

# THE EFFECT OF PREVENTION ASPECTS, ASSESSMENT ASPECTS, INTERNAL FAILURE ASPECTS, AND EXTERNAL FAILURE ASPECTS ON THE BENEFITS OF CONSTRUCTION COMPANY PROJECTS

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## ABSTRACT

Several construction projects of PT. Wijaya Karya (Persero) Tbk. experienced many records of product deviations that required repairs to be accepted by the employer. Quality costs (prevention costs, costs, internal failure costs, and external failures) planned by project management are still low on average 1% - 2%. The decline in profit in the last 3 years, namely from 2019 to 2021, is very likely due to the cost of repairs due to poor quality. This study aims to determine the effect of prevention, appraisal, internal failure, and external failure costs on the profitability of construction company projects. The population of this research is construction company employees who have managerial positions, with a total sample of 50 people. The analytical method used in this research is multiple linear regression analysis using the SPSS computer program. The results of the study found that prevention costs, appraisal costs, internal failure costs, and external failure costs had an effect both individually and simultaneously on the profitability of construction company projects.

## INTRODUCTION

In carrying out its work, the contractor refers to the technical specifications and technical drawings provided by the employer (Clough et al., 2015). However, the fact is that there are still frequent improvements from the results of the work that has been done, for example, after the concrete casting work is completed, but within a few days it looks like a crack on the concrete, then it must be repaired in the way agreed with the employer.

In making a budget plan for construction costs, each quality of the stages of work refers to the technical specifications issued by the employer (Swantari & Habibie, 2015). The most significant is uncertainty regarding the expected duration and cost of project activities (Eldosouky et al., 2014). This means that the contractor has considered the quality costs to meet the required quality standards of work results.

One of the important parameters in project control is the costs, especially those related to quality costs (Wicaksono & Sunarko, 2019). The cost of quality can be interpreted as (1) prevention costs are costs associated with conformance to prevent product damage, (2)

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assessment costs are costs associated with conformance to determine whether a product complies with quality requirements, (3) internal failure costs are costs associated with errors and nonconformance that occur at the time of working on the product or before it is handed over to the customer, and (4) external failure costs are costs associated with errors and nonconformance that occur at the time the product is already handed over to the customer (Rizka, 2019).

Increasing product quality can certainly reduce the rate of return of returned products from customers so it will therefore have an impact on reducing warranty and repair costs (Mulyana, 2020). Increasing product quality can also reduce production costs through the reduction or elimination of internal failure costs which have the largest share compared to assessment and prevention costs in production costs (Balouchi et al., 2019). Quality products will lead to low inventory in the warehouse, be it the inventory of raw materials, spare parts, and finished products (Ditkaew, 2018). Because the company can work on the production process according to a predetermined schedule, inventory turnover becomes smoother and of course, profit revenue will be realized more quickly.

An increase in sales usually occurs as the speed at which companies respond, an increase or decrease in selling prices, and an increase in their reputation for a quality product (Muchram et al., 2019). Similarly, quality improvements can lower costs as companies increase productivity and lower rework, scraps, and warranty costs.

**Table 1**  
**Related Previous Study**

| No | Researcher's Name and Years  | Research Title  | Research Methods | Research Variables   | Research Results  |
|----|------------------------------|---|------------------|--|---|
| 1  | (Shrouy & Tiwari, 2017)      | Analysis of Cost of Poor Quality(COPQ) and its Calculation: Steel Industri, 2017  | Quantitative     | Cost of poor quality and calculation of COPQ   | Three main criteria for account COPQ i.e. Mapping products, processes, and cost   |
| 2  | (Owusu, 2020)                | Assessment of Cost of Qualityand its Effects on Manufacturing Performance:A Case Studyof Special Ice Company Limited, Ghana | Qualitative      | Cost of quality (X), manufacturing performance (Y)   | The cost of quality elements such as external failure costs has a variable significant impact on the performance of manufacturing enterprises |
| 3  | (Dinaroe et al., 2018)       | Cost of Quality Analysis of Tailor's Industry in Aceh   | Qualitative      | Cost of quality  | Not all quality costs are carried out at industrial tailor companies in Aceh  |
| 4  | (Fujianugrah & Annisa, 2020) | Effect of Prevention Cost and Appraisal Coston Sales Growth   | Quantitative     | Independent variables: prevention costs and valuation costs, dependent variables: sales growth | Variable cost prevention and valuation costs partially and simultaneously affect sales growth   |
| 5  | (Tresnawati et al., 2017)    | The Effect of Efficiency and Quality Coston Profitability   | Quantitative     | Independent variables: quality cost efficiency, dependent variables: profitability             | The cost of quality has a significant effect on the level of profitability  |

**Table 2**  
**Work quality standards**

| No | Project   | Identity   | Period      | %               |                 |                       |                       | Total |
|----|---|------------|-------------|-----------------|-----------------|-----------------------|-----------------------|-------|
|    |   |            |             | Prevention cost | Assessment cost | Internal failure cost | External failure cost |       |
| 1  | Accessibility dan Ducting Utility BSH             | Access     | 2015 - 2016 | 0,08%           | 0,37%           | 0,35%                 | 0,35%                 | 1,15% |
| 2  | Structure of Automated People Mover System (APMS) | APMS       | 2016 - 2018 | 0,32%           | 0,78%           | 0,57%                 | 0,57%                 | 2,23% |
| 3  | Extension and widening of Banyuwangi Airport      | Banyuwangi | 2018 - 2019 | 0,73%           | 0,90%           | 0,54%                 | 0,54%                 | 2,71% |
| 4  | Construction of Bogor toll road gates             | GTBG       | 2018 - 2020 | 0,38%           | 0,13%           | 0,74%                 | 0,53%                 | 1,78% |
| 5  | Accessibility of BSH                              | Access     | 2020 - 2021 | 0,20%           | 0,38%           | 1,12%                 | 0,34%                 | 2,03% |

Based on the Table 2, there is a percentage of Prevention Costs, Assessment Costs, Internal Failure Costs, and External Failure Costs against the total value of projects whose value is not too large. From the description above, the author is interested in examining the effect of quality cost variables on the profit of construction company projects with the title "The Effect of Prevention Costs, Assessment Costs, Internal Failure Costs, and External Failure Costs on the Profitability of Construction Company Projects".

The objectives of this study are: (1) to find out the effect of preventive costs on the profitability of construction company projects, (2) to find out the effect of the cost of the assessment on the profitability of the construction company's project, (3) to find out the effect of internal failure costs on the profitability of construction company projects, (4) to find out the influence of external failure costs on the profitability of construction company projects, and (4) to find out the effect of prevention cost, assessment cost, internal failure cost, and external failure cost together on the profitability of construction company projects.

## METHOD

Quantitative methods and statistical analysis were applied for this research (Creswell, 2017). The population in this study were employees assigned to the construction company PT. Wijaya Karya (Persero) Tbk. The number of variables in this study is 5 (4 independent variables and 1 dependent variable), then the total sample is at least  $5 \times 10 = 50$ . In this study, the authors took the number of samples adjusting the number of employees placed in the project at least 50 people. The group that the authors took in this study were employees of construction companies placed in projects that occupied managerial positions.

In this study, the authors used questionnaires to obtain data related to the thoughts, feelings, attitudes, beliefs, values, perceptions, personalities, and behaviors of the respondents. The measurement scale uses the Likert Scale and is made in the form of a checklist, where respondents are asked to determine one of the five answer choices as follows:

- SS = Strongly Agree                      Given score 5
- S = Agree                                      Given score 4
- RG = Hesitantly                              Given score 3

- TS = Disagree    Given Score 2
- STS = Strongly Disagree    Given Score 1

The analysis method used in this study is multiple regression linear analysis with the following formula:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 \dots\dots\dots (3.1)$$

- Y = Profitability
- a = Constant
- b<sub>1</sub> – b<sub>4</sub> = regression coefficient
- X<sub>1</sub> = Prevention costs
- X<sub>2</sub> = Assessment fee
- X<sub>3</sub> = Internal failure costs
- X<sub>4</sub> = External failure costs

For the correlation test using the formula 4 predictors as follows:

$$R_{y(1,2,3)} = \frac{b_1\sum X_1Y + b_2\sum X_2Y + b_3\sum X_3Y + b_4\sum X_4Y}{\sum Y^2} \dots\dots\dots (3.2)$$

Determination Coefficient = R<sup>2</sup>

$$F = \frac{R^2 (N - m - 1)}{m (1 - R^2)} \dots\dots\dots (3.3)$$

m = predictors number

Calculations of regression analysis, correlation test, and significance test will be carried out using the SPSS computer program.

## RESULTS AND DISCUSSION

Descriptive statistical tests are used to analyze data by describing the data that has been collected from respondents, as it is without intending to make generally accepted conclusions. The data used for descriptive analysis in this study are variables of prevention costs, assessment costs, internal failure costs, external failure costs, and profitability. Based on 50 questionnaires that have been filled out by respondents, the following results can be obtained:

**Table 3**  
**Variable cost data analysis**

| Variable               | Total | Min-Max | Mean      | Median | Deviation standard | 95% CI Mean     |
|------------------------|-------|---------|-----------|--------|--------------------|-----------------|
| Prevention Costs       | 50    | 15-30   | 27,<br>82 | 29     | 2,8<br>26          | 27,02-<br>28,62 |
| Assessment Costs       | 50    | 20-35   | 31,<br>50 | 32     | 3,1<br>90          | 30,59-<br>32,41 |
| Internal Failure Costs | 50    | 21-44   | 36,<br>62 | 37     | 4,8<br>61          | 35,24-<br>38,00 |
| External Failure Costs | 50    | 14-30   | 22,<br>90 | 22     | 3,8<br>61          | 21,80-<br>24,00 |
| Profitability          | 50    | 12-30   | 27,<br>28 | 28     | 3,4<br>11          | 26,31-<br>28,25 |

Based on Table 3 the description of the variable can be described as follows:

- a) The average respondent score for the Preventive Cost variable was 27.82. With a standard deviation of 2,826 and a Confidence Interval (CI) of 95%, it is believed that the average score on the Preventive Cost variable is at an interval of 27.02 – 28.62.
- b) The average respondent's score for the Cost of Assessment variable was 31.50. With a standard deviation of 3,190 and a Confidence Interval (CI) of 95%, it is believed that the average score on the Variable Cost of Assessment is at an interval of 30.59 – 32.41.
- c) The average respondent score for the Internal Cost of Failure variable was 36.62. With a standard deviation of 4,861 and a Confidence Interval (CI) of 95%, it is believed that the average score on the Internal Failure Cost variable is at an interval of 35.24 – 38.00.
- d) The average respondent's score for the External Failure Cost variable was 22.29. With a standard deviation of 3,861 and a Confidence Interval (CI) of 95%, it is believed that the average score on the External Failure Cost variable is at an interval of 21.80 – 24.00.
- e) The average respondent score for the Profitability variable was 27.28. With a standard deviation of 3,411 and a Confidence Interval (CI) of 95%, it is believed that the average score on the Profitability variable is at an interval of 26.31 – 28.25.

Based on the results of the analysis using SPSS, the researcher will then discuss the analysis that has been carried out. This study was conducted to determine the effect of prevention costs, assessment costs, internal failure costs, and external failure costs on the profitability of construction company projects. To find out its effect, a hypothesis test is carried out, including the following:

1) First hypothesis testing (H1)

It is known that the calculated t value for the (partial) effect of X1 on Y is  $3.064 > 1.679$  or the Sig value of  $0.004 < 0.05$ , so it can be concluded that H1 is accepted and H0 is rejected which means there is a positive and significant influence of Prevention Costs (X1) on Profitability (Y).

2) Second hypothesis testing (H2)

It is known that the calculated t value for the (partial) effect of X2 on Y is  $2.706 > 1.679$  or the Sig value of  $0.010 < 0.05$ , so it can be concluded that H2 is accepted and H0 is rejected which means that there is a positive and significant influence of Valuation Cost (X2) on Profitability (Y).

3) Third hypothesis testing (H3)

It is known that the calculated t value for the (partial) effect of X3 on Y is  $2.070 > 1.679$  or the Sig value of  $0.044 < 0.05$ , so it can be concluded that H3 is accepted and H0 is rejected which means there is a positive and significant influence of Internal Failure Cost (X3) on Profitability (Y).

4) Fourth hypothesis testing (H4)

It is known that the calculated t value for the (partial) effect of X4 on Y is  $2.028 > 1.679$  or the Sig value of  $0.049 < 0.05$ , so it can be concluded that H4 is accepted and H0 is

rejected which means that there is a positive and significant influence of External Failure Costs (X4) on Profitability (Y).

5) Fifth hypothesis testing (H5)

It is known that the calculated F value for the effect of (Simultaneous) X1, X2, X3, and X4 on Y is  $24.344 > 2.574$  or a significant  $0.000 < 0.05$ , so it can be concluded that H5 is accepted and H0 is rejected which means there is a positive and significant influence of Prevention Failure Cost (X1), Assessment Cost (X2), Internal Failure Cost (X3) and External Failure Cost (X4) simultaneously (together) on Profitability (Y).

## CONCLUSION

Based on the results of the research that has been discussed, prevention Costs have a positive and significant effect on the profitability of construction company projects, meaning that the better the prevention cost budget, the better the profit obtained by construction company projects

Cost Assessment has a positive and significant effect on the profitability of construction company projects, meaning that the better the prevention cost budget, the better the profit obtained by construction company projects.

Internal Failure Costs have a positive and significant effect on the profitability of construction company projects, meaning that the better the internal failure cost budget, the better the profit obtained by construction company projects.

External Failure Costs have a positive and significant effect on the profitability of construction company projects, meaning that the better the external failure cost budget, the better the profit obtained by the construction company's projects.

Prevention Costs, Assessment Costs, Internal Failure Costs, and External Failure Costs simultaneously (together) have a positive effect and are significant to the profitability of construction company projects, and the magnitude of the influence is indicated by the value of R Square of 68.4 %.

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