Analysis of Policy Barriers to the Implementation of Local Content Requirement in Construction Projects in Indonesia

Firmansyah
Department of Civil Engineering, Hasanuddin University, Gowa 92171, Indonesia
firman_d5@yahoo.com

Rosmariani Arifuddin
Department of Civil Engineering, Hasanuddin University, Gowa 92171, Indonesia
rosmarianiarifuddin@unhas.ac.id (corresponding author)

Syarif Burhanuddin
Department of Civil Engineering, Hasanuddin University, Gowa 92171, Indonesia
syarifbur9@gmail.com

Received: 26 September 2025 | Revised: 1 November 2025 | Accepted: 11 November 2025

ABSTRACT

This study assesses the application of Local Content Requirement (LCR) in building construction projects, analyzes the contribution of LCR components (materials, labor, and equipment) to the total LCR value using regression analysis, and identifies obstacles in carrying out the policy. The research focuses on building construction projects, utilizing processed data sourced from 24 building construction project documents from 2022 to 2024. The results show a level of commitment and realization, with an average achievement of 64.67%. This LCR value exceeds the minimum regulatory requirement of 40%, indicating compliance with government standards. However, it is still below the aspirational target of 100% LCR, suggesting significant potential for increasing the proportion of fully local components. Although there were fluctuations, the LCR achievement ratio has shown a consistent upward trend. Furthermore, regression analysis demonstrates that the LCR value of materials has a significant positive effect on the total LCR value, whereas the LCR values of labor and equipment have negative effects that are not statistically significant. This negative relationship does not indicate reduced local utilization but rather reflects the smaller financial proportion of local labor and equipment compared to material costs, which dominate total project expenditures. Meanwhile, the results of the Relative Importance Index (*RII*) analysis show that significant factors hindering the implementation of LCR include: (i) dependence on a single LCR-certified vendor, which increases procurement costs (*RII* = 0.829); (ii) delays in budget disbursement from the client, which affect the procurement schedule (*RII* = 0.826); and (iii) locally manufactured heavy equipment that meets LCR requirements but is difficult to obtain (*RII* = 0.774). The research findings indicate that policy interventions should prioritize strengthening the domestic supply ecosystem, diversifying vendors, streamlining procedures, and fostering partnerships between public agencies and local manufacturers to enhance the sustainability and effectiveness of LCR implementation in Indonesia's construction sector.

Keywords-construction projects; building; Indonesia

I. INTRODUCTION

The construction sector plays a vital role in national development in several developing countries [1]. Similarly, in Indonesia, the construction sector contributed 10.43% to Indonesia's Gross Domestic Product (GDP) in 2024 [2]. In addition to building infrastructure, the construction sector has a strong multiplier effect and backward linkage, especially with the industrial sector, thereby driving overall economic growth [3]. In line with this, research in other developing countries, such as Turkey, shows that construction has a powerful backward linkage, providing a significant stimulus effect on upstream sectors such as manufacturing and logistics [4].

In the global context, the downward trend in international trade tariffs has prompted many countries to adopt non-tariff policies, one of which is the LCR, as an instrument to protect domestic industries [5]. For example, in Nigeria, the implementation of LCR policies in the extractive sector has shown progress in promoting local participation and industrial growth, although challenges remain in capacity building and regulatory enforcement [6]. Similarly, a study of Brazil's oil industry highlights that political and industrial capacity factors significantly affect the effectiveness of local content policy [7]. In Ghana, LCR in the upstream petroleum sector promotes local supplier participation, technology transfer, and skill development through regulatory oversight and collaborative engagements between foreign and local firms; though, in-country spending mandates have limited impact [8]. The main objective of the LCR policy is to encourage manufacturing processes to be carried out domestically in certain parts of the value chain, either through the obligation to use local components in minimum quantities (based on weight), complete localization of certain components, or by requiring the use of local labor [9].

Similarly, the Indonesian government implements LCR policies in various sectors through Presidential Regulation Number 12 of 2021, concerning the Procurement of Government Goods/Services. Furthermore, the policy of Presidential Regulation Number 12 of 2021 aims to reduce dependence on imported products and strengthen the local industry. In Presidential Regulation Number 12 of 2021, it has been regulated through Article 66, paragraph (2) that construction projects funded by the government are obliged to use domestic products if products that have a sum of LCR value and Company Benefit Weight (BMP) of at least 40% are available [10].

In Indonesia, the LCR is defined as the amount of domestic content in goods, services, or a combination of goods and services used in a production activity or project [11]. The main components that are taken into account in the LCR value include the use of local materials, the involvement of domestic labor, and the use of production equipment or machinery originating from within the country. These three components together determine the amount of local contribution reflected in a product or service, and form the basis for calculating LCR certification as regulated in national regulations [12, 13].

In practice, LCR is applied in the construction sector with an emphasis on the use of local materials in its calculation. Previous research has shown that the utilization of local aggregates, such as Senoni stone and Mahakam sand from East Kalimantan, not only supports the achievement of LCR values but also contributes to reducing environmental footprints and supporting sustainable construction practices [14]. However, its adoption in the field still faces challenges, such as local LCR-certified products that have not fully met quality standards and certification processes that take a long time and incur high costs [15].

The successful implementation of the LCR policy depends not only on regulations, but also on the effectiveness of the integration of the construction material supply chain. This allows companies to be more responsive to the market despite the conflict of interest between stakeholders, where the use of sustainable materials plays a vital role as a mediator in improving industrial performance. Moreover, construction waste management can be a source of additional profits, so that the integration of supply chains, including customers, suppliers, internal organizations, and information, will increase the contribution of the construction sector to national GDP [16].

International studies show that the success of sustainable supply chain integration is strongly influenced by collaboration between stakeholders, the availability of material environmental impact information, the consistent implementation of government standards, and incentives for construction companies to use environmentally friendly and locally standard materials that encourage widespread adoption. So, LCR successful implementation requires a strategic approach with an emphasis on material supply chain integration locally [17].

Research in New Zealand identified barriers to supply chain integration in the manufacturing of prefabricated elements. These involved a lack of collaboration between manufacturers and construction actors, narrow project focus, and weak long-term relationships. Hence, the proposed barriers and enablers framework can also be applied to traditional construction to overcome these barriers and accelerate the achievement of local material use targets [18].

In addition, material management practices, such as procurement, stock and waste control, as well as material handling, have a significant impact on the performance of construction projects. Reliable procurement prevents costly delays, stock control minimizes material shortages and surpluses, and efficient handling increases productivity and reduces work accidents. Although more internally controlled material planning and logistics contribute less, improved material management still has the potential to increase efficiency, profitability, and competitiveness. especially in developing countries with construction challenges [19].

Several construction projects in Indonesia managed to achieve a high LCR. These entailed a house renovation project in Sikka Regency achieving an LCR value of 70.4%, a multi-storey building project in Surabaya recording an LCR value of 67.08%, and a road construction project in Denpasar recording an LCR of 63.71%, exceeding the minimum target and showing a real contribution to the local industry and regional workforce [20–22]. This success demonstrates that achieving high LCR is possible if projects are well-planned and supported by local resources.

However, not all projects show similar achievements; a stadium project in Jakarta only achieved an LCR of 55.8%, below the target of 60%, due to limited domestic industrial capacity and inefficient certification processes [23]. Regarding the road project on Simeulue Island, the LCR value for labor and materials is high, but for equipment, it is only 47.77% because it still depends on imported products [24]. Obstacles to LCR implementation do not only come from providers, but also from procurement systems that have not been fully integrated with LCR certification data. Furthermore, carrying out LCR in construction projects is constrained by the supervision and reporting process [25, 26].

Meanwhile, policy challenges related to LCR are not only encountered in the building construction sector but also in other sectors such as renewable energy and oil and gas. Previous studies have reported obstacles in these fields, including limited domestic industrial capacity, dependence on imported components, and weak supervision and policy enforcement, all of which can hinder the achievement of local development goals [27]. Although the focus of the study is on building projects, similar obstacles can be found in the construction sector of power plant buildings, particularly related to the process of certifying local products and integrating data in government procurement systems [12]. In addition, the successful implementation of the LCR policy is highly dependent on the institutional capacity that supports the labor certification process in the construction sector. The latest study reveals that five significant obstacles are: lack of policy incentives that can motivate the implementation of certification, lack of harmonious and consistent regulations, lack of synchronization between government policies and certification implementers, limited number of competent professionals in certification institutions, and low levels of literacy and technological readiness in the field [28].

Referring to the phenomenon of LCR policy adoption in construction projects in Indonesia, this study was developed with the following objectives: (i) to assess the application of LCR in building construction projects, (ii) to analyze the contribution of LCR components (materials, labor, and equipment) to the total LCR value using regression analysis, and (iii) to identify and rank factors that hinder the policy's execution through *RII* analysis. The research focuses on building projects carried out by government construction services companies. The results of this study provide valuable guidance to stakeholders by evaluating the improvement of LCR policies and the increase in the use of domestic products in the construction sector in Indonesia.

II. RESEARCH DATA AND FRAMEWORK

A. Research Framework

Figure 1 illustrates the research framework and the systematic stages undertaken in this study.

B. Types and Data Collection

Secondary data are data that were initially collected for other purposes; however, they can be repurposed to support different research goals [29]. This study utilizes secondary data obtained from internal project documents at the construction services company PT Nindya Karya, which covers 24 building projects funded by the government and completed between 2022 and 2024. The project document data obtained include: (i) contract value data, (ii) LCR commitment value data, (iii) material LCR component data, (iv) labor LCR component data, and (v) equipment LCR component data. Information at the project level is obtained through the official LCR reporting form, which is provided internally by PT Nindya Karya. The form contains detailed data on the value of LCR commitments, LCR realization, and proportional contributions from three main components: materials, labor, and equipment.

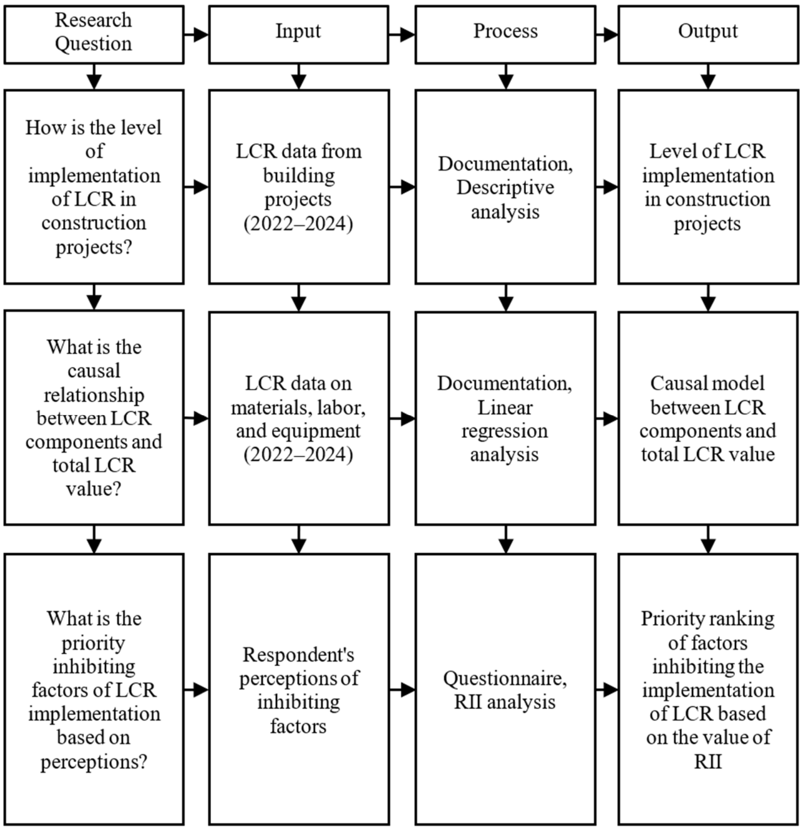

Fig. 1. Research flow framework.

Project selection is based on the completeness and consistency of the available documentation to ensure the reliability of the data. The latter serve as the basis for descriptive analysis and linear regression analysis, which aim to evaluate the performance of LCR implementation in the national building construction sector.

Additionally, primary data were collected through the distribution of questionnaires to respondents who had direct knowledge and involvement in the implementation of PT Nindya Karya's construction project. The questionnaire aims to measure factors that affect the execution of LCR, including regulations, the availability of domestic materials, the role of project management, and company policies.

C. Research Variables

A variable is a characteristic or attribute of an individual or organization that can be measured or observed and varies among the people or organizations studied [30]. The variables in this study are categorized based on the three analysis approaches used, namely descriptive analysis, linear regression analysis, and *RII* analysis. All variables were taken from project data related to the implementation of the LCR policy in 24 building projects during the period 2022-2024.

1) Variables for Annual Descriptive Analysis

Descriptive analysis was employed to examine annual trends in LCR implementation, including commitments, realizations, achievements, and contributions of each LCR component. The details of the observed variables are presented in Table I. The variables are expressed as percentages, enabling consistent comparison across years. The contribution of each component is calculated based on the ratio of its local value to the total budget of all components.

2) Variables for Linear Regression Analysis

This approach is used to analyze the influence of the LCR value on each of the main components in a construction project, specifically materials, labor, and equipment, on the total LCR value within a single construction project. The details of the observed variables are displayed in Table II; the variables are expressed in Rupiah (IDR) units and are sourced from verified project documents.

The three main components — materials, labor, and equipment — are considered independent variables in the linear regression model because each makes an essential and complementary contribution to achieving the LCR value of a construction project. Materials play a significant role as they are one of the largest cost components in a project, and efficient use of local materials can help reduce overall construction costs [31]. On the other hand, labor is a crucial factor because its quality and availability greatly determine the smoothness and quality of project implementation, while construction equipment plays an important role in supporting the effectiveness of work in the field through the use of domestic production tools, which also contribute to the value of LCR and operational efficiency [32].

TABLE I. LCR PERFORMANCE INDICATORS FOR ANNUAL DESCRIPTIVE ANALYSIS

Variable	Description
Year of implementation	Year of project implementation (2022-2024)
LCR commitment (%)	The value of the planned LCR commitment as a percentage of the total value of the project
LCR realization (%)	The actual value of LCR in percentage form
LCR achievement (%)	The ratio between the value of realization and the commitment of LCR, expressed as a percentage
Material LCR contribution (%)	Percentage of the value of local materials to the total project material budget
Labor LCR contribution (%)	The percentage of the value of local labor services to the total labor cost of the project
Equipment LCR contribution (%)	Percentage of the value of domestic production equipment usage to the total project equipment budget

TABLE II. LINEAR REGRESSION MODEL SUMMARY

Variable	Description
Material LCR value (IDR)	Local content values of material components
Labor LCR value (IDR)	Local content values of the labor components
Equipment LCR value (IDR)	Local content values of equipment components
Total value of LCR (IDR)	The total local content value of all components in the project (as a dependent variable)

All monetary values are expressed in Indonesian Rupiah (IDR). For reference, they can be converted to U.S. Dollars (USD) using an average exchange rate of 1 USD = 15,500 IDR.

3) Variables for RII Analysis

This approach is used to rank the factors that hinder LCR execution. In the context of inhibiting factor analysis, these variables are measured using specific indicators and analyzed with *RII*. Details of the observed variables are outlined in Table III.

D. Data Analysis

1) Descriptive Analysis

This approach is used to compare the performance of LCR policy implementation in construction projects for the years 2022, 2023, and 2024. The analysis focuses on percentage-based indicators, including LCR commitment (%), LCR realization (%), and LCR achievement (%), as well as the proportional contribution of each component: materials, labor, and equipment. The purpose of this analysis is to identify emerging trends, determine the most dominant components, and evaluate year-to-year variations in LCR achievement. The results of this evaluation provide an overview of the consistency and effectiveness of integrating domestic components into the project over time.

2) Linear Regression Analysis

This approach is used to analyze the influence of LCR implementation on each component's contribution to the total LCR value in a project. Multiple linear regression models are used with financial data in Rupiah (IDR), including LCR values for materials, labor, and equipment as independent variables. This model aims to determine whether the contribution of these components has a significant impact on the total LCR value in a construction project. Model equations are expressed in (1):

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon \quad (1)$$

where Y is a dependent variable whose value is predicted by the model; X_1, X_2, and X_3 are independent variables that affect Y; β_0 represents a constant in the regression equation; β_1, β_2, and β_3 are the regression coefficients that are related to the variable X_1, X_2, and X_3, respectively, to Y; and ε is an error term that represents another variable or interference that the model does not describe.

TABLE III. FACTORS INHIBITING THE IMPLEMENTATION OF LCR IN *RII* ANALYSIS

Variable	Sub-Variable	Indicator		References
X.1	Compliance of local product quality with project standards	X.1.1	Local products certified with LCR have not fully met project quality standards	[15]
		X.1.2	The quality of local products is lower than imported products	[15]
X.2	Limited availability of local products certified with LCR	X.2.1	LCR-certified products are difficult to find in the market	[25]
		X.2.2	The limited availability of LCR-certified products causes delays in procurement	[24]
X.3	Time and cost of certifying local products	X.3.1	Many project equipment items still rely on imported products	[24]
		X.3.2	Locally manufactured heavy equipment that meets LCR requirements is difficult to obtain	[24]
X.4	Limited capacity of local production	X.4.1	Domestic production capacity is insufficient to meet the needs of large-scale projects	[33]
X.5	Time and cost of LCR certification	X.5.1	The cost of LCR certification is an obstacle for local vendors to participate	[15]
		X.5.2	The lengthy LCR certification process hampers procurement	[15]
X.6	Difficulty in preparing technical specifications with LCR	X.6.1	Preparing technical specifications with LCR considerations takes more time	[34]
		X.6.2	Difficulty in ensuring that products in the specifications meet the minimum 25% LCR requirement	[34]
X.7	Internal technical capability in understanding LCR	X.7.1	Lack of understanding in calculating the LCR value in projects	[35]
		X.7.2	Difficulty in estimating the LCR value of projects	[35]
X.8	Adjustment to changes in procurement regulations	X.8.1	Changes in procurement methods require adjustments in project technical documents	[34]
		X.8.2	The shift from direct procurement to e-purchasing slows down project implementation	[34]
X.9	Impact of delays in client budget disbursement	X.9.1	Delays in budget disbursement from the client affect the procurement schedule	[34]
X.10	Limited number of LCR product suppliers	X.10.1	LCR-certified products are often available from only one vendor	[15]
		X.10.2	Dependence on a single LCR-certified vendor increases procurement costs	[15]

3) *RII Analysis*

RII analysis is employed to identify and rank the factors that hinder LCR implementation in construction projects, covering aspects such as regulations, material availability, and project management. This method allows prioritization based on respondents' perceptions, providing a clear overview of the most significant barriers.

The survey utilized a five-point Likert scale, with values ranging from 1, indicating "Strongly Disagree," to 5, indicating "Strongly Agree." Higher scores reflect stronger agreement, with the statements related to factors that may hinder the LCR implementation in construction projects.

To determine the relative importance of each factor, the *RII* was calculated for every sub-variable using:

$$RII = \frac{\Sigma W}{A \times N} \quad (2)$$

where W represents the weight assigned by each respondent (from 1 to 5), A is the highest possible weight on the scale (5), and N is the total number of respondents. This approach allows for the ranking of factors based on the collective perception of the respondents, providing a clear indication of which obstacles are considered most significant in the context of LCR implementation.

III. RESULTS AND DISCUSSION

A. *Evaluation of LCR Implementation*

The achievement of LCR implementation in the analyzed projects showed fluctuations from 2022 to 2024. The graph in Figure 2 illustrates the comparison between the average LCR commitment, realization, and achievement values for each year.

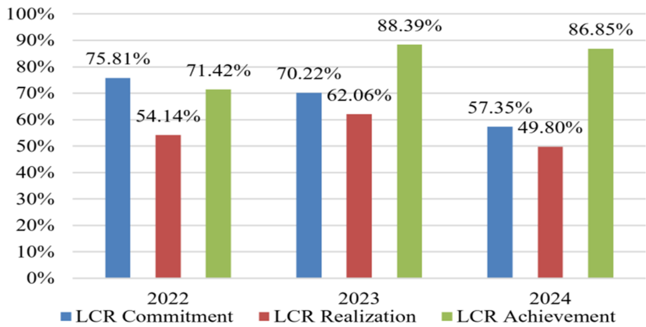

Fig. 2. Comparison of commitments, realization, and achievement of LCR per year (2022–2024).

Figure 2 shows the trend of commitment, realization, and achievement of LCR in construction projects from 2022 to 2024. The LCR commitment value shows a gradual decrease from 75.81% in 2022 to 57.35% in 2024. The realization of LCR increased from 54.14% in 2022 to 62.06% in 2023, but decreased again to 49.80% in 2024. Meanwhile, the achievement of LCR, which is calculated as a comparison between realization and commitment, has actually increased. This achievement increased from 71.42% in 2022 to 88.39% in 2023, then decreased slightly but remained high in 2024 at 86.85%.

B. Local Content Analysis on Procurement Components

This analysis evaluates the percentage of local content in three main categories of procurement, namely materials, labor, and equipment. Figure 3 presents a comparison between the local content and total procurement values for each component during the period 2022-2024.

Figure 3 illustrates the trend of the average contribution of material components, labor, and equipment to the LCR implementation in construction projects from 2022 to 2024. The material component showed fluctuations with an achievement of 74.43% in 2022, decreased to 60.37% in 2023, and increased again in 2024 to reach 77.28%. The labor component consistently recorded the highest figure, at 100% throughout the entire period, indicating that all labor used was local. Meanwhile, the contribution of LCR from equipment components showed a relatively stable trend with a value of 69.63% in 2022, decreasing slightly to 66.25% in 2023, and increasing again to 68.96% in 2024.

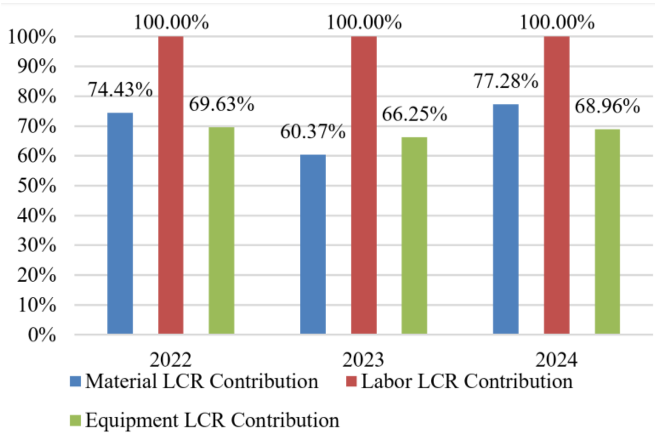

Fig. 3. Comparison of the average percentage of LCR in the procurement of materials, labor, and equipment in construction projects in 2022–2024.

C. Linear Regression Analysis

Multiple linear regression analysis was used to evaluate the effect of the LCR value of each component — materials, labor, and equipment — on the total LCR value of the project. Based on the results of data processing for 24 projects during the 2022–2024 period.

1) Normality of Residuals

The results of the residual normality test are presented in Table IV, which shows the significance level of the Shapiro–Wilk test applied to the regression model residuals. This test is used to determine whether the residuals are normally distributed, which is one of the fundamental assumptions of the classical linear regression model.

TABLE IV. NORMALITY TEST OF RESIDUALS (SHAPIRO–WILK)

	Sig.
Residual	0.977

Based on the Shapiro–Wilk test results, the residuals obtained a significance value of 0.977. Since the Sig. value (0.977) > 0.05, the residuals are considered to be normally distributed. This indicates that the regression model satisfies the normality assumption, and therefore, the data are appropriate for further regression analysis.

2) Multicollinearity Test

The multicollinearity test results are depicted in Table V, where the Tolerance and Variance Inflation Factor (VIF) values for each independent variable are demonstrated. This test was conducted to assess the degree of intercorrelation among the independent variables in the regression model. In general, a Tolerance value below 0.10 or a VIF value exceeding 10 indicates a potential multicollinearity issue, as such conditions suggest that one predictor variable may be linearly dependent on others within the model.

TABLE V. MULTICOLLINEARITY TEST

Variable	**Tolerance**	**VIF**
Material LCR value	0.917	1.091
Labor LCR value	0.818	1.223
Equipment LCR value	0.886	1.129

Based on the results in Table V, all independent variables show Tolerance values above 0.10 and VIF values below 10. These results indicate that the regression model is free from multicollinearity, meaning that each independent variable provides unique information and can be reliably included in the regression analysis.

3) Heteroskedasticity Test

The heteroskedasticity test results are listed in Table VI, which shows the significance values obtained from the Glejser test. This test was performed to verify whether the regression model exhibits signs of heteroskedasticity, namely unequal variance of residuals across observations. The model is considered free from heteroskedasticity if the significance value (Sig.) exceeds 0.05, indicating that the residuals have constant variance.

TABLE VI. HETEROSKEDASTICITY TEST (GLEJSER TEST)

Variable	**Sig.**
Material LCR value	0.402
Labor LCR value	0.613
Equipment LCR value	0.335

Based on the Glejser test results, the significance values for the material LCR value (0.402), labor LCR value (0.613), and equipment LCR value (0.335) are all greater than 0.05. Therefore, it can be concluded that the regression model does not exhibit heteroskedasticity, indicating that the residuals are homoscedastic and the model satisfies the constant variance assumption.

4) Leverage and Outlier Analysis

The results of the leverage and outlier diagnostics are summarized in Table VII, which presents descriptive statistics for standardized residuals, studentized residuals, Cook's distance, and leverage values across all 24 project observations. This test was performed to identify whether any data points exert excessive influence on the regression model or deviate substantially from the overall pattern of observations.

TABLE VII. SUMMARY OF LEVERAGE AND OUTLIER DIAGNOSTICS

Statistic	Standardized residual	Studentized residual	Cook's distance	Leverage
Minimum	−1.66	−1.74	0.002	0.010
Maximum	1.82	1.95	0.315	0.405
Mean	0.00	0.02	0.054	0.092
Threshold (guideline)	±3.0	±3.0	< 1.0	< 0.5

The results in Table VII show that all standardized and studentized residuals fall within the acceptable range of ±3.0, indicating the absence of outlier observations in the regression model. The Cook's distance values range from 0.002 to 0.315, which are well below the critical value of 1.0, confirming that no single project exerts a disproportionate influence on the regression estimates. The leverage values vary between 0.010 and 0.405, all below the tolerance threshold of 0.5 and within the acceptable range defined by $3(k + 1)/n = 0.5$. These findings suggest that the model is stable and not unduly affected by high-leverage or influential cases, ensuring the reliability of the regression results.

5) Model Validity

The total results of the multiple linear regression model estimation are presented in Table VIII, including the values of the determination coefficient, correlation, and model strength after correction.

TABLE VIII. SUMMARY OF MULTIPLE LINEAR REGRESSION MODELS

R	R^2	Adjusted R^2	Std. Error of the estimate
0.897	0.804	0.739	25,711,363,606.57 (IDR)

Based on the data processing results, a determination coefficient value (R^2) of 0.804 was obtained, indicating that 80.4% of the variation in the total value of the project's LCR can be explained by three independent variables. The Adjusted R^2 value of 0.739 indicates that the model's strength remains high after correcting for the number of predictive variables. The correlation between the independent and dependent variables is reflected in the R-value of 0.897, indicating a strong and significant relationship.

6) Simultaneous Significance Test (F-Test)

Details of the F-test (ANOVA) results are provided in Table IX. This test determines whether the three independent variables simultaneously affect the dependent variables.

TABLE IX. ANOVA TEST RESULTS FOR REGRESSION MODEL SIGNIFICANCE

	Mean Square	F-value	Sig.
Regression	8.13×10^{21}	12.300	0.002
Residual	6.61×10^{20}		

The ANOVA test results showed that the regression model was statistically significant, with an F-value of 12.300 and a significance level of $p = 0.002$ ($p < 0.05$). This means that, together, the LCR values of the three components (materials, labor, and equipment) have a significant effect on the total LCR value of the project.

7) Partial Significance Test (T-Test)

The partial test results of each variable are illustrated in Table X, which shows the significance of each variable's contribution to the total LCR. The t-test results for each variable showed that only the material LCR value had a statistically significant effect on the total value of the project's LCR, with a coefficient value of 1.976, a t-value of 5.844, and a significance value of $p < 0.001$. This means that every 1 Rupiah increase in the material LCR increases the total project LCR by 1,976 Rupiah (assuming that the other variables are fixed). In contrast, the LCR values of labor and equipment had significance values of 0.519 and 0.340, respectively, indicating that they are not statistically significant. This shows that the contribution of these two components had no significant impact on the total increase in the project's LCR.

TABLE X. REGRESSION COEFFICIENTS AND PARTIAL SIGNIFICANCE TEST RESULTS (T-TEST)

Variable	B coefficient	Std. error	t-value	Sig.
Constant	29427490928.404	19810183654.288	1.485	0.172
Material LCR value	1.976	0.338	5.844	0.000
Labor LCR value	-0.486	0.723	-0.671	0.519
Equipment LCR value	-2.136	2.122	-1.007	0.340

8) Regression Equations

Based on the estimated results, the multiple linear regression model obtained is presented in:

$$Y = 29{,}427{,}490{,}928 + 1.976X_1 - 0.486X_2 - 2.136X_3 \quad (3)$$

where Y is the total local content value of all components in the project, X_1 is the local content value of material components (IDR), X_2 is the local content value of labor components (IDR), and X_3 is the local content value of equipment components (IDR).

The regression equation explains how the monetary value of each LCR component—materials, labor, and equipment—affects the total project LCR value. The constant

(29,427,490,928) represents the baseline total LCR when all components are zero. The material coefficient (1.976) indicates that each 1 IDR increase in local material value increases the total LCR by about 1.976 IDR, showing a positive and significant effect. The negative coefficients for labor (–0.486) and equipment (–2.136) suggest that their variations do not significantly affect the total LCR value. This means that, in monetary terms, the local material component contributes most strongly to the overall LCR performance in the analyzed construction projects.

D. RII Analysis

1) Respondent Overview

This study involved a total of 76 respondents, all of whom were internal employees of PT Nindya Karya and directly engaged in the planning, procurement, execution, or reporting processes related to the LCR implementation in construction projects. The respondents were carefully selected to ensure their suitability for providing reliable insights on LCR practices. Figures 4-6 provide an overview of the respondents. Overall, the selected respondents demonstrated adequate expertise, practical experience, and involvement in LCR-related activities, making their inputs highly relevant for analyzing the factors affecting LCR implementation and performance in the company's projects.

2) Reliability Test

Table XI presents the results of the reliability analysis conducted to assess the internal consistency of the survey instrument used in this study.

TABLE XI. RELIABILITY TEST OF THE QUESTIONNAIRE (CRONBACH'S ALPHA)

Cronbach's alpha	Number of items
0.913	18

The Cronbach's Alpha value obtained is 0.913 for all 18 items, indicating excellent reliability. This high value confirms that the questionnaire items are consistently measuring the factors affecting LCR execution in construction projects, and the responses can be considered reliable for further analysis.

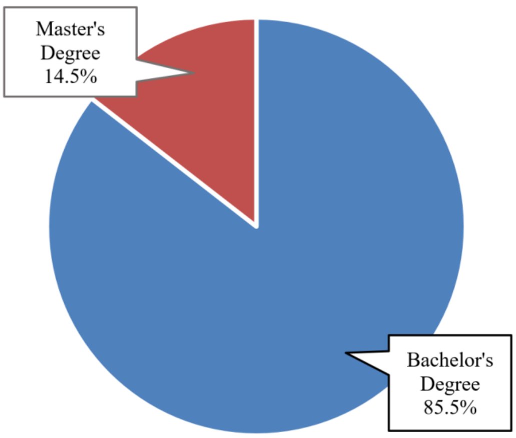

Fig. 4. Respondent education.

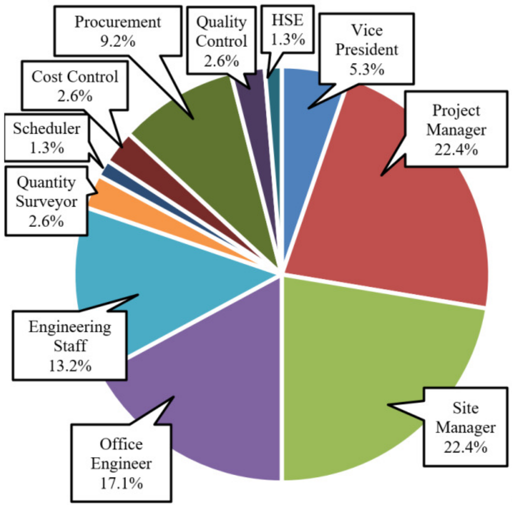

Fig. 5. Respondent positions.

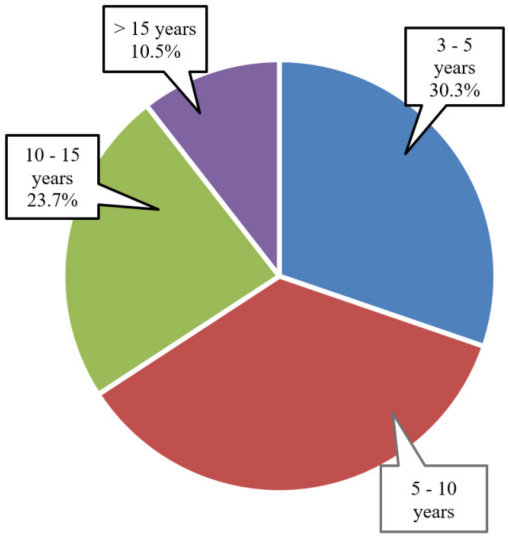

Fig. 6. Respondent work experience.

3) RII Analysis

The *RII* analysis results rank the factors that obstruct the LCR application in construction projects. Table XII presents the *RII* value, along with the ranking of each indicator, which is identified as the main obstacle based on respondent perception.

E. Interpretation and Implications

The results of this study indicate that the implementation of the LCR policy in building construction projects by PT Nindya Karya from 2022 to 2024 has fluctuated in various indicators, but shows a tendency to improve in terms of achieving targets. The decrease in the value of commitment and realization of LCR from year to year does not necessarily reduce implementation quality, as evidenced by the increase in the LCR achievement ratio. This indicates that even though the targets are lower, the success rate in meeting them improves and becomes more consistent.

Analysis of the material, labor, and equipment components reveals that the most significant contribution comes from local labor, consistently accounting for 100% of the total. This indicates that the labor sector is the main pillar in the LCR execution. In contrast, the contribution of equipment and materials tends to fluctuate, reflecting challenges in the availability of local products in the two components.

The linear regression model indicates that the LCR value for materials has a positive and statistically significant influence on the total value of the project's LCR. In contrast, the LCR values for labor and equipment do not exhibit a statistically significant influence.

TABLE XII. RESULTS OF RII CALCULATION AND RANKING ON FACTORS INHIBITING THE IMPLEMENTATION OF LCR

Indicator		Std. deviation	RII	Rank
X.10.2	Dependence on a single LCR-certified vendor increases procurement costs	0.989	0.829	1
X.9.1	Delays in budget disbursement from the client affect the procurement schedule	0.971	0.826	2
X.3.2	Locally manufactured heavy equipment that meets LCR requirements is difficult to obtain	0.929	0.774	3
X.5.2	The lengthy LCR certification process hampers procurement	0.962	0.771	4
X.5.1	The cost of LCR certification is an obstacle for local vendors to participate	0.994	0.761	5
X.2.2	The limited availability of LCR-certified products causes delays in procurement	1.106	0.753	6
X.10.1	LCR-certified products are often available from only one vendor	1.213	0.737	7
X.8.1	Changes in procurement methods require adjustments in project technical documents	0.907	0.718	8
X.6.1	Preparing technical specifications with LCR considerations takes more time	1.036	0.716	9
X.3.1	Many project equipment items still rely on imported products	1.112	0.711	10
X.4.1	Domestic production capacity is insufficient to meet the needs of large-scale projects	1.182	0.689	11
X.2.1	LCR-certified products are difficult to find in the market	1.190	0.679	12
X.6.2	Difficulty in ensuring that products in the specifications meet the minimum 25% LCR requirement	0.962	0.629	13
X.1.2	The quality of local products is lower than imported products	1.017	0.605	14
X.8.2	The shift from direct procurement to e-purchasing slows down project implementation	1.110	0.582	15
X.1.1	Local products certified with LCR have not fully met project quality standards	1.078	0.579	16
X.7.2	Difficulty in estimating the LCR value of projects	1.061	0.518	17
X.7.1	Lack of understanding in calculating the LCR value in projects	1.077	0.505	18

The *RII* analysis results reveal that the main barriers to the LCR implementation in construction projects are predominantly institutional and supply-related. The highest-ranked factor, "dependence on a single LCR-certified vendor increases procurement costs" (*RII* = 0.829), demonstrates that excessive reliance on a limited number of certified suppliers creates a quasi-monopoly condition, leading to inflated prices and procurement inefficiencies. This issue is compounded by "delays in budget disbursement from the client affecting the procurement schedule" (*RII* = 0.826), which further disrupts the timely acquisition of local materials and services. Additionally, "difficulty in obtaining locally manufactured heavy equipment that meets LCR requirements" (*RII* = 0.774) indicates that the domestic production capacity for compliant machinery remains insufficient to support large-scale infrastructure development.

These findings suggest that policy intervention should focus on strengthening the domestic supply ecosystem and improving procedural efficiency. The government and state-owned contractors should promote vendor diversification by expanding the pool of certified suppliers and simplifying the LCR certification process to encourage broader participation of local industries. Streamlined certification and transparent vendor databases could reduce dependency and enhance competitiveness among suppliers. Moreover, improving the efficiency of project financing and payment mechanisms is essential; implementing milestone-based disbursements or revolving funding schemes would mitigate procurement delays caused by slow budget realization.

At the same time, fostering partnerships between public agencies, construction associations, and domestic manufacturers is crucial to increasing the availability of LCR-compliant heavy equipment. Support mechanisms, such as soft loans or joint manufacturing programs, could help local producers upgrade technology and meet required standards. Collectively, these strategies align directly with the empirical evidence derived from the *RII* analysis and offer practical pathways for enhancing the sustainability and effectiveness of LCR implementation within Indonesia's construction sector.

F. Limitations of the Study

This study has several limitations. First, the data were collected only from projects executed by a single company, PT Nindya Karya. Therefore, the findings may reflect company-specific practices and may not be generalizable to the broader construction industry. Second, the sample size was limited to 24 projects over three years, which may affect the statistical representativeness. Future research should include multiple contractors and a larger number of projects to enhance the generalizability of the results.

IV. CONCLUSION

Based on the above results and analysis, it can be concluded that: (i) the descriptive analysis shows that, despite a decrease in the percentage of Local Content Requirement (LCR) commitment and realization, the percentage of LCR achievement experienced an increasing trend over the years. This indicates a gradual improvement in the implementation of LCR policies at the construction project level. (ii) The regression analysis reveals that only the material component has a positive and statistically significant influence on the total LCR value, whereas labor and equipment components do not. This is likely because local labor was already fully utilized across all projects, leaving little variation, and LCR-compliant equipment was limited in availability, reducing its explanatory power. (iii) The Relative Importance Index (*RII*) analysis identifies the three most significant inhibiting factors in LCR implementation: dependence on a single LCR-certified vendor that increases procurement costs (rank 1, *RII* = 0.829), delays in budget disbursement from the client affecting procurement schedules (rank 2, *RII* = 0.826), and difficulty in obtaining locally manufactured heavy equipment that meets LCR requirements (rank 3, *RII* = 0.774). Factors with lower impact but still requiring attention include challenges in calculating and estimating the project's LCR value (ranked 17th and 18th, *RII* ≈ 0.505‑0.518), highlighting the need to focus interventions on main constraints while enhancing human resource capacity.

Overall, these findings provide a realistic picture of how LCR policies operate in the field and offer valuable insights for policymakers and industry stakeholders. Targeted strategies should prioritize strengthening the domestic supply ecosystem, promoting vendor diversification, streamlining certification processes, improving financing and payment mechanisms, and supporting local producers in upgrading technology. By addressing the main obstacles and leveraging these measures, the effectiveness, sustainability, and overall impact of LCR implementation in Indonesia's construction sector can be significantly enhanced.

REFERENCES

[1] D. T. H. Giang and L. Sui Pheng, "Role of Construction in Economic Development: Review of Key Concepts in the Past 40 Years," *Habitat International*, vol. 35, no. 1, pp. 118–125, Jan. 2011, https://doi.org/10.1016/j.habitatint.2010.06.003.

[2] *Indikator Konstruksi Triwulan IV 2024*, vol. 19. Jakarta, Indonesia: Badan Pusat Statistik, 2025.

[3] C. D. Permana and A. Asmara, "Analisis Peranan dan Dampak Investasi Infrastruktur Terhadap Perekonomian Indonesia: Analisis Input-output," *Jurnal Manajemen dan Agribisnis*, vol. 7, no. 1, Mar. 2010.

[4] B. Ilhan and H. Yaman, "A Comparative Input-Output Analysis of the Construction Sector in Turkey and EU Countries," *Engineering, Construction and Architectural Management*, vol. 18, no. 3, pp. 248–265, May 2011, https://doi.org/10.1108/09699981111126160.

[5] O. Fernando and L. Y. Ing, *Indonesia's Local Content Requirements: An Assessment on Consistency with Free Trade Agreement Commitments*. Jakarta, Indonesia: Economic Research Institute for ASEAN and East Asia, 2022.

[6] O. Abe, "Local Content Requirements in Nigeria's Extractive Sector and the Implications for Sustainable Development," *Journal of African Law*, vol. 66, no. 1, pp. 73–96, Feb. 2022, https://doi.org/10.1017/S0021855321000504.

[7] B. Trojbicz and M. S. Françoso, "The Political Economy of Local Content Policy: The Brazilian Oil Industry in the 21st Century," *Resources Policy*, vol. 100, Jan. 2025, Art. no. 105430, https://doi.org/10.1016/j.resourpol.2024.105430.

[8] F. Y. Gbadago, "Analyzing Local Content and in-Country Spending Requirements to Advance Technology Transfers and Support Entrepreneurial Development in Ghana's Upstream Petroleum Sector," *Humanities and Social Sciences Communications*, vol. 12, no. 1, Feb. 2025, Art. no. 275, https://doi.org/10.1057/s41599-025-04549-w.

[9] F. Scheifele, M. Bräuning, and B. Probst, "The Impact of Local Content Requirements on the Development of Export Competitiveness in Solar and Wind Technologies," *Renewable and Sustainable Energy Reviews*, vol. 168, Oct. 2022, Art. no. 112831, https://doi.org/10.1016/j.rser.2022.112831.

[10] *Pemerintah Republik Indonesia, Peraturan Presiden Republik Indonesia Nomor 12 Tahun 2021 tentang Pengadaan Barang/Jasa Pemerintah.* Jakarta, Indonesia: Kementerian Perindustrian Republik Indonesia, 2021.

[11] *Menteri Perindustrian Republik Indonesia, Peraturan Menteri Perindustrian Nomor 35 Tahun 2025 tentang Ketentuan dan Tata Cara Sertifikasi Tingkat Komponen Dalam Negeri dan Bobot Manfaat Perusahaan*. Jakarta, Indonesia: Kementerian Perindustrian Republik Indonesia, 2025.

[12] R. F. Sitompul, E. Endri, S. Hasibuan, C. Jaqin, A. Indrasari, and L. Putriyana, "Policy Challenges of Indonesia's Local Content Requirements on Power Generation and Turbine Production Capability," *International Journal of Energy Economics and Policy*, vol. 12, no. 1, pp. 225–235, Jan. 2022, https://doi.org/10.32479/ijeep.12504.

[13] M. Limenta and L. Y. Ing, *Indonesia's Local Content Requirements: Assessment with WTO Rules*, Jakarta, Indonesia: Economic Research Institute for ASEAN and East Asia, Jan. 2022.

[14] D. S. Mabui, M. Tumpu, A. Abas, Irianto, and Eswan, "Exploring the Eco-Friendly Potential of Local Aggregates: A Study on the Use of Senoni Stone and Mahakam Sand in Asphalt Concrete Mixes," *Engineering, Technology & Applied Science Research*, vol. 15, no. 2, pp. 21404–21409, Apr. 2025, https://doi.org/10.48084/etasr.10030.

[15] T. Hidayat, R. Ekha Putera, and H. Koeswara, "Analisis Kebijakan Penerapan Tingkat Komponen Dalam Negeri (TKDN) dalam Pengadaan Barang dan Jasa di Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi: Studi Kasus di Biro Umum dan Pengadaan," *Jurnal Ilmu Administrasi Negara ASIAN (Asosiasi Ilmuwan Administrasi Negara)*, vol. 12, no. 1, pp. 85–94, July 2024, https://doi.org/10.47828/jianaasian.v12i1.203.

[16] A. Kamal *et al.*, "Quantitative Analysis of Sustainable Use of Construction Materials for Supply Chain Integration and Construction Industry Performance through Structural Equation Modeling (SEM)," *Sustainability*, vol. 13, no. 2, Jan. 2021, Art. no. 522, https://doi.org/10.3390/su13020522.

[17] G. L. F. Benachio, M. C. D. Freitas, and S. F. Tavares, "Green Supply Chain Management in the Construction Industry: A Literature Review," *IOP Conference Series: Earth and Environmental Science*, vol. 225, Feb. 2019, Art. no. 012011, https://doi.org/10.1088/1755-1315/225/1/012011.

[18] N. Sooriyamudalige, W. Shahzad, P. Childerhouse, and N. Domingo, "Barriers and Enablers for Supply Chain Integration in Prefabricated Elements Manufacturing in New Zealand," *International Journal of Construction Supply Chain Management*, vol. 10, no. 1, pp. 73–91, July 2020, https://doi.org/10.14424/ijcscm100120-73-91.

[19] S. Yıldız, S. Güneş, and S. Kıvrak, "Examining the Impact of Material Management Practices on Project Performance in the Construction Industry," *Buildings*, vol. 14, no. 7, July 2024, Art. no. 2076, https://doi.org/10.3390/buildings14072076.

[20] T. Kaidu and A. M. N. Soludale, "Analisis Tingkat Komponen Dalam Negeri (Tkdn) Pada Proyek Renovasi Rumah Dinas Kantor Pelayan Pajak Di Kabupaten Sikka," *Jurnal Teknik Sipil dan Arsitektur*, vol. 30, no. 1, pp. 42–48, Jan. 2025, https://doi.org/10.36728/jtsa.v30i1.4455.

[21] S. I. Tribunda and I. N. D. P. Putra, "Evaluation of Domestic Component Level (TKDN) and Company Benefit Weight (BMP) in Multi-Story Building Construction Projects," *Jurnal TESLINK: Teknik Sipil dan Lingkungan*, vol. 6, no. 2, pp. 377–386, Sept. 2024, https://doi.org/10.52005/teslink.v6i2.390.

[22] D. A. T. A. Wedagama, Ida Bagus G. A. Y. Pramana, and I. M. S. Graha, "Implementasi Kebijakan Tingkat Kandungan dalam Negeri (TKDN) pada Proyek Konstruksi Jalan di Kota Denpasar," *Jurnal Teknologi dan Manajemen Industri Terapan*, vol. 4, no. 2, pp. 466–474, June 2025, https://doi.org/10.55826/jtmit.v4i2.663.

[23] H. M. Melkysedek, D. Pontan, M. Zaki, and L. Kusumawati, "Evaluation of the Implementation of the Domestic Component Level Policy on Construction Projects in Indonesia: Case Study of Indoor Multifunction Stadium in Jakarta," *Journal La Multiapp*, vol. 5, no. 6, pp. 966–976, Dec. 2024, https://doi.org/10.37899/journallamultiapp.v5i6.1784.

[24] J. Amin, R. Kurnia Sandy, and A. Ayob, "Implementation and Analysis of Domestic Component Level in the Bangkalak Road Construction

Project on Simeulue Island," *Journal of Sustainable Civil Engineering Insights*, vol. 1, no. 1, pp. 11–20, June 2024.

[25] Moh. A. Fikri, D. Darsih, and D. R. Amalia, "Data Visualization and Forecasting Domestic Component Level (TKDN) Indonesian Ministry of Industry Using Power Business Intelligence," *E3S Web of Conferences*, vol. 448, Nov. 2023, Art. no. 02003, https://doi.org/10.1051/e3sconf/202344802003.

[26] Mardiaman and D. Setiawan, "Evaluation of Readiness for Implementation of Domestic Component Levels of Architectural Work to Support the Implementation of Green Building in Government Bogor Regency," *E3S Web of Conferences*, vol. 429, Sep. 2023, Art. no. 01011, https://doi.org/10.1051/e3sconf/202342901011.

[27] R. H. Pedersen, J. S. Ovadia, and U. E. Hansen, "Local Content and Linkage Development in African Energy Transitions: Lessons from Oil and Gas," *The Extractive Industries and Society*, vol. 23, Sept. 2025, Art. no. 101679, https://doi.org/10.1016/j.exis.2025.101679.

[28] M. A. Abdurrahman, T. D. Maharani, and R. Arifuddin, "Barriers to the Labor Certification Implementation and Development in the Construction Services in South Sulawesi," *Engineering, Technology & Applied Science Research*, vol. 15, no. 4, pp. 24672–24679, Aug. 2025, https://doi.org/10.48084/etasr.10913.

[29] E. Smith, *Using Secondary Data in Educational and Social Research*. Maidenhead, England: Open University Press, 2008.

[30] J. W. Creswell and J. D. Creswell, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, Fifth edition. Los Angeles, CA, USA: SAGE, 2018.

[31] R. Jagatramka, R. Prasad, A. Kumar, and S. Pipralia, "Efficiency of Materials in Construction of Buildings in Rural Areas of Chhattisgarh," *Materials Today: Proceedings*, vol. 47, pp. 3276–3281, 2021, https://doi.org/10.1016/j.matpr.2021.07.070.

[32] R. Arifuddin, M. H. Muharram, and M. A. Abdurrahman, "Analysis of Factors affecting Construction Project Tender Winning in Small Qualification Contractors," *Engineering, Technology & Applied Science Research*, vol. 15, no. 1, pp. 20197–20202, Feb. 2025, https://doi.org/10.48084/etasr.9357.

[33] Deswandri *et al.*, "Mapping of the Potential Involvement of National Companies to Fulfilment of Local Content Requirements in HTGR Construction Projects in Indonesia," *Nuclear Engineering and Design*, vol. 398, Nov. 2022, Art. no. 111960, https://doi.org/10.1016/j.nucengdes.2022.111960.

[34] L. Lusiawati and A. Nugaraha, "Analisis Faktor-Faktor yang Mempengaruhi Penyerapan Anggaran Di Kecamatan X Kota Bandung," *Jurnal Bisnis, Ekonomi, dan Sains*, vol. 4, no. 1, pp. 21–30, Sept. 2024, https://doi.org/10.33197/bes.vol4.iss1.2024.2118.

[35] Kanaidi, "Kajian Implementasi Penilaian Tingkat Komponen Dalam Negeri (TKDN) sebagai Aspek Penentu Pemeringkatan Pemenang Pengadaan atau Tender Barang dan Jasa Pemerintah," *Jurnal Apresiasi Ekonomi*, vol. 11, no. 1, pp. 123–136, 2023.