

Evaluation of readiness for implementation of domestic component levels of architectural work to support the implementation of green building in government Bogor regency

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Abstract . Government policy on fulfilling the domestic component level assessment of goods and services has been issued. The minimum KDN level for the building was set at 40%. The success of local governments in implementing the KDN level refers to 40%. This study objective was only to evaluate the KDN level of architectural material of buildings in the Bogor district. A survey study did the data collection. Furthermore, the KDN level of 21 buildings that have been completed was assessed. Local governments are ready to support the implementation of the KDN level if the KDN level is higher than 40%. The assessed architectural material was KDN level based on certificate issued by PT Socofindo and the Indonesian Survey. The descriptive statistics used to determine the readiness of implementation KDN level were mean, minimum, and maximum values. The research results show that the architectural material KDN level for building implementation was above 40%. The average KDN level total was 65.60%, KDN level full range from 50.46 to 85.8%. The study results showed that the architectural material KDN level of building implementation surpassed 40%. This study obtained that the Government of Bogor Regency is ready to support green building implementation.

1 Introduction

Industrial construction must promote overall economic development. It improves added value, employment, foreign exchange, and national competitiveness. The Ministry of Industry and several related ministries use more domestic components in implementing Industrial Empowerment

Design and engineering are among the domestic components companies investing in Indonesia must undertake [1].

Part or all of Indonesia workforce uses domestic raw materials or components. It promotes domestic goods [2].

The goal of implementing local content requirements is to ensure Indonesian companies employ local labor, materials, and equipment.

Promoting local content offers long-term benefits because all countries need products from other countries. Each country applies local content level requirements.

Local content varies by industry. Therefore, manufacturing minimum percentages is essential. Even when raw materials are imported, local content is seen in production.

KDN level process is carried out domestically with local labor² for instance, low cost green car (LCGC) program vehicle content. Local content varies by industry. Even if the product's raw materials come from imports with differing levels of local content, the lowest level of KDN for the product must be determined. Government Regulation 41/2013 requires manufacturers use 80% local content.

The method assesses the level of domestic income as a tangible form of its implementation. Regulation on the KDN level has to be enforced at the Ministry level, but its performance has not been widely implemented at the regional level. Previous researchers have presented several causes, including a lack of understanding of product quality, shared sense of the importance of KDN level and awareness of using domestic products is a driver of a sustainable national economy.

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Policies on green building will help environmental sustainability. Various approaches need to be taken, ranging from mandatory targets to soft requirements to meet the criteria² assessment of green building buildings based on the fulfillment of 7 parameters and 165 indicators. One of the parameters of green building is the use of building materials. So it is essential to include domestic component level criteria in green building which have implications for sustainable development. Therefore, a collaboration between supporting industries is needed to strengthen KDN-level fulfillment.

Meeting the local components of building construction materials requires government attention. Therefore, the Government of Indonesia has issued KDN-level policy to accelerate the use of local production [2]. The industry's competitiveness must have the support of all relevant stakeholders.

Government support is a factor that determines the success or failure of supporting the industry in fulfilling KDN values. The level of local components is relatively high in other countries such as China, South Korea, Japan and Vietnam. Developing integrated local component industries is essential for industrial development [3]. However, local content requirements that are influenced by many factors can harm productivity performance, so the government must integrate KDN and other policies [4]. The provision for the percentage of local material content has been set at 40%.

Local content requirements are one of the policy measures used by many countries, including Indonesia [5], to protect and support strategic sectors. Making policies that do not pay attention to how local content will not be helpful, even if foreign countries can only capture the opportunity. The Indonesian government has required products with a natural and external level (KDN) of 4.5 percent.

The implementation of local content requirements has been applied in various industries. The performance of local content requirements has an opportunity cost. There are opportunities to replace the import of steam turbines and generators. Thus recommendations for the implementation of local content requirements are proper. However, there is controversy over its application to support Indonesia's economic development [6].

The potential increase in KDN level on the 17500 LDWT Tanker is 21.98 percent, while on the 750 DWT Pioneer Ship, the local content implementation is 8.22 percent [3].

Another research, the procurement of goods and services for information technology projects in West Nusa Tenggara (NTB) owned by the Ministry of Law and Human Rights (HAM) resulted in successive levels of KDN: printers (20.68%), scanners (46.47%), laptops (28.88%), pc units (26.79%), multimedia pcs (27.13%), drones (100%)

and digital cameras (100%) [8]. KDN level is still in the range of 15 percent in the defense sector. In factory and salt production, the procurement of cost based goods and services has a KDN level of 70.9% respectively and processed based 85.5%, where the value is relatively high because raw materials and labour come from local [9].

Therefore studies on local content practices are already being implemented to promote the participation of local companies in Uganda's road construction sector. Particular institutions must improve the workforce's competence, part of the KDN [10].

Green building requires a variety of materials, especially for architectural work. The local content in buildings must be determined to determine the level of use of local workers, equipment and materials. Thus, the implementation of the KDN level in Bogor City is known whether it has met the provisions. This study aims to determine the domestic component level of each building and meet the requirements of the domestic component level.

The research question is how much local architectural work's average, maximum and minimum content in building construction projects is. If an average domestic content level is more than 40%, it is concluded that Bogor City has support for implementing green buildings. Knowing the amount of local content will help the government determine whether or not construction service providers have complied with local content level policies. Ultimately, the government can make the right policies about local content levels.

2 Methodology research

The research was conducted by survey study. The survey method is necessary to assess the type, volume, and cost of architectural work in each building's cost budget plan. According to the certificate, each material for the architectural work in the selected building is checked KDN level.

Data were collected on 21 buildings ranging from one to three floors with an area of 200-2000 m² in the Bogor district.

Data on 21 completed buildings, number of floors ranging from 1 to 3, area 200 to 1200 m² collected in Bogor district. Duration of building data collection from 2017-2022. Furthermore, each type of architectural material used in buildings was evaluated whether it used domestic components.

The procedure for obtaining the KDN Level of each building is as follows:

1. Calculate the weight of each type of architectural work using equation 1.

$$X_i = \frac{x_i}{total\ cost} \times 100\% \quad (1)$$

where:

X_i = certainty architecture item weight

x_i = certainty architecture item cost

2. Calculates the KDN level for each architectural material. Each material has certificates and grades provided by PT Surveyor Indonesia and PT Sucofindo. The two institutions have been designated as KDN-level assessors by the government.
3. It is multiplying each KDN level by the weight of the building's architectural material.
4. Calculate the total KDN level value for a building.
5. The KDN level of all buildings is calculated. Table 1 shows the results of all building KDN level calculations.

Subsequently, the KDN level analysis was performed using methods based on the Indonesian Minister of Industry Regulation Number: 16/M IND/PER/2/2011 regarding provisions and procedures for cost-based calculation of domestic component levels. In addition, production criteria were assessed based on production origin (Table 1) [11].

Table 1. Production Origin

| item | allocation |
|----------------------|------------|
| All from domestic | 100% |
| One part of domestic | 65% |
| All from abroad | 0% |

Furthermore, the percentage of total use of domestic component materials is calculated. The calculation of the percentage weight refers to the rule. Architectural work used as an object of study includes filler walls, partition walls, floor cladding, frames, door and window shutters, PVC doors, vertical circulation, ceilings, roof coverings, finishing walls and columns and sanitary ware. The percentage of local content of each building is determined; if using local materials, it is considered 100% valuable.

For example, from Table 2 for light bricks, the Jaya Celkon brand with certificate no 4806/sj ind.8/KDN/7/2021 has a KDN level of 88.35%

Table 2. Kinds of architectural work with KDN level following certificate stipulated by PT Surveyor Indonesia and PT Sucofindo.

| No | 1 | 2 | 3 | 4 | 3 x 4 |
|-----|-------------------|---------------------------|-------|------|-------|
| 1 | Filler wall | | | | |
| 1.1 | Red brick | Artisan product | 100 | 0.24 | 0.24 |
| 1.2 | Lightweight brick | | | | |
| | Grand elephant | 3576/sj ind.8/TKDN/6/2021 | 88.35 | 0.62 | 0.54 |

Table 2 (continued). Kinds of architectural work with KDN level following certificate stipulated by PT Surveyor Indonesia and PT Sucofindo.

| No | 1 | 2 | 3 | 4 | 3 x 4 |
|-----|-----------------|---------------------------|-------|------|-------|
| | Jaya celcon | 4806/sj ind.8/TKDN/7/2021 | 90.14 | | |
| 2 | Partition wall | | | | |
| 2.1 | Gypsum | | | | |
| | Knauf | 1627/sj ind.8/TKDN/2/2023 | 30.76 | | |
| | Jayaboard | 1780/sj ind.8/TKDN/2/2023 | 30.34 | 3.26 | 0.99 |
| | Aplus | 1307/sj ind.8/TKDN/2/2023 | 51.4 | | |
| | Kalsiboard | 3028/sj ind.8/TKDN/7/2022 | 53.27 | | |
| 2.2 | GRC | | | | |
| | Super panel | 4430/sj ind.8/TKDN/9/2022 | 83.45 | 2.1 | 1.75 |
| | Aplus | 4815/sj ind.8/TKDN/7/2021 | 42.76 | | |
| | Versa | | | | |
| 2.3 | Multiplex | 2391/sj ind.8/TKDN/6/2021 | 83.68 | | |
| 2.4 | Partition frame | | | | |
| | Metal stud | 1301/sj ind.8/TKDN/2/2023 | 46.14 | | |
| | Aplus | 1302/sj ind.8/TKDN/2/2023 | 50.36 | 1.6 | 0.81 |
| 3 | Floor coatings | | | | |
| 3.1 | Floor tiles | | | | |
| | Mulia | 415/sj ind.8/TKDN/6/2020 | 74.01 | | |
| | Roman | 3210/sj ind.8/TKDN/7/2022 | 74.9 | 3.21 | 2.4 |
| | Asia | 4931/sj ind.8/TKDN/7/2021 | 89.65 | | |
| | Ikad | 1226/sj ind.8/TKDN/5/2021 | 68.13 | | |
| | Garuda | 3082/sj ind.8/TKDN/6/2021 | 49.57 | | |
| | Indogress | 277/sj ind.8/TKDN/4/2020 | 82.58 | | |
| | Platinum | 4932/sj ind.8/TKDN/7/2021 | 83.76 | 1.07 | 0.89 |

Table 2 (continued). Kinds of architectural work with KDN level following certificate stipulated by PT Surveyor Indonesia and PT. Sucofindo.

| No | 1 | 2 | 3 | 4 | 3 x 4 |
|-----|------------------------|------------------------------|-------|------|-------|
| | Granito | 7458/sj ind.8/tkd n/12/2022 | 86.78 | | |
| 3.2 | Granit ht | | | | |
| | Garuda | 3082/sj ind.8/tkd n/6/2021 | 49.57 | | |
| | Indogress | 277/sj ind.8/tkd n/4/2020 | 99.29 | | |
| | Granito | 7458/sj ind.8/tkd n/12/2022 | 86.78 | | |
| | Roman | 3210/sj ind.8/tkd n/7/2022 | 69.62 | 0.9 | 0.63 |
| | Niro | 1667/sj ind.8/tkd n/2/2023 | 67.23 | | |
| | Sandimas | 8082/sj ind.8/tkd n/8/2021 | 50.4 | | |
| 3.3 | Marmer | | | | |
| | Citatah | 8147/sj ind.8/tkd n/12/2022 | 93.17 | | |
| | Lampung | 8134/sj ind.8/tkd n/12/2022 | 98.48 | 3.11 | 3.06 |
| 3.4 | Epoxy | | | | |
| | Nippon | 6622/sj ind.8/tkd n/7/2021 | 16.99 | | |
| | Propan | 8589/sj ind.8/tkd n/8/2021 | 38.18 | | |
| | Jotun | 4414/sj ind.8/tkd n/7/2021 | 22 | | |
| 3.5 | Screed fln acian halus | Field Products | 99.8 | | |
| 3.6 | Trowel finish | | | | |
| | Ultrachem | 11178/sj ind.8/tkd n/12/2021 | 84.42 | | |
| | Mu 700 | 1793/sj ind.8/tkd n/2/2023 | 90.69 | | |
| 4 | Sills, doors, windows | | | | |
| 4.1 | Wooden sills | Artisan product | 99.8 | | |
| 4.2 | Aluminium sills | | | | |

Table 1 (continued). Kinds of architectural work with KDN level following certificate stipulated by PT. Surveyor Indonesia and PT. Sucofindo.

| No | 1 | 2 | 3 | 4 | 3 x 4 |
|-----|--------------------|-----------------------------|-------|-------|-------|
| | Alexindo | 3171/sj ind.8/tkd n/6/2021 | 60.71 | 1.57 | 0.95 |
| | Forta | 3137/sj ind.8/tkd n/6/2021 | 51.89 | | |
| | Ykk | 7387/sj ind.8/tkd n/12/2022 | 66.,5 | | |
| | Dacon | 4497/sj ind.8/tkd n/7/2021 | 52.34 | | |
| 4.3 | Solid wood doors | Artisan product | 99.8 | | |
| 4.4 | Multiplex doors | Artisan product | 99.8 | | |
| 4.5 | Aluminium doors | | | | |
| | Alexindo | 3171/sj ind.8/tkd n/6/2021 | 60.71 | 4.2 | 2.55 |
| | Forta | 3137/sj ind.8/tkd n/6/2021 | 51.89 | | |
| | Ykk | 7387/sj ind.8/tkd n/12/2022 | 66.,5 | | |
| | Dacon | 4497/sj ind.8/tkd n/7/2021 | 52.34 | 52.34 | |
| 4.6 | PVC door | | | | |
| | S-plus | 7308/sj ind.8/tkd n/12/2022 | 79.86 | 1.6 | 1.28 |
| | Kends | 7436/sj ind.8/tkd n/8/2021 | 75.37 | | |
| | Karang pilang | 4794/sj ind.8/tkd n/9/2022 | 55.36 | | |
| 4.7 | Solid wood windows | Artisan product | 99.8 | | |
| 4.8 | Aluminium window | | | | |
| | Alexindo | 3171/sj ind.8/tkd n/6/2021 | 60.71 | 1.29 | 0.78 |
| | Forta | 3137/sj ind.8/tkd n/6/2021 | 51.89 | | |
| | Ykk | 7387/sj ind.8/tkd n/12/2022 | 66.5 | | |
| | Dacon | 4497/sj ind.8/tkd n/7/2021 | 52.34 | | |
| 4.9 | Laca tempered | | | | |

Table 2 (continued). Kinds of architectural work with KDN level following certificate stipulated by PT Surveyor Indonesia and PT Sucofindo.

| No | 1 | 2 | 3 | 4 | 3 x 4 |
|-----|-------------------------|----------------------------|-------|------|-------|
| | Asahi | 2800/sj ind.8/tkdn/6/2021 | 61.95 | 0.1 | 0.06 |
| | Fortuna | 7700/sj ind.8/tkdn/8/2021 | 67.09 | | |
| | Maruni | 7771/sj ind.8/tkdn/8/2021 | 68.26 | | |
| | Tamindo | 538/ikta/tkdn/11/2016 | 63.02 | | |
| 5.1 | Lift | | | | |
| | Mitsubishi | 10251/sj ind.8/tkdn/9/2021 | 31.55 | | |
| | Line | 5971/sj ind.8/tkdn/11/2022 | 40.06 | | |
| 5.2 | Wooden stairs | Artisan product | 99.8 | | |
| 5.3 | Railing stainless steel | | | | |
| | Astm 316.9 | 2462/sj ind.8/tkdn/6/2021 | 19.01 | 0.57 | 0.11 |
| 6 | Plafond | | | | |
| 6.1 | Wooden frame | Artisan product | 99.8 | | |
| 6.2 | Galvanize frame | | | | |
| | Kencana | 5750/sj ind.8/tkdn/7/2021 | 60.18 | | |
| | Aplus | 5432/sj ind.8/tkdn/7/2021 | 47.01 | 1.3 | 0.61 |
| | Diamond | 5377/sj ind.8/tkdn/7/2021 | 61.59 | | |
| 6.3 | Galvalume frame | | | | |
| | Kencana | 6847/sj ind.8/tkdn/11/2022 | 60.32 | | |
| | Aplus | 1299/sj ind.8/tkdn/2/2023 | 34.45 | | |
| | Diamond | 5377/sj ind.8/tkdn/7/2021 | 61.59 | | |
| 6.4 | Penutup grc | | | | |
| | Grc board | 4430/sj ind.8/tkdn/9/2022 | 83.45 | 0.3 | 0.25 |
| | Aplus | 4815/sj ind.8/tkdn/7/2021 | 42.76 | | |

Table 2 (continued). Kinds of architectural work with KDN level following certificate stipulated by PT Surveyor Indonesia and PT Sucofindo.

| No | 1 | 2 | 3 | 4 | 3 x 4 |
|-----|----------------------|----------------------------|-------|------|-------|
| | Grc board | 4430/sj ind.8/tkdn/9/2022 | 83.45 | 0.3 | 0.25 |
| | Aplus | 4815/sj ind.8/tkdn/7/2021 | 42.76 | | |
| | Natapon | 6376/sj ind.8/tkdn/7/2021 | 50.71 | | |
| 6.5 | Gypsum cover | | | | |
| | Knauf | 1627/sj ind.8/tkdn/2/2023 | 30.76 | | |
| | Jayaboard | 1780/sj ind.8/tkdn/2/2023 | 30.34 | 1.43 | 0.43 |
| | Aplus | 1307/sj ind.8/tkdn/2/2023 | 51.4 | | |
| | Kalsiboard | 3028/sj ind.8/tkdn/7/2022 | 53.27 | | |
| 6.6 | Pvc cover | | | | |
| | Indo plafond | 7247/sj ind.8/tkdn/12/2022 | 63.65 | | |
| | Sun plafond | 7154/sj ind.8/tkdn/12/2022 | 63.15 | | |
| | Shunda plafond | 5279/sj ind.8/tkdn/10/2022 | 87.16 | | |
| | Natapon | 6376/sj ind.8/tkdn/7/2021 | 50.71 | | |
| 7 | | | | | |
| 7.1 | Glazing ceramic tile | | | | |
| | Kanmuri | 4251/sj ind.8/tkdn/9/2022 | 80.89 | 4.1 | 3.32 |
| | Kia | 411/ikta/tkdn/11/2017 | 77.06 | | |
| 7.2 | Metal roof tile | | | | |
| | Karang pilang | 4795/sj ind.8/tkdn/9/2022 | 57.85 | | |
| | Sakura | 2733/sj ind.8/tkdn/6/2021 | 51.54 | | |
| | Prima | 5604/sj ind.8/tkdn/10/2022 | 58.19 | | |
| | Rainbow | 3243/sj ind.8/tkdn/6/2021 | 38.52 | | |

Table 2 (continued). Kinds of architectural work with KDN level following certificate stipulated by PT Surveyor Indonesia and PT Sucofindo.

| No | 1 | 2 | 3 | 4 | 3 x 4 |
|-------|---------------------------|-----------------------------|-------|------|-------|
| 7.3 | Genteng bitumen | | | | |
| | Onduvilla | 6926/sj ind.8/tkdn /11/2022 | 24.77 | | |
| 7.4 | List plank Grc | | | | |
| | Grc board | 4430/sj ind.8/tkdn /9/2022 | 83.45 | | |
| | Aplus | 4815/sj ind.8/tkdn /7/2021 | 42.76 | 0.19 | 0.08 |
| 7.5 | List plank wood | produk pengrajin | 99.8 | | |
| 7.6 | Upvc | | | | |
| | Roofmaxx | 2866/sj ind.8/tkdn /6/2021 | 75.55 | | |
| | Alderon | 2122/sj ind.8/tkdn /6/2021 | 62.73 | | |
| | Holodeck | 4244/sj ind.8/tkdn /9/2022 | 79.83 | | |
| 8 | Wall and column finishing | | | | |
| 8.1 | Cat weather shield | | | | |
| | Vinilex | 6617/sj ind.8/tkdn /7/2021 | 35.88 | | |
| | Dulux | 187/sj ind.8/tkdn /1/2023 | 58.42 | 3.24 | 1.89 |
| | Jotun | 1255/sj ind.8/tkdn /5/2021 | 34.5 | | |
| 8.2 | Cat acrye interior | | | | |
| | Vinilex | 8567/sj ind.8/tkdn /8/2021 | 38.03 | | |
| | Dulux | 182/sj ind.8/tkdn /1/2023 | 62.13 | | |
| | Jotun | 2626/sj ind.8/tkdn /3/2023 | 50.23 | 4.45 | 2.24 |
| 8.3 | Cat duco | | | | |
| 8.3.1 | | 8320/sj ind.8/tkdn /8/2021 | 39.98 | | |
| 8.3.2 | | 1257/sj ind.8/tkdn /5/2021 | 26.12 | 1.1 | 0.29 |
| 8.4 | Skim coat | | | | |
| | Propan | 4817/sj ind.8/tkdn /7/2021 | 70.05 | | |

Table 2 (continued). Kinds of architectural work with KDN level following certificate stipulated by PT Surveyor Indonesia and PT Sucofindo.

| No | 1 | 2 | 3 | 4 | 3 x 4 |
|-----|---------------------------|------------------------------|-------|------|-------|
| | Emco | 5525/sj ind.8/tkdn /7/2021 | 85.88 | | |
| 8.5 | Natural stone+ coating | | | | |
| | Propan | 118/sj ind.8/tkdn /1/2022 | 52.76 | 0.09 | 0.05 |
| | Andesit | 11611/sj ind.8/tkdn /12/2021 | 99.75 | 2.23 | 2.22 |
| 8.6 | Aluminium composite panel | | | | |
| | Seven | 496/sj ind.8/tkdn /3/2022 | 40.44 | | |
| | Goodsense | 2131/sj ind.8/tkdn /6/2022 | 3 | | |
| 8.7 | Marble plating | | | | |
| | Citatah | 8147/sj ind.8/tkdn /12/2022 | 93.17 | | |
| | Lampung | 8134/sj ind.8/tkdn /12/2022 | 98.48 | | |
| 9 | Sanitary | | | | |
| 9.1 | Closet sitting | | | | |
| | Toto | 7587/sj ind.8/tkdn /8/2021 | 41.15 | 2.23 | 0.92 |
| | Amstand | 2198/sj ind.8/tkdn /6/2022 | 36.72 | | |
| | Ina | 8158/sj ind.8/tkdn /8/2021 | 50.05 | | |
| 9.2 | Squat closet | | | | |
| | Toto | 7587/sj ind.8/tkdn /8/2021 | 41.15 | | |
| | Amstand | 2201/sj ind.8/tkdn /6/2022 | 70.68 | 1.1 | 0.78 |
| | Ina | 8253/sj ind.8/tkdn /8/2021 | 79.72 | | |
| 9.3 | Wastafel | | | | |
| | Toto | 7560/sj ind.8/tkdn /8/2021 | 64.68 | 1.75 | 1.13 |
| | Amstand | 10269/sj ind.8/tkdn /9/2021 | 62.91 | | |

Table 2 (continued). Kinds of architectural work with KDN level following certificate stipulated by PT Surveyor Indonesia and PT Sucofindo.

| No | 1 | 2 | 3 | 4 | 3 x 4 |
|-----|--------------|----------------------------|-----------|----------|-------|
| | Ina | 8507/sj ind.8/tkdn /8/2021 | 41.9 9 | | |
| 9.4 | Kitchen sink | | | | |
| | Royal | 2963/sj ind.8/tkdn /7/2022 | 14.5 | 0.0 1 | 0 |
| | Imtech | 2963/sj ind.8/tkdn /7/2022 | 14.5 | | |
| 9.5 | Wall tap | | | | |
| | Toto | 202/bim/t kdn/4/2015 | 24.7 | 0.0 6 | 0.01 |
| | Amstand | 2204/sj ind.8/tkdn /6/2022 | 33.0 8 | | |
| 9.6 | Shower tap | | | | |
| | Toto | 202/bim/t kdn/4/2015 | 20.3 5 | 2.1 | 0.43 |
| | Amstand | 2204/sj ind.8/tkdn /6/2022 | 33.0 8 | | |
| 9.7 | Shower | | | | |
| | Toto | 202/bim/t kdn/4/2015 | 46.4 2 | 0.1 4 | 0.06 |
| | Amstand | 2204/sj ind.8/tkdn /6/2022 | 33.0 8 | | |
| 9.8 | Jet washer | | | | |
| | Toto | 202/bim/t kdn/4/2015 | 46.4 2 | 0.0 9 | 0.04 |
| 9.9 | Floor drain | | | | |
| | Toto | 202/bim/t kdn/4/2015 | 91.5 8 | 0.0 4 | 0.04 |
| 9.1 | Urinoir | | | | |
| | Toto | 7387/sj ind.8/tkdn /8/2021 | 60.5 2 | 0.1 1 | 0.07 |
| | Amstand | 2204/sj ind.8/tkdn /6/2022 | 50.6 2 | | |
| | Total | 51.49 | 31.9 1 | | |

The KDN level of architecture work uses the Equation 2.

$$N = M \times B \quad (2)$$

where

N = total KDN value

M = KDN value of the material stated in the certificate

B = Weight of installed work

For example, a filling wall uses light brick with Grand Elephant. This product has a certificate with no 3576/SJIND.8/KDN/6/2021 and has a KDN value of 88.35% as a result of the assessment from PT Sucofindo then multiplied by the weight of the work in the budget draft so that the KDN value of the work is obtained.

M = 88.35% (PT Sucofindo's assessment)

B = 0.62% (weight of work according to draft)

So that

N = 88,35% x 0,62%

N = 0,54%

Determining mean, min and max are using statistics. The descriptive statistical analysis result of KDN-level achievements will show construction actors for implementing green buildings. Presidential Regulation 2 of 2022 states that local content is at least 40% [2].

3 Results and discussion

3.1 Result

With the data processing process taken from 21 buildings, KDN levels were recapitulated from 14.30 to 45.59%. Table 3 describes KDN level results for 21 buildings

3.2 Discussion

The weight of work is the value of installed material in an activity obtained from the total value divided by the activity's total value (Equation 3)

$$\text{weight} = \frac{\text{work cost}}{\text{total cost of work}} \times 100\% \quad (3)$$

PT Sucofindo or PT Surveyor Indonesia issues the KDN value of products as the party appointed by the Ministry of Industry to assess outcomes based on calculations from various aspects, including raw materials, production processes, labour, and production management of related products [12]

The average KDN level for 21 (twenty one) building construction activities owned by the Bogor Regency Government from 2017 to 2022 was 26.28% (65.70% of architecture work).

From Table 1, the activity with the smallest KDN value is 14.30% (76.97% of architecture work) in the construction of the IGD Ponok Phase II building in the 2021 activity year; the owner of the activity is Cibinong Hospital. In this activity, the portion of architectural work is tiny because this is the advanced stage or completion of the same work in the previous financial year. Moreover, it is dominated by mechanical, electrical, and plumbing work, so the building can function as an emergency and neonatal inpatient installation.

Table 3. Results of KDN level calculation in 21 buildings in Bogor Regency.

| NO | Buildings | Floor | KDN level % | Weight arch % | KDN level arch % |
|-------|------------------------------------|-------|-------------|---------------|------------------|
| 1 | Rehab gedung serba guna | 2 | 31.91 | 51.49 | 61.98 |
| 2 | Rehab kantor kodim 0621 | 2 | 27.63 | 46.91 | 58.91 |
| 3 | Pemb. Kantor dan lab. Upt cibinong | 2 | 36.30 | 57.06 | 63.62 |
| 4 | Pemb. Gom kec. Jonggol | 3 | 34.48 | 56.67 | 60.85 |
| 5 | Pemb. Gedunggununjang | 3 | 25.38 | 50.29 | 50.46 |
| 6 | Pemb. Gedung uptij cigudeg | 2 | 24.96 | 38.00 | 65.68 |
| 7 | Pemb. Upt irigasi wil iv lw. Liang | 2 | 19.56 | 26.63 | 73.42 |
| 8 | Revitalisasi puskesmas ciawi | 2 | 35.01 | 50.70 | 69.04 |
| 9 | Pemb. Gedung forensik & mortuari | 3 | 19.98 | 30.46 | 65.62 |
| 10 | Revitalisasi igd | 1 | 15.74 | 24.09 | 65.33 |
| 11 | Pemb. Puskesmas kemang | 2 | 31.49 | 44.30 | 71.08 |
| 12 | Pemb. Gedung serbaguna | 2 | 14.47 | 20.44 | 70.79 |
| 13 | Pemb. Gedung kantor | 2 | 27.65 | 36.53 | 75.68 |
| 14 | Mesjid besar kec. Tajur halang | 2 | 25.06 | 35.35 | 70.89 |
| 15 | Pemeliharaan gedung rafflesia | 2 | 31.12 | 50.24 | 61.95 |
| 16 | Renovasi gedung kantor | 2 | 37.49 | 67.23 | 55.76 |
| 17 | Gudang kpud kab. Bogor | 2 | 39.78 | 46.33 | 85.87 |
| 18 | Pemb. Ged. Aula polres bogor | 2 | 18.39 | 27.95 | 65.80 |
| 19 | Gedung igd ponek tahap ii | 2 | 14.30 | 18.57 | 76.97 |
| 20 | Tribun stadion mini jonggol | 2 | 15.63 | 26.44 | 59.10 |
| 21 | Gedung barang bukti | 2 | 45.59 | 60.95 | 74.79 |
| Total | | | 27.23 | 41.27 | 65.99 |

Meanwhile, the activity with the most significant KDN value was obtained by the Bogor Regency KPUD building construction activities in 2022 with a figure of 39.57% (85.85% of architecture work) is possible because this activity starts from vacant land that does not require demolition. Hence, the portion of architectural work becomes the majority in this two-story building. In addition, it also indicated a tendency to use materials with high KDN values, thus increasing the weight of obtaining the total KDN level.

Other activities among the most significant and most negligible generally are buildings additions or expansions due to the need for service functions. In addition, some are built from vacant land conditions, but many buildings use materials whose KDN value is low regarding the certificate. The use of materials with low KDN is caused by several factors, including

Lack of information related to the KDN value of material products that have often been used and proven to be of good quality, but it turns out the KDN value is low. It is because there is a reluctance to use materials with new brands. After all, they have never been used in other activities, even though they have a high KDN value compared to well-known brands. In addition, there is a brand name that thinks imported products are always superior in quality.

These factors reduce architectural KDN level attainment. Another factor is that architecture makes up just a tiny part of the total work.

The structural field has always been the most dominant portion of every activity, and the MEP field is in buildings with special functions, such as public health centers and hospitals. Until some of these unique activities, architecture as an aesthetic rule is often completed later with different budgets.

4 Conclusion

1. The KDN level of building implementation from architectural work is still above 0%, averaging 65.60%.
2. The lowest value is KDN at 50.46%, and the highest is 85.85%.
3. Building providers of architectural works have met the domestic component level requirements
4. The policy of implementing local component level provisions in the Bogor district has been implemented.
5. Government Bogor Regency has ready to implement KDN level as part of green building criteria.

5 Suggestion

1. Future research should consider the entire building, not just architectural work
2. Domestic component level assessments should also be done in other regions

3. Improve the competence of the construction workforce which is part of the TKDN level.

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