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# Electrical Project Model Using the Local Component Level (TKDN) in Government Building Construction

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***Abstract***

*The implementation of the Local Component Level (Tingkat Komponen Dalam Negeri/TKDN) in electrical work is one of the government's strategic policies to enhance national industrial competitiveness, reduce dependence on imported products, and support sustainable infrastructure development. However, the implementation of TKDN in government building construction projects still faces various obstacles, such as the limited availability of TKDN-certified products, low integration between planning and procurement, and the absence of a model capable of explaining the factors that influence the level of TKDN implementation. This study aims to develop an electrical work model using the TKDN level in government building construction by identifying the factors that influence its implementation and analyzing the relationships among these factors with respect to the success of TKDN implementation. The study employed a quantitative approach through the distribution of questionnaires to 210 respondents; the data were then analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS) to test the relationships among variables and to construct an empirical model. The results produced an empirical model explaining the influence of electrical work unit price, electrical material, labor, electrical equipment, equipment mobilization, and TKDN policy on the success of TKDN implementation in government building construction projects. Among these variables, five were found to have a significant influence, while equipment mobilization did not show a statistically significant effect.The novelty of this study lies in the development of a TKDN implementation model for electrical work that integrates regulatory compliance and supervision, technical, and managerial aspects within a single empirical framework. The resulting model is expected to serve as a basis for decision-making by the government and construction service providers in increasing the use of domestic products in government building projects.*

**Keywords:** *Local Component Level (TKDN); Government Building Construction; Electrical Work; SEM-PLS; Implementation Model.*



## INTRODUCTION

The construction sector is one of the main drivers of economic growth because it plays a role in providing infrastructure, increasing productivity, creating jobs, and enhancing national competitiveness. High-quality infrastructure development has an impact on improving connectivity, logistics efficiency, investment, and public welfare, making it a development priority in many countries, including Indonesia [1], [2], [3], [4]. In recent years, the Indonesian government has continued to increase the construction of government buildings, hospitals, schools, universities, government offices, and various other public facilities as part of accelerating national development. The success of such development is determined not only by cost, quality, and time, but also by the ability of projects to support the strengthening of the national industry through increased use of domestic products.

As an effort to strengthen the national industrial structure, the Government of Indonesia applies the Local Component Level (TKDN) policy to the procurement of government goods and services. The TKDN policy aims to increase the use of domestic products, strengthen the capacity of the national manufacturing industry, reduce dependence on imported products, create jobs, enhance technology transfer, and provide added value to the national economy. In the construction sector, this policy becomes a strategic instrument because most of the government's development budget is used for the procurement of materials, equipment, and building support systems with varying levels of domestic Component [5], [6], [7], [8], [9], [10].

One component that accounts for a considerable proportion of the cost in government building construction is electrical works. Electrical works cover power distribution systems, electrical panels, cables, transformers, lighting, grounding systems, lightning protection systems, fire alarm systems, communication systems, and various building automation systems. The value of electrical works in modern building projects can reach 20–35% of the total project value, depending on the function and complexity of the building[11]. Therefore, increasing the use of electrical products that meet TKDN requirements makes a significant contribution to achieving national targets for the use of domestic products.

Although various regulations have mandated the use of TKDN-certified products in government procurement, their implementation in the field still faces numerous obstacles. Several studies show that the use of domestic electrical products is still influenced by the limited capacity of national industry, the uneven TKDN certification of electrical products, a preference for imported products, limited information regarding local products, and weak integration among the planning, procurement, and project execution stages [6], [12], [13]. In addition, the selection of products for electrical works often considers price and technical specifications more than the domestic Component value, so the target for TKDN use has not been optimally achieved.

From a construction management perspective, the implementation of TKDN in electrical works is a system that involves many stakeholders, ranging from the government as regulator, project owners, planning consultants, supervisory consultants, contractors, suppliers, and distributors, to the manufacturing industry. Each stakeholder has different interests, responsibilities, and levels of influence over the success of TKDN implementation. The complexity of these relationships means that the success of TKDN application is influenced not only by regulatory factors, but also by organizational, technical, economic, supply chain, human resource competency, and project management commitment aspects [14], [15], [16] [17], [18].

Various previous studies on TKDN have mostly focused on evaluating industrial policy, analyzing economic impacts, or measuring the level of local Component in the manufacturing sector. Research in the construction field generally only discusses the level of compliance in using domestic products or evaluates the implementation of government procurement regulations. Meanwhile, research that specifically develops a model for TKDN implementation in electrical works of government building construction is still very limited. In fact, electrical works have different characteristics compared with civil or architectural works because they involve very rapid technological development, high safety standards, complex technical specifications, and dependence on the manufacturing supply chain. Most previous studies used descriptive approaches or simple statistical analyses, so they have not been able to explain the causal relationships among the factors that influence TKDN implementation. Not many studies have integrated the factors of regulation, industrial capacity, procurement systems, human resource competency, technological readiness, supply chain support, and organizational commitment into an empirical model capable of explaining the level of success of TKDN implementation. Yet the relationships among these factors are multidimensional and mutually influential, thus requiring a more comprehensive analytical approach, such as Structural Equation Modeling–Partial Least Squares (SEM-PLS)[19], [20], [21], [22].

Previous studies have contributed to understanding TKDN implementation from different perspectives. Several studies have primarily focused on evaluating government policies and measuring the economic impact of domestic component requirements. Other studies have emphasized procurement compliance, industrial capacity, or supply chain performance in the construction sector. Although these studies provide valuable insights, they generally examine these aspects separately and rely on descriptive or conventional statistical approaches. Consequently, the complex interactions among regulatory, technical, managerial, and operational factors influencing TKDN implementation in government building electrical works have not yet been comprehensively explained through an integrated empirical model.

Based on the synthesis of previous studies, a clear research gap can be identified. Existing studies have not comprehensively integrated the effects of electrical work unit price, electrical material, labor, electrical equipment, equipment mobilization, and TKDN policy into a single empirical model for government building construction projects. Therefore, this study develops and validates an integrated SEM-PLS model to explain the relationships among these variables and their contribution to the success of TKDN implementation. This study aims to identify the factors, namely electrical work unit price, electrical material, labor, electrical equipment, equipment mobilization, and TKDN policy, affecting the success of TKDN implementation and project performance, to analyze the relationships among these factors using the SEM-PLS approach, and to develop a TKDN-based electrical works implementation model for government building construction projects.

This study is expected to provide a theoretical contribution to the development of construction management science, particularly in the development of a TKDN implementation model for electrical works. From a practical standpoint, the resulting model is expected to serve as a reference for increasing the use of domestic products, strengthening the competitiveness of the national industry, improving procurement efficiency, enhancing supply chain coordination, and supporting the achievement of sustainable infrastructure development targets and national industrial self-reliance.

This study contributes to the construction management literature by providing an empirical model that integrates regulatory, technical, and managerial factors affecting TKDN implementation in electrical works. The proposed model also offers practical guidance for government agencies and construction service providers in improving compliance with domestic component policies. Furthermore, the proposed model evaluates both significant and non-significant determinants, thereby providing a more comprehensive understanding of the factors influencing TKDN implementation in government building construction projects.

## METHOD

This study uses a quantitative approach with the explanatory research method to develop an implementation model of electrical works using the Local Component Level (TKDN) in government building construction projects. This approach was chosen because it aims to test the causal relationships among the latent variables that influence TKDN implementation and to analyze their effect on project performance through Structural Equation Modeling–Partial Least Squares (SEM-PLS) modeling. The study began with the identification of the problem through a study of TKDN implementation in electrical works of government buildings. Subsequently, a literature review was conducted on reputable international journals, TKDN regulations, government procurement standards, and previous research to obtain the factors that influence the success of TKDN implementation.

Next, a research instrument in the form of a questionnaire was developed using a five-point Likert scale. Before being used in the main survey, the instrument was validated through expert judgment involving academics, construction practitioners, consultants, contractors, and government procurement officials. After that, a pilot test was conducted to test the clarity of the questions, the initial validity, and the reliability of the instrument.

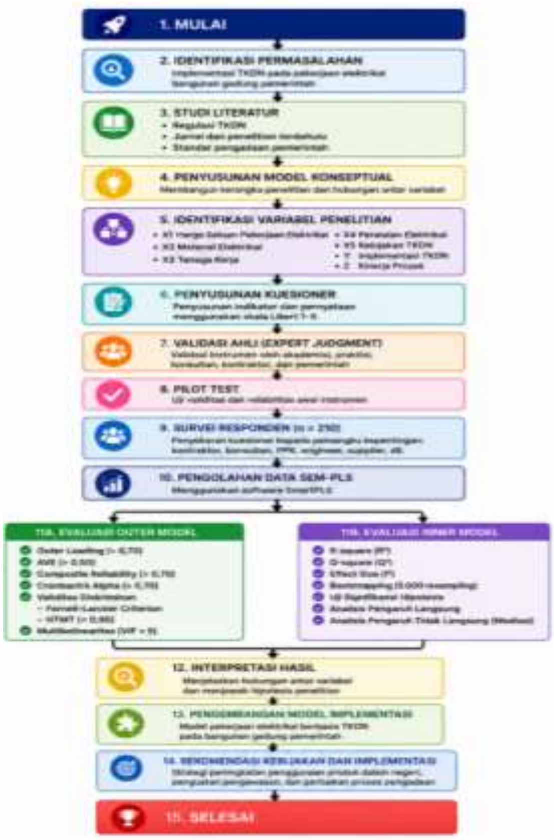


**Figure 1. Research methodology of the proposed study.**

The results of the SEM-PLS analysis were used to develop the TKDN-Based Electrical Works Implementation Model, which explains the relationship among electrical work unit price, electrical material, labor, electrical equipment, and TKDN policy with respect to TKDN implementation as well as its impact on the performance of government building construction projects.

**Respondent Profile**

**Table 1. Respondent Profile**

| Respondent Category | Frequency | Percentage (%) |
|---|---|---|
| Project Engineer / Design Consultant | 101 | 48.10 |
| Main Contractor | 31 | 14.76 |
| Supervising Consultant | 16 | 7.62 |
| Project Owner / Government | 9 | 4.29 |
| Other Practitioners Involved in Government Building Projects | 53 | 25.24 |
| Total | **210** | **100.00** |

A total of 210 valid responses were obtained and used in this study. The respondents represented key stakeholders involved in government building construction projects implementing the Domestic Component Level (TKDN), including project engineers/design consultants, main contractors, supervising consultants, project owners/government representatives, and other practitioners directly involved in project implementation. As presented in Table 1, project engineers/design consultants constituted the largest proportion of respondents (48.10%), followed by other practitioners (25.24%) and main contractors (14.76%). The diversity of respondents provides comprehensive professional perspectives on the implementation of TKDN in electrical works and supports the reliability of the empirical analysis conducted using the SEM-PLS approach.

**Descriptive Statistics**

**Table 2. Descriptive Statistics of Research Variables**

| Variable | Mean | Standard Deviation |
|---|---|---|
| Electrical Work Unit Price | 3.85 | 0.55 |
| Electrical Material | 3.92 | 0.48 |
| Labor | 3.78 | 0.60 |
| Electrical Equipment | 3.88 | 0.50 |
| Equipment Mobilization | 3.80 | 0.58 |
| TKDN Policy | 3.95 | 0.45 |
| TKDN Implementation Success | 3.90 | 0.52 |

Table 2 presents the descriptive statistics of the research variables. Overall, all variables obtained mean values above the midpoint of the five-point Likert scale, indicating that respondents generally expressed positive perceptions regarding the factors influencing the successful implementation of TKDN in government building construction projects. Among the independent variables, TKDN Policy recorded the highest mean score (3.95), suggesting that respondents perceived government policy as the most influential factor in supporting successful TKDN implementation. In contrast, Labor (3.78) and Equipment Mobilization (3.80) received relatively lower mean scores, indicating that these aspects were perceived more variably across respondents.

The standard deviation values ranged from 0.45 to 0.60, reflecting relatively low variability in respondents' responses. This indicates a reasonably consistent level of agreement among respondents and suggests that the collected data are sufficiently reliable to support subsequent measurement model evaluation and structural model analysis using the SEM-PLS approach.

**RESULTS AND DISCUSSION**

The results of data processing on 210 respondents were analyzed using SEM-PLS through various statistical tests. The first test was conducted by checking the loading factor.

**Table 3. Outer Loading Results**

| Variable | Indicator | Outer Loading Range | Description |
|---|---|---|---|
| X1 Electrical Work Unit Price | X1.2–X1.6 | 0.755–0.823 | Valid |
| X2 Electrical Material | X2.1–X2.5 | 0.735–0.883 | Valid |
| X3 Labor | X3.1–X3.5 | 0.772–0.922 | Valid |
| X4 Electrical Equipment | X4.1–X4.4 | 0.769–0.854 | Valid |
| X5 Equipment Mobilization | X5.1–X5.4 | 0.855–0.943 | Valid |
| X6 TKDN Policy | X6.1–X6.6 | 0.754–0.878 | Valid |
| Y TKDN Implementation Success | Y1–Y7 | 0.732–0.885 | Valid |

Based on Table 3, all indicators have outer loading values greater than 0.70, thus meeting the criteria for convergent validity. These results indicate that all indicators are able to adequately represent the constructs being measured and are suitable for use in the research model. The highest outer loading value was found for indicator X5.3 at 0.943, representing the Equipment Mobilization variable. This indicates that the indicator has the strongest ability to explain the construct being measured. The lowest outer loading value is found for indicator Y2 at 0.732. Although it is the lowest value in the model, this indicator is still above the required minimum threshold and is therefore declared valid. The results of the convergent validity test show that all research indicators meet the established criteria.

**Table 4. Cronbach's Alpha Test Results**

| Variable | *Cronbach's Alpha* | *rho_A* | *Composite Reliability* | *AVE* |
|---|---|---|---|---|
| Electrical Work Unit Price | 0.856 | 0.867 | 0.896 | 0.634 |
| Electrical Material | 0.854 | 0.866 | 0.895 | 0.632 |
| Labor | 0.914 | 0.920 | 0.936 | 0.747 |
| Electrical Equipment | 0.842 | 0.845 | 0.894 | 0.679 |
| Equipment Mobilization | 0.935 | 0.938 | 0.954 | 0.837 |
| TKDN Policy | 0.902 | 0.908 | 0.925 | 0.673 |
| TKDN Implementation Success | 0.924 | 0.928 | 0.939 | 0.689 |

Based on Table 4, all research constructs have Cronbach's Alpha values above 0.70. The Cronbach's Alpha values range from 0.842 to 0.935. These results indicate that all constructs have a very good level of internal consistency in measuring the concepts studied. The rho_A test results also show that all constructs have values above the minimum threshold of 0.70. The rho_A values range from 0.845 to 0.938. The construct reliability of the research model has met the criteria required in SEM-PLS analysis.

**Table 5. VIF Test Results**

| Variable | VIF Range | Interpretation |
|---|---|---|
| Electrical Work Unit Price | 1.786 – 2.003 | Safe |
| Electrical Material | 1.781 – 2.696 | Safe |
| Labor | 1.877 – 4.725 | Still acceptable |
| Electrical Equipment | 1.833 – 2.773 | Safe |
| Equipment Mobilization | 2.387 – 6.351 | Still acceptable |
| TKDN Policy | 1.951 – 3.004 | Safe to fairly high |
| TKDN Implementation Success | 1.891 – 3.957 | Still acceptable |

Based on Table 5, most indicators in the research model have VIF values within the safe category, namely below 6. These results indicate that there is no significant collinearity problem in most of the research constructs.

**Table 6. Coefficient of Determination (R-Square)**

| Endogenous Variable | R-Square | R-Square Adjusted | Interpretation |
|---|---|---|---|
| TKDN Implementation Success | 0.818 | 0.813 | Strong |

Based on Table 6, an R-Square value of 0.818 was obtained for the TKDN Implementation Success variable. This value indicates that the variables Electrical Work Unit Price, Electrical Material, Labor, Electrical Equipment, Equipment Mobilization, and TKDN Policy simultaneously explain 81.8% of the variation in TKDN Implementation Success. The remaining 18.2% of the variation is explained by other factors outside the research model that were not analyzed in this study.

**Table 7. Hypothesis Testing Results**

| Hypothesis | Relationship Between Variables | Original Sample | t-Statistic | p-Value | Decision |
|---|---|---|---|---|---|
| H1 | Electrical Work Unit Price → TKDN Implementation Success | 0.112 | 2.054 | 0.040 | Accepted |
| H2 | Electrical Material → TKDN Implementation Success | 0.229 | 2.880 | 0.004 | Accepted |
| H3 | Labor → TKDN Implementation Success | -0.197 | 2.372 | 0.018 | Accepted |
| H4 | Electrical Equipment → TKDN Implementation Success | 0.268 | 4.033 | 0.000 | Accepted |
| H5 | Equipment Mobilization → TKDN Implementation Success | -0.066 | 0.865 | 0.387 | Rejected |
| H6 | TKDN Policy → TKDN Implementation Success | 0.579 | 10.244 | 0.000 | Accepted |

Based on the hypothesis testing results in Table 7, of the six hypotheses proposed in this study, five hypotheses were accepted and one hypothesis was rejected. The variables Electrical Work Unit Price, Electrical Material, Labor, Electrical Equipment, and TKDN Policy were proven to have a significant effect on TKDN Implementation Success, whereas electrical equipment mobilization was rejected. The Equipment Mobilization variable was not proven to have a significant effect on TKDN Implementation Success. The test results also show that TKDN Policy is the variable with the most dominant influence on TKDN Implementation Success, with a path coefficient of 0.579 and a t-statistic of 10.244. These findings indicate that the success of TKDN implementation is strongly influenced by regulatory, supervisory, compliance, and consistency aspects in the implementation of the TKDN policy in government building construction projects.

The research results show that the developed SEM-PLS model has very good measurement model quality and structural model quality. All indicators meet the criteria for convergent validity with outer loading values above 0.70, AVE values greater than 0.50, and Composite Reliability and Cronbach's Alpha exceeding the minimum threshold of 0.70. These findings indicate that each construct is able to represent the latent variable consistently and reliably. These results are consistent with the guidelines for evaluating measurement models in SEM-PLS, which state that outer loading values >0.70, Composite Reliability >0.70, and AVE >0.50 indicate good convergent validity and construct reliability [23] [21].

In addition, the multicollinearity test results show that most indicators have Variance Inflation Factor (VIF) values below 5. Although some Equipment Mobilization indicators have relatively high VIF values, all of them remain below the maximum threshold of 10, so they do not indicate a serious multicollinearity problem. Thus, the relationships among the variables in the model can still be interpreted validly without distortion due to excessively high correlations among indicators [21].

The coefficient of determination ($R^2$) value of 0.818 indicates that the model has a very strong predictive ability. This means that the combination of the variables Electrical Work Unit Price, Electrical Material, Labor, Electrical Equipment, Equipment Mobilization, and TKDN Policy is able to explain 81.8% of the variation in TKDN Implementation Success. This value falls into the substantial category according to the classification of Hair et al. (2022), thus indicating that the developed model is able to describe the main factors that determine the success of TKDN implementation in government building construction projects. The magnitude of the $R^2$ value also indicates that the success of TKDN implementation is more influenced by internal project factors than by external factors not included in the model [21].

The test results show that the Electrical Work Unit Price has a positive and significant effect on the success of TKDN implementation ($\beta = 0.112$; $p = 0.040$). Although the magnitude of the effect is relatively small compared with other variables, this finding indicates that the work price structure is one of the factors determining the success of using domestic products. Realistic unit prices provide room for contractors to select local materials that meet quality standards without having to reduce the quality of work.

This finding is consistent with the research of Aigbavboa et al. (2022), which explains that accurate cost estimation is the main basis for the success of construction material procurement [24]. Likewise, Love et al. (2023) state that good cost control can improve the efficiency of the construction supply chain and encourage the use of local materials when prices have appropriately considered market conditions [25].

Electrical Material has a positive and significant effect on the success of TKDN implementation ($\beta = 0.229$; $p = 0.004$). This result indicates that the availability of local materials that meet technical specifications is an important prerequisite for the successful implementation of the TKDN policy. This finding supports the research of Hosseini et al. (2023), which states that the success of construction projects is strongly influenced by the ability of the supply chain to provide materials of the right quality, quantity, and time[26]. The research of Osei-Kyei and Chan (2022) also shows that strengthening the domestic supply chain increases the resilience of the construction industry while reducing dependence on imported materials [27]. In the context of TKDN implementation, the research results indicate that increasing the capacity of the national electrical manufacturing industry is a strategic factor in expanding the use of domestic products.

The Labor variable shows a significant effect with a negative relationship ($\beta = -0.197$; $p = 0.018$). This finding is interesting because it indicates that increasing the complexity of the labor aspect can actually reduce the success of TKDN implementation if labor competency is not yet adequate. This result can be explained by the fact that TKDN implementation requires the ability of the workforce to understand local product specifications, installation processes, and compliance with national standards. A lack of training or experience in using local products can cause productivity to decline, resulting in a negative relationship.

This finding is in line with the research of Pham et al. (2023), which shows that labor competency is one of the main determinants of the success of construction innovation implementation[28]. In addition, Loosemore and Lim (2023) explain that the quality of human resources is more decisive than the quantity of labor in improving construction project performance [29]. Electrical Equipment has a positive and significant effect ($\beta = 0.268$; $p < 0.001$). This result indicates that technological readiness and construction equipment make an important contribution to supporting the use of domestic products. TKDN implementation is related not only to the use of local materials but also to the readiness of installation equipment, testing tools, and supporting technology suited to the characteristics of domestic products. Modern equipment can increase work productivity, reduce installation errors, and ensure the quality of work. This finding supports the research of Pan and Zhang (2023), which states that the modernization of construction equipment contributes significantly to increasing project productivity [30]. The research of Abdelmegid et al. (2024) also shows that investment in construction technology has a direct impact on improving the quality of project execution [31].

Equipment Mobilization has no significant effect on the success of TKDN implementation ($\beta = -0.066$; $p = 0.387$). This finding indicates that the equipment mobilization process is not the main factor determining the success of TKDN policy implementation. This result can be explained by the fact that most government projects already have standardized mobilization mechanisms, so the variation in mobilization time and cost is relatively small across projects. Thus, the mobilization factor is no longer a main differentiator of the success of TKDN implementation. This finding differs from the research of Zhang et al. (2022), which found that heavy equipment mobilization affects the efficiency of large-scale infrastructure projects. The difference in results is likely due to the characteristics of this study, which focuses on electrical works of government buildings, so that the equipment mobilization needs are relatively simpler than in road, dam, or mining projects [32], [33].

The TKDN Policy variable is the most dominant factor influencing the success of TKDN implementation ($\beta = 0.579$; $p < 0.001$). This finding indicates that the success of TKDN implementation is determined more by the quality of regulation, supervision mechanisms, consistency in applying rules, and the commitment of all stakeholders than by technical aspects alone.

Although equipment mobilization did not have a statistically significant effect on TKDN implementation, its inclusion in the research model remains important. This finding indicates that the availability and mobilization of electrical equipment alone are insufficient to improve TKDN implementation unless they are supported by appropriate procurement policies, compliant electrical materials, competitive unit prices, and effective regulatory enforcement. Therefore, the non-significant result should be interpreted as an empirical finding rather than evidence that equipment mobilization is irrelevant within government building construction projects.

The structural relationships identified in this study indicate that successful TKDN implementation is influenced by an interaction of regulatory, technical, and operational factors rather than by individual variables acting independently. Government policy serves as the primary driving force by establishing mandatory requirements and procurement regulations that encourage the use of domestic products. These regulations subsequently influence contractors' procurement strategies, material selection, and equipment utilization throughout project execution. Consequently, the effectiveness of TKDN implementation depends not only on regulatory enforcement but also on the availability of compliant electrical materials, competitive unit prices, and appropriate electrical equipment capable of meeting project specifications.

Conversely, the negative effect of labor suggests that increasing workforce availability alone does not necessarily improve TKDN implementation. The effectiveness of labor depends on the competence of personnel in understanding TKDN requirements, procurement procedures, and quality control during project execution. Likewise, the non-significant effect of equipment mobilization indicates that logistical readiness is insufficient to enhance TKDN implementation without adequate regulatory support and the availability of domestic electrical products. These findings demonstrate that successful TKDN implementation requires an integrated management approach involving policy, procurement, technical resources, and project execution.

## CONCLUSION

Based on the results of the analysis using Structural Equation Modeling–Partial Least Squares (SEM-PLS) on 210 respondents, several conclusions can be drawn as follows.

1. The measurement model (outer model) meets all validity and reliability criteria. All indicators have outer loading values above 0.70, while the Cronbach's Alpha, Composite Reliability, and Average Variance Extracted (AVE) values have met the required minimum thresholds. This indicates that the research instrument is able to measure the constructs validly and reliably.
2. The research model does not experience any significant multicollinearity problems. The Variance Inflation Factor (VIF) test results show that most indicators are in the safe

category (VIF < 5), while some indicators have relatively high values but remain within the acceptable limits in SEM-PLS analysis.

3. The structural model has strong predictive ability. The coefficient of determination (R-Square) value of 0.818 indicates that the variables Electrical Work Unit Price, Electrical Material, Labor, Electrical Equipment, Equipment Mobilization, and TKDN Policy are able to explain 81.8% of the variation in TKDN Implementation Success. The remaining 18.2% is influenced by other factors outside the research model.

Among the six variables examined, five variables significantly influenced TKDN implementation, whereas equipment mobilization did not demonstrate a statistically significant effect. Nevertheless, its inclusion contributes to a more comprehensive understanding of the implementation model and provides direction for future studies to further investigate its role under different project characteristics. This study has several limitations. First, the research focused only on government building construction projects in Indonesia, which may limit the generalizability of the findings to other construction sectors or countries. Second, the study employed a cross-sectional research design using questionnaire data collected at a single point in time. Future research is therefore encouraged to include broader project types, longitudinal data, and additional organizational or technological variables to further validate and extend the proposed implementation model.

The implications of this study are beneficial for the government, owners (government), contractors, the manufacturing industry, and planning consultants, which can be explained as follows:

1. For the government, the research results indicate the need to strengthen TKDN regulations through increased supervision, improvement of the TKDN certification mechanism, integration of domestic product data, and increased compliance of all stakeholders in construction procurement.
2. For project owners and Commitment-Making Officers (PPK), the developed model can be used as a basis for preparing technical specifications and procurement documents and for evaluating the use of electrical products that meet TKDN requirements.
3. For contractors, this research provides information that the success of TKDN implementation requires planning of material procurement, equipment selection, and improvement of labor competency that supports the use of domestic products.
4. For the national manufacturing industry, the research results serve as input to increase production capacity, product quality, technological innovation, and TKDN certification in order to meet the needs of government construction projects.
5. For planning consultants, the research results show the importance of incorporating TKDN-certified electrical products from the design stage so that TKDN implementation can be carried out optimally during the project execution stage.

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## BIBLIOGRAPHY

[1] B. Flyvbjerg, "How Big Things Get Done," *Oxford University Press*, 2022.

[2] B. Flyvbjerg, "Top ten behavioral biases in project management: An overview," *Project Management Journal*, vol. 52, no. 6, pp. 531–546, 2021.

[3] World Bank, "World Development Report 1994: Infrastructure for Development," *World Development Report, Oxford University Press for the*

*World Bank, 978-0-1952-0879-8*, pp. 1–254, Jun. 1994.

[4] World Bank, "The World Bank Annual Report 2022: Helping Countries Adapt to a Changing World," Washington, DC, 2022. Accessed: Sep. 08, 2025. [Online]. Available: https://openknowledge.worldbank.org/handle/10986/38050

[5] T. Hidayat, R. E. 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, 2024.

[6] Kementerian Perindustrian, *Peraturan Menteri Perindustrian Nomor 16 Tahun 2011 Tentang Ketentuan dan Tata Cara Penghitungan Nilai Tingkat Kandungan Dalam Negeri (TKDN)* . Indonesia: https://peraturan.bpk.go.id/Home/Details/142371/permenperin-no-16-m-ind-per-2-2011, 2011.

[7] J. Black, "Risk and regulatory policy: improving the governance of risk," *OECD Reviews of Regulatory Reform. In Risk-based regulation: Choices, practices and lessons being learnt. Paris: OECD*, 2010.

[8] Adetoyese Latilo, Ngozi Samuel Uzougbo, Munachi Chikodili Ugwu, Portia Oduro, and Onoriode Reginald Aziza, "Developing legal frameworks for successful engineering, procurement, and construction projects," *International Journal of Applied Research in Social Sciences*, vol. 6, no. 8, pp. 1868–1883, Aug. 2024, doi: 10.51594/ijarss.v6i8.1430.

[9] H. T. Nguyen and B. Hadikusumo, "Impacts of human resource development on engineering, procurement, and construction project success," *Built Environment Project and Asset Management*, vol. 7, no. 1, pp. 73–85, 2017, doi: 10.1108/BEPAM-04-2016-0010.

[10] H. E. Mutikanga, M. Abdul Nabi, G. G. Ali, I. H. El-adaway, and A. Caldwell, "Postaward Construction and Contract Management of Engineering, Procurement, and Construction Hydropower Projects: Two Case Studies from Uganda," *Journal of Management in Engineering*, vol. 38, no. 6, Nov. 2022, doi: 10.1061/(asce)me.1943-5479.0001088.

[11] A. , H. K. , & H. C. Ashworth, "Willis's Practice and Procedure for the Quantity Surveyor," *Oxford: Wiley-Blackwell*, no. 14, 2018.

[12] Kementerian Perindustrian, "Rekapitulasi Data Sertifikat TKDN," Jakarta, 2024. Accessed: Sep. 08, 2025. [Online]. Available: https://tkdn.kemenperin.go.id/rekap.php

[13] Peraturan Menteri PPN/Kepala Bappenas, *Peraturan Menteri PPN/Kepala Bappenas Nomor 8 Tahun 2023 tentang Perubahan atas Rencana Strategis Kementerian PPN/Bappenas Tahun 2020–2024*. 2023, pp. 1–19.

[14] P. E. D. Love, "Influence of Project Type and Procurement Method on Rework Costs in Building Construction Projects," *Journal of Construction*

*Engineering and Management* , vol. 128, pp. 18–29, 2002, doi: 10.1061/ASCE0733-93642002128:118.

[15] K. M. Briggs, F. A. Loveridge, and S. Glendinning, "Failures in transport infrastructure embankments," *Eng. Geol.*, vol. 219, pp. 107–117, Mar. 2017, doi: 10.1016/j.enggeo.2016.07.016.

[16] P. E. D. Love, P. Teo, and J. Morrison, "Revisiting Quality Failure Costs in Construction," *J. Constr. Eng. Manag.*, vol. 144, no. 2, Feb. 2018, doi: 10.1061/(asce)co.1943-7862.0001427.

[17] P. Erik Eriksson, "A Case Study Of Partnering In Lean Construction," 2009.

[18] E. Osipova and P. E. Eriksson, "How procurement options influence risk management in construction projects," *Construction Management and Economics*, vol. 29, no. 11, pp. 1149–1158, Nov. 2011, doi: 10.1080/01446193.2011.639379.

[19] J. F. Hair, C. M. Ringle, and M. Sarstedt, "PLS-SEM: Indeed a silver bullet," *Journal of Marketing Theory and Practice*, vol. 19, no. 2, pp. 139–152, Apr. 2011, doi: 10.2753/MTP1069-6679190202.

[20] J. Risher and J. F. Hair, "The Robustness of PLS Across Disciplines," 2017. Accessed: Apr. 17, 2025. [Online]. Available: University of South Alabama

[21] J. F. Hair, M. Hult, C. M. Ringle, and M. Sarstedt, "A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)," 2022. [Online]. Available: https://www.researchgate.net/publication/354331182

[22] S. K. Yaman, N. M. Yusop, N. E. Hashim, H. Mohammad, and H. A. Bakar, "Factors affecting quality in construction project life cycle (CPLC)," *International Journal of Integrated Engineering*, vol. 14, no. 1, pp. 322–335, 2022.

[23] J. , R. C. M. , & S. M. Henseler, "A new criterion for assessing discriminant validity in variance-based structural equation modeling," *J. Acad. Mark. Sci.*, vol. 43, no. 1, pp. 115–135, 2015.

[24] C. , T. W. , & A. D. Aigbavboa, "Cost management practices in construction projects: A systematic review," *Building*, vol. 12, no. 9, 2022.

[25] P. E. D. Love, D. J. Edwards, and Z. Irani, "Moving Beyond Optimism Bias and Strategic Misrepresentation: An Explanation for Social Infrastructure Project Cost Overruns," *IEEE Trans. Eng. Manag.*, vol. 59, no. 4, pp. 560–571, 2012, doi: 10.1109/TEM.2011.2163628.

[26] M. R. , C. N. , & U. C. Hosseini, "Supply chain resilience in construction: Current status and future directions," *Engineering, Construction and Architectural Management*, vol. 30, no. 6, pp. 3418–3442, 2023.

[27] R. , & C. A. P. C. Osei-Kyei, "Sustainable construction supply chains: A review of current practices and future research," *J. Clean. Prod.*, 2022.

[28] H. , N. T. , & L. Q. Pham, "Workforce competence and project success in

construction," *Buildings*, vol. 13, no. 6, 2023.

[29] M. , & L. B. T. H. Loosemore, "Human capital and skills development in construction: A review of contemporary challenges," *Construction Management and Economics*, vol. 41, no. 9, pp. 733–750, 2023.

[30] W. , & Z. L. Pan, "Construction equipment modernization and project performance: Evidence from infrastructure projects," *Buildings*, vol. 13, no. 7, 2023.

[31] M. A. , G. V. A. , & O. M. Abdelmegid, "Digital technologies and productivity improvement in construction projects: A systematic review," *Autom. Constr.*, vol. 161, 2024.

[32] H. , X. L. , & C. P. Zhang, "Explainable artificial intelligence for infrastructure asset management: A review of opportunities and challenges," *Autom. Constr.*, vol. 160, 2024.

[33] X. , L. H. , & W. G. Zhang, "Equipment logistics and productivity in infrastructure construction projects," *Autom. Constr.*, 2022.