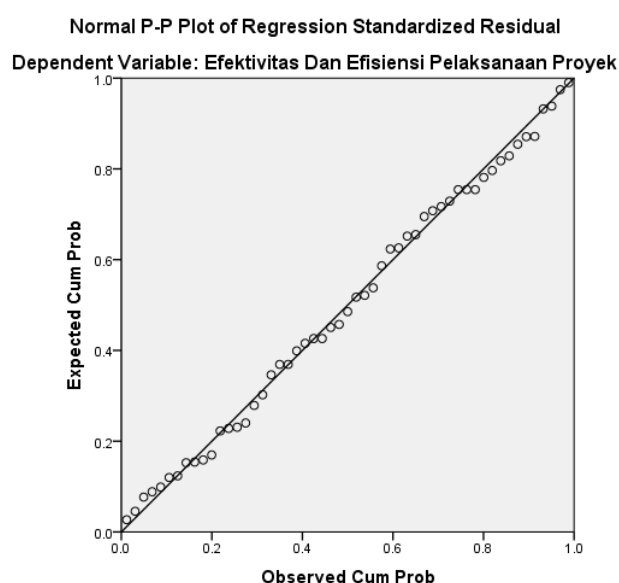
**One-Sample Kolmogorov-Smirnov Test**

		Unstandardized Residual
N		53
Normal Parameters <sup>a,b</sup>	Mean	,0000000
	Std. Deviation	,27831923
Most Extreme Differences	Absolute	,057
	Positive	,057
	Negative	-,046
Kolmogorov-Smirnov Z		,412
Asymp. Sig. (2-tailed)		,996

a. Test distribution is Normal.

b. Calculated from data.

in addition, one of the easiest methods to see the normality of the residuals is to observe the histogram graph that compares the statement records with a distribution that processes a normal distribution. A everyday distribution will form a diagonal line and the residual statistics plot might be compared to the diagonal line. If the residual facts distribution is normal, then the road that describes the real information will follow the diagonal line as in figure 3 below:



**Figure 3.** Results of Normality Test Using P-Plot

Based on the results of the normality test using the normal plot graph, it can be concluded that the normal plot graph shows that the points are spread around the diagonal line, and their distribution follows the normal line of this graph indicating that the regression model meets the assumption of normality. The Multicollinearity Test is used to determine whether or not there is a linear relationship between independent variables in the regression

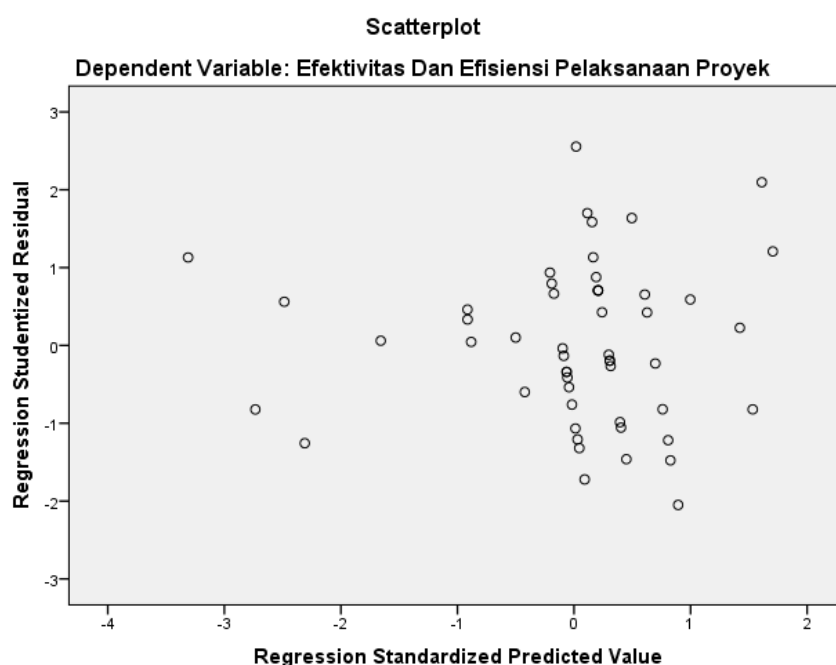
model (Ghozali, 2018). One way to determine whether or not there is multicollinearity in a regression model is to look at the tolerance and VIF (Variance Inflation Factor) values. If the tolerance value is  $> 0.1$  and  $VIF < 10$ , it can be interpreted that there is no multicollinearity in the study. The results of the multicollinearity test can be seen in the following table 4.4:

**Table 4.. Multicollinearity Test Results**

Coefficients <sup>a</sup>		
	Collinearity Statistics	
	Tolerance	VIF
1 (Constant)		
Work System	,197	8,339
Productivity	,108	9,218
External Factors	,250	7,875
Human Resources	,260	6,550
Occupational Health and Safety	,143	6,987
Budget Availability	,109	9,189

a. Dependent Variable: Effectiveness and Efficiency of Project Implementation

Heteroscedasticity testing is carried out to test whether in a regression model, there is inequality in the variance of the residuals from one observation to another (Ghozali, 2018). If the variance of the residuals from one observation to another remains constant, it is called homoscedasticity. Detection of the presence or absence of heteroscedasticity is carried out by looking at the presence or absence of a certain pattern in the scatterplot graph between SRESID and ZPRED, which is shown in the following figure:



**Figure 4.** Results of Heteroscedasticity Test Scatterplot Graph

The regression equation can be seen from the table of coefficient test consequences primarily based at the output of SPSS model 25 at the 6 independent variables, specifically paintings gadget (X1), productiveness (X2), external factors (X3), human resources (X4), Occupational health and safety (K3) (X5), and price range availability (X6) on the effectiveness and performance of assignment implementation (Y). the subsequent is a table of a couple of linear regression evaluation processed the usage of the SPSS 25 program software:

Based on the results of the a couple of linear regression analysis in table five above, the more than one regression equation version is acquired as follows:

$$Y = 9.236 + 0.143X_1 + 0.101X_2 + 0.259X_3 + 0.228X_4 + 0.140X_5 + 0.195X_6 + e$$

Description:

Y: Effectiveness and efficiency of project implementation

X1: Work system

X2: Productivity

X3: External factors

X4: Human resources

X5: Occupational Health and Safety (K3)

X6: Budget availability

e: Standard Error

The simultaneous test (F-Test) basically shows whether all the independent variables referred to in this study have a simultaneous (together) influence on the dependent variable (Ghozali, 2018). If the significant value of F is greater than  $\alpha$  0.05, then the independent variables have a simultaneous effect on the dependent variable. From the results of the F test, the following is obtained:

**Table 5.** Results of Simultaneous Hypothesis Testing  
ANOVA<sup>a</sup>

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	346,274	6	57,712	659,078	.000 <sup>b</sup>
Residual	4,028	46	,088		
Total	350,302	52			

a. Dependent Variable: Efektivitas Dan Efisiensi Pelaksanaan Proyek

Predictors: (Constant), Budget Availability, Occupational Health and Safety, Productivity, Work System, Human Resources, External Factors

From table 5 above, it can be seen that with a significant number of 0.000. So it can be concluded that the significant number of 0.000 is smaller than the significant level  $\alpha$  of 0.05. So it can be concluded that the first hypothesis is accepted. This means that the work system, productivity, external factors, human resources, Occupational Health and Safety (K3), and budget availability together (simultaneously) affect the effectiveness and efficiency of project implementation. Partial Test (t-Test) In the multiple linear test, the magnitude of the determination coefficient (R<sup>2</sup>) is also analyzed. The determination coefficient test in this study is used to see the magnitude of the influence of the independent variables (work system, productivity, external factors, human resources, occupational health and safety, budget availability) on the dependent variable, namely the effectiveness and efficiency of project implementation.

Based on Table 5, the determination coefficient value (R<sup>2</sup>) is 0.989. This shows that the independent variables used in this study can explain the variation in the effectiveness and efficiency of project implementation by 98%, while the remaining 2% is influenced by other factors not included in this regression model. Effectiveness and efficiency are critical in running a mission due to the fact as much as feasible the assignment should be completed on time with none extra costs in step with the price range plan that has been made. If the project may be finished earlier, it will enjoy fee financial savings and be greater efficient. This cost saving is what blessings the undertaking birthday party in addition to being efficient and additionally in phrases of the effectiveness of the paintings time. inside the production and infrastructure improvement industry, the lengthy section agreement scheme is more and more being used as an technique to growth mission effectiveness and efficiency. This scheme involves appointing one contractor or consortium to work on a big element (long section) of a venture, in assessment to the conventional technique where the undertaking is divided into several small work programs carried out by using various contractors. in addition, the lengthy segment scheme additionally has the potential .

A successful task is a undertaking that has effects which might be a good deal better than the estimates which can be typically observed in terms completion time, fees incurred, building nice, employee protection, controlled environmental impact, client pleasure, to the profitability received by way of all parties from the task. A a success venture is a project that is finished as expected, which means that the venture is capable of meet the effectiveness and efficiency, to gain this the mission has taken into consideration all task necessities, has sufficient sources to satisfy wishes in a timely manner. The definition of mission success has differences between researchers, this is due to the fact the view of success relies upon on the perspective chosen (Adelback and Johansson, 2013). The success of a construction mission is decided through many elements that have an effect on

the fulfillment in achieving its effectiveness and efficiency, as well as the implementation of the upkeep of the Bungku-Bahodopi-Border of Southeast Sulawesi national road using an extended segment settlement scheme, to acquire success is truly influenced by numerous factors, as researchers have stated inside the results of the examine via hypothesis checking out which suggests that paintings machine factors, productivity, outside elements, human resources, Occupational fitness and protection (K3), and finances availability simultaneously have a big impact on the effectiveness and performance of the implementation of the preservation of the Bungku-Bahodopi-Border of Southeast Sulawesi national avenue the use of an extended phase agreement scheme, where the consequences of the dedication coefficient test show that the importance of the influence given through the six variables on the effectiveness and efficiency of the implementation of the upkeep of the Bungku-Bahodopi-Border of Southeast Sulawesi country wide avenue is ninety eight%, at the same time as the last 2% is encouraged with the aid of different variables or factors not blanketed in this have a look at. authorities law is an component related to compliance with requirements, which includes technical rules (material specifications, avenue thickness, and implementation methods) should be complied with to ensure the first-rate of maintenance results, licensing and forms regarding sluggish or complicated licensing tactics can restrict undertaking progress, to budget and procurement wherein procurement regulations for goods/offerings (e-procurement, auctions) affect the velocity and quality of effective and green implementation.

Social and monetary situations relate to community participation, wherein neighborhood network support (for instance in phrases of land get admission to or labor) can speed up the work. monetary impact in which the undertaking should limit disruption to monetary activities round the road (which include distribution of goods and worker mobility). hard work availability of professional nearby human sources can growth cost and time performance. Availability of materials concerns the supply of substances, wherein the supply of substances which includes asphalt, crushed stone, and cement need to be maintained to keep away from delays in task work. on this component it also depends on distribution logistics, if the mission region is far off, the fee of transporting substances may be high and have an effect on the effectiveness and efficiency of the challenge. Then this component also concerns import dependence If sure materials ought to be imported, rate fluctuations and scarcity may be obstacles to accomplishing effective and efficient consequences.

Further to the supply of substances, different external factors are related to technological advances, inclusive of the use of contemporary heavy device, wherein the use of technology consisting of automatic asphalt machines or drones for monitoring can boom the rate and accuracy of labor. similarly, this component also concerns creation methods, wherein techniques which includes cold blend asphalt or soil stabilization can be used to hurry up upkeep in regions with extreme weather. other technological advances additionally issue task management structures, where software program along with building statistics Modeling (BIM) helps planning and supervision extra efficiently.

Different external elements issue weather situations, wherein high rainfall can disrupt paving work and motive puddles that damage road systems, in addition intense temperatures such as excessive warmth can have an effect on the nice of asphalt substances, while excessive humidity slows down drying, so maintenance have to be done in the course of the dry season to minimize climate disruptions.

Therefore, knowing the have an impact on of these external factors at the sustainability of the project that. The partial check outcomes show that the budget availability issue has a sizable effect on the effectiveness and efficiency of the implementation of the Bungku-Bahodopi-Batas Sultra road protection task. price range availability has a large effect at the effectiveness and efficiency of undertaking implementation. correct cost estimates and powerful cost management can improve undertaking efficiency, ensure greatest use of resources, and ultimately acquire mission dreams higher.

The availability of an good enough and consistent price range is very vital for the clean jogging of the assignment. If the price range is not available as needed, there may be delays in paintings due to lack of ability to pay for materials and hard work, decreased great of labor because of cost cutting within the middle of the challenge, and instability in the contractor's coins drift, which could disrupt operations.

Moreover, it's also critical to note that the use of historical statistics from comparable initiatives can improve making plans accuracy. The advantages are being able to estimate cloth and salary charges greater realistically, figuring out viable fee risks primarily based on previous enjoy, minimizing finances deviations because of more mature calculations,

Furthermore, timely bills substantially have an effect on contractor motivation and overall performance. The impacts of overdue payments include disruption of the contractor's cash waft which leads to delays in buying substances or paying wages, decreased productivity because of investment uncertainty, and may purpose struggle between contractors and subcontractors/providers. Therefore, so as for the Bungku-Bahodopi-Batas Sultra country wide street maintenance venture to run efficaciously and efficaciously, it calls for the provision of adequate and regular budget, budget making plans primarily based on ancient information and in-intensity analysis, sensible fee estimates with reserves for risk, and well timed payments from the proprietor to the contractor. therefore, the undertaking may be completed in step with goal with appropriate pleasant and avoid budget waste.

## V. CONCLUSION

Based totally on the research consequences that have been discussed in the previous bankruptcy, it could be concluded that venture implementation control which include paintings system elements, productivity, outside elements, human assets, Occupational health and protection (K3), and budget availability, each concurrently and partly, have a substantial effect at the effectiveness and performance of the implementation of upkeep of the Bungku-Bahodopi-Batas Sultra countrywide street segment using a protracted section agreement scheme.

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## REFERENCES

- [1] G. Santos, H. Behrendt, L. Maconi, T. Shirvani, and A. Teytelboym, "Part I: Externalities and economic policies in road transport," 2010. doi: 10.1016/j.retrec.2009.11.002.
- [2] T. M. Kamaludin, . N., H. Mallisa, and N. Ulmi Ulva, "Identification of Risk Factors Affecting Performance in the Implementation of the Reconstruction of the Lindu Lake Access Road, Indonesia," *Engineering and Technology Journal*, vol. 10, no. 05, May 2025, doi: 10.47191/etj/v10i05.59.
- [3] H. Huo, K. He, M. Wang, and Z. Yao, "Vehicle technologies, fuel-economy policies, and fuel-consumption rates of Chinese vehicles," *Energy Policy*, vol. 43, pp. 30–36, Apr. 2012, doi: 10.1016/j.enpol.2011.09.064.
- [4] O. Akinradewo, C. Aigbavboa, and O. Akinradewo, "Impact of Construction Project Planning on Contractor's Profit," in *IOP Conference Series: Earth and Environmental Science*, IOP Publishing Ltd, Nov. 2019. doi: 10.1088/1755-1315/385/1/012009.
- [5] S. Arifin and T. M. Kamaludin, "1. Ijce - Analysis Of Delay Factors Of Reconstruction And Rehabilitation Work Tompe-Inside Roads, Palu-Surumana City." [Online]. Available: [www.iaset.us](http://www.iaset.us)
- [6] A. I. Rifai, H. Thalib, D. Prayogo, and M. Isradi, "Customer Satisfaction and Road Performance in Long Segment Maintenance Contract: Application of an Urban Road Network," 2022.
- [7] G. Leduc, "Road Traffic Data: Collection Methods and Applications." [Online]. Available: <http://www.jrc.ec.europa.eu/>
- [8] "UCSF UC San Francisco Previously Published Works Title Effectiveness of Quality Management System (QMS) on Construction Projects", doi: 10.5281/zenodo.290272.
- [9] N. Jain et al., "Design, Implementation, and Evaluation of the Linear Road Benchmark on the Stream Processing Core," 2006.
- [10] A. A. Abouarab, H. H. Elsayed, H. Elkhayat, A. Mostafa, D. C. Cleveland, and A. El Nori, "Current solutions for long-segment tracheal reconstruction," 2017, Japanese Association for Coronary Artery Surgery. doi: 10.5761/atcs.ra.16-00251.
- [11] A. Bayram, M. Larson, H. Hanson, and C. Carr, "A New Formula For Total Longshore Transport Rate," *World Scientific Pub Co Pte Lt*, Apr. 2007, pp. 3357–3369. doi: 10.1142/9789812709554\_0283.
- [12] A. Widyantya, A. Setyawan, and F. P. Pramesti, "Effectiveness of Longsegment Contract Method on the Road Rehabilitation and Maintenance System," in *Journal of Physics: Conference Series*, IOP Publishing Ltd, Jun. 2021. doi: 10.1088/1742-6596/1912/1/012056.
- [13] P. Sampaio, P. Saraiva, and A. G. Rodrigues, "The economic impact of quality management systems in Portuguese certified companies: Empirical evidence," *International Journal of Quality and Reliability Management*, vol. 28, no. 9, pp. 929–950, Oct. 2011. doi: 10.1108/02656711111172522.
- [14] J. A. Durlak and E. P. DuPre, "Implementation matters: A review of research on the influence of implementation on program outcomes and the factors affecting implementation," *Am J Community Psychol*, vol. 41, no. 3–4, pp. 327–350, Jun. 2008, doi: 10.1007/s10464-008-9165-0.
- [15] H. Fitrianti, J. Ekonomi Pembangunan, F. Ekonomi, and U. Negeri Semarang, "Economics Development Analysis Journal Strategi Pengembangan Desa Wisata Talun Melalui Model Pemberdayaan Masyarakat," *EDAJ*, vol. 204, no. 1, 2014, [Online]. Available: <http://journal.unnes.ac.id/sju/index.php/edaj>
- [16] M. K. Rifqi, M. Parlindungan, and S. Siallagan, "Prioritization of Trans-Sumatra Toll Road Segment Phase II Using The Analytical Hierarchy Process," *Jurnal Impresi Indonesia*, doi: 10.58344/jii.v4i6.6621.
- [17] A. R. Khan and S. Khandaker, "A critical insight into policy implementation and implementation performance," *Public Policy Adm*, vol. 15, no. 4, pp. 538–548, 2016, doi: 10.13165/VPA-16-15-4-02.
- [18] M. Lima, C. Coelho, and F. Jesus, "Wave Overtopping and Flooding Costs in the Pre-Design of Longitudinal Revetments," *Water (Switzerland)*, vol. 15, no. 7, Apr. 2023, doi: 10.3390/w15071434.
- [19] D. Kim, H. S. Oh, and G. Choi, "EPT: An R package for ensemble patch transform," *SoftwareX*, vol. 14, Jun. 2021, doi: 10.1016/j.softx.2021.100704.
- [20] M. J. Sirois, A. Lavoie, and C. E. Dionne, "Impact of Transfer Delays to Rehabilitation in Patients with Severe Trauma," *Arch Phys Med Rehabil*, vol. 85, no. 2, pp. 184–191, 2004, doi: 10.1016/j.apmr.2003.06.009.
- [21] P.- Perawang, A. Chandra, G. Yanti, and S. W. Megasari, "Andre, Analisis Daya Dukung Pondasi Bored Pile pada Proyek Pembangunan Menara Listrik Transmisi 500 KV Analisis Daya Dukung Pondasi Bored Pile pada Proyek Pembangunan Menara Listrik Transmisi 500 KV Peranap-Perawang," 2018.
- [22] A. A. Fashina, M. A. Omar, A. A. Sheikh, and F. F. Fakunle, "Exploring the significant factors that influence delays in construction projects in Hargeisa," *Heliyon*, vol. 7, no. 4, Apr. 2021, doi: 10.1016/j.heliyon.2021.e06826.
- [23] M. Singh Bhatia and A. Awasthi, "Investigating Effectiveness of Quality Management Systems," 2014. [Online]. Available: <https://www.researchgate.net/publication/275656904>
- [24] Q. P. Zhong, H. Tang, and W. Zhou, "Analyzing the influence factors of the post-earthquake reconstruction project using fuzzy Dematel," *Journal of Asian Architecture and Building Engineering*, vol. 23, no. 3, pp. 1050–1062, 2024, doi: 10.1080/13467581.2023.2257265.
- [25] D. Maditinos, D. Chatzoudes, and C. Tsairidis, "Factors affecting ERP system implementation effectiveness," *Journal of Enterprise Information Management*, vol. 25, no. 1, pp. 60–78, Dec. 2011, doi: 10.1108/17410391211192161.
- [26] S. Narayan et al., "The effectiveness, costs and coastal protection benefits of natural and nature-based defences," *PLoS One*, vol. 11, no. 5, May 2016, doi: 10.1371/journal.pone.0154735.