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QUANTITY TAKE-OFF AND UNIT PRICE ANALYSIS FOR THE ESTATE SEPAKU HOUSING PROJECT, PENAJAM PASER UTARA REGENCY

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Abstract: Housing development in the buffer area of Indonesia's Nusantara Capital City (IKN) requires accurate, location-sensitive cost estimates, yet the cost structure of such projects remains poorly documented. This study analyzes the Cost Budget Plan (Rencana Anggaran Biaya/RAB) of the Estate Sepaku Housing Project in Penajam Paser Utara Regency using quantity take-off and Unit Price Analysis (Analisis Harga Satuan Pekerjaan/AHSP). A quantitative descriptive case study was applied to a work package of 20 housing units and supporting site infrastructure on a 2,211 m² site with 1,055 m² of building floor area, using working drawings, technical specifications, PUPR Regulation No. 8 of 2023, and the 2023 regional Standard Price List of Goods and Services (SHBJ). Work items were identified, quantities were calculated and reconciled against the cost recapitulation, AHSP-based unit prices were applied, and costs were recapitulated by work group. The total construction cost was Rp4,240,234,957, equivalent to Rp212,011,748 per housing unit and Rp4,019,180 per m² of building floor area, excluding taxes and other non-construction cost components. Wall work dominated at Rp1,202,854,210 (28.37%), followed by roofing work (18.62%), door and window frame work (11.57%), and structural work (11.12%); together these four groups accounted for 69.67% of the total. The novelty of this study lies in mapping the cost drivers of repetitive housing construction in the IKN buffer area, providing normalized cost benchmarks and identifying the work groups that should receive priority in procurement planning and budget control.

Keywords: construction cost estimate; quantity take-off; Unit Price Analysis; housing project

1. INTRODUCTION

The development of infrastructure and residential areas in Indonesia continues to increase along with population growth, urbanization, and the relocation of national development activities to the Nusantara Capital City (IKN). Housing projects in IKN supporting areas require careful cost planning because construction activities in newly developing regions are strongly affected by material availability, transportation access, labor productivity, and local price fluctuations. In construction project management, cost performance is one of the key indicators of project success, in addition to quality and time performance (Arianie & Puspitasari, 2017; Stringer et al., 2025). Inaccurate early cost estimates may cause budget shortages, cost overruns, procurement problems, and delays during construction (Bozgulova et al., 2019; Stringer et al., 2025).

The accuracy of an RAB rests on three interacting factors: the quality of the quantity take-off, the appropriateness of the unit prices, and the suitability of the AHSP applied to labor, material, and equipment components (Nurcahyani & Sari, 2023). Previous work has established each factor separately. Quantity-based calculation and AHSP have been shown to support budget control (Fazeli et al., 2021), to generate systematic estimates for housing (Harahap, 2021), and to provide a structured basis for resource requirements (Delsi et al.,

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2022), while comparative studies demonstrate that different calculation methods, price references, and wage assumptions yield materially different costs even for buildings of similar function (Ferdinand & Pamadi, 2023; Permadi et al., 2018). Read together, however, these studies treat cost estimation mainly as a methodological comparison asking which method or price reference produces the more accurate figure rather than asking how the resulting cost is distributed across work groups. They therefore deliver total costs but not a cost structure that practitioners can act upon, and they are calibrated to established markets rather than to rapidly developing areas where prices, logistics, and labor supply differ.

Indonesian studies show a similar pattern. Cost analyses have addressed the partial rehabilitation of earthquake-resistant simple houses (Rianto et al., 2026), disaster logistics warehouse planning (Sa'adah et al., 2025), the comparison of precast concrete panels with conventional concrete (Nurcahyani & Sari, 2023), and earned-value evaluation of cost and time performance (Alwarizi & Sari, 2024). These works are valuable references, yet each is bound to a different building type or a different objective rehabilitation, non-residential facilities, material comparison, or performance monitoring and none reports the cost composition of housing development in the IKN buffer area derived from an item-level quantity take-off and AHSP recapitulation (Hu & Skibniewski, 2021).

This study addresses that gap, and differs from the studies above in two respects. Methodologically, it carries the analysis through to an item-level recapitulation in which every quantity is reconciled against the detailed cost table, and expresses the outcome not only as a total but as a ranked cost structure with normalized indicators cost per housing unit and cost per square metre that permit comparison with other projects. Practically, it treats the RAB as a cost-control instrument rather than a budgeting formality. The Estate Sepaku Housing Project was selected because it combines the local price conditions of a rapidly developing IKN supporting area with the repetitive housing-unit construction that amplifies the effect of any single unit-price error across 20 units. Knowing which work groups dominate that structure tells owners, contractors, and consultants where procurement attention and price monitoring will have the greatest effect. Accordingly, the objective of this study is to analyze the Cost Budget Plan of the Estate Sepaku Housing Project in Penajam Paser Utara Regency using quantity take-off and AHSP, and to identify the dominant cost components together with their implications for budget control in housing projects located in the IKN buffer area.

2. METHOD

This study employed a quantitative descriptive method with a case-study approach. The object of the study was the Estate Sepaku Housing Project in Penajam Paser Utara Regency, East Kalimantan, Indonesia. Based on the project quantity recapitulation, the analyzed package covered 20 housing units and supporting site infrastructure, including preparatory work, earthwork, septic tank work, foundation work, wall work, structural work, roofing work, flooring, sanitary work, door and window frame work, water installation, painting, electrical installation, drainage, road work, and green open space work. The site area used in the calculation was 2,211 m², and the calculated building floor area was 1,055 m².

The data used in this study were secondary data obtained from project planning documents. The main data consisted of working drawings, technical specifications, AHSP based on the Regulation of the Minister of Public Works and Housing Number 8 of 2023, and the 2023 regional Standard Price List of Goods and Services (SHBJ) used as the reference for local unit prices. The use of local price data is important because construction costs in Penajam Paser Utara and the surrounding East Kalimantan region are influenced by material supply chains, labor availability, and transportation distance to the project site (Bozgulova et al., 2019).

The analysis was carried out in four stages. First, all work items were identified from the drawings and technical specifications. Second, quantity take-off was conducted by calculating the dimensions of each work item according to its unit, such as m² for area-based work, m³ for volume-based work, kg for reinforcement, and unit or point for fixtures and installation items. Third, each quantity was multiplied by the corresponding AHSP-based unit price. The unit price included labor, material, equipment, and a 10% overhead and profit component at the unit-price analysis stage. Fourth, the cost of each item was recapitulated into work groups to determine the total project cost and the percentage contribution of each group (Abdullahi et al., 2019).

The reliability of the quantities was safeguarded in three ways. First, every work item was measured directly from the working drawings and each quantity was recalculated a second time before being entered into the cost recapitulation; the take-off was performed by the first author and independently re-checked by the co-authors as supervising lecturers, so that no quantity entered the RAB on the strength of a single calculation. Second, the quantity summary and the detailed cost recapitulation were reconciled item by item, and any figure that did not

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agree between the two was traced back to its source and corrected, so that the quantities reported in Table 1 are identical to those priced in Table 3. Third, where a dimension in the working drawings disagreed with the project cost document, the drawings and technical specifications were treated as the governing reference and the item was re-measured from the drawings, because the drawings define the physical work to be executed. The 10% overhead and profit rate was adopted from the project cost document and applied uniformly at the unit-price analysis stage, as shown in Table 2; it lies within the overhead and profit limit permitted for AHSP-based estimates under PUPR Regulation No. 8 of 2023.

The cost value reported in this study is limited to the construction cost items included in the project RAB. Value-added tax (PPN/VAT), land acquisition, design and supervision fees, price escalation, and contingency costs were not included because these components were not presented in the project cost document used as the basis of analysis. This scope limitation was stated to make the calculation assumptions clear and to allow replication by future researchers using the same quantity take-off and AHSP procedure.

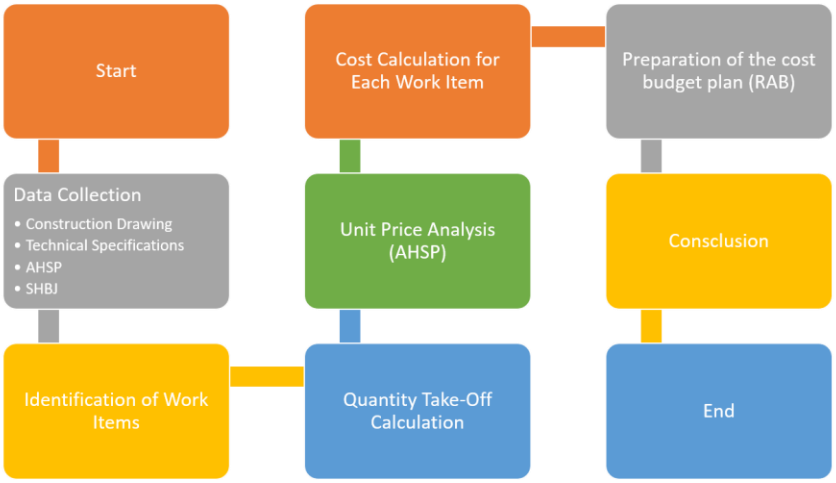


Figure 1. Research Flowchart

3. RESULTS

The Estate Sepaku Housing Project is located in Penajam Paser Utara Regency, East Kalimantan Province, a strategic area supporting the development of the Nusantara Capital City (IKN). The project analyzed in this study consists of 20 housing units and supporting infrastructure. Because the project uses repeated housing-unit components, several work items such as walls, roofing, doors, windows, sanitary fixtures, and utility installations appear in relatively large quantities. This characteristic makes quantity take-off accuracy an important determinant of the final RAB value (Graham et al., 2018).

The analysis was conducted based on working drawings and technical specifications. The work items were grouped into preparatory work, earthwork, septic tank work, foundation work, wall work, structural work, roofing work, flooring, sanitary work, door and window frame work, water installation, painting, electrical installation, drainage, road work, and green open space work. This grouping was used to identify not only the total construction cost, but also the dominant cost components that should become priorities in budget control.

Quantity take-off was performed for each item according to the unit of measurement stated in the project documents. Area-based work such as wall plastering, wall finishing, flooring, roof covering, and painting was calculated in square meters; concrete and excavation work were calculated in cubic meters; reinforcement work was calculated in kilograms; and fixtures or installation items were calculated by unit, set, or point. This standardization of units was necessary because inconsistencies in units may directly affect the validity of cost estimates. For example, the quantity of lightweight brick masonry was calculated based on the total wall length, wall height, and number of wall faces, minus the area of door and window openings. The calculation is shown as follows:

$$\text{Volume} = (P \times T \times n) - Lb \quad (1)$$
$$= (383 \times 3 \times 2) - 446.25$$

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= 2,298.00 - 446.25
= 1,851.75 m² ≈ 1,852 m²

where:

P = total wall length (m)
T = wall height (m)
n = number of wall faces
Lb = total area of door and window openings (m²)

The same quantity take-off procedure was applied to the remaining work items based on the project drawings and technical specifications. The summary of major work quantities is presented in Table 1. The calculation results show that wall-related work had the highest quantities. Wall plastering and wall finishing each reached 3,703.50 m², while lightweight brick masonry reached 1,851.75 m². Roofing work using lightweight steel roof structure and aluzinc roof covering each reached 1,506.00 m². These quantities indicate that wall and roofing components are likely to have a strong influence on the total construction cost.

Table 1. Summary of Major Work Quantities in the Estate Sepaku Housing Project

No	Work Item	Quantity	Unit
1	Wall Plastering	3,703.50	m²
2	Wall Finishing (Skim Coat)	3,703.50	m²
3	Tie Beam Reinforcement	2,627.38	kg
4	Beam Reinforcement	2,608.54	kg
5	Column Reinforcement	2,464.10	kg
6	Site Clearing	2,211.00	m²
7	Lightweight Brick Masonry	1,851.75	m²
8	Foundation Reinforcement	1,823.00	kg
9	Lightweight Steel Roof Structure	1,506.00	m²
10	Aluzinc Roof Covering	1,506.00	m²
11	Electrical Wiring Installation	1,400.00	m
12	Timber Door, Window, and Louver Frames	9.00	m³

Based on Table 1, the largest area-based quantities are wall plastering and wall finishing, followed by lightweight brick masonry and roofing work. Wall plastering and wall finishing each reach exactly twice the lightweight brick masonry area because both faces of every wall are finished, which is why a single structural element generates three of the largest quantities in the project. Reinforcement quantities are also substantial, particularly for tie beam, beam, column, and foundation work. Every quantity in Table 1 was reconciled against the detailed cost recapitulation in Table 3, so that the quantity summary and the priced quantities are consistent; work items with comparatively small quantities, such as septic tank reinforcement (569.88 kg), are therefore not listed among the major quantities but are priced in full in Table 3.

The obtained quantities were then used as the basis for Unit Price Analysis (AHSP). AHSP determines the unit price of each work item by combining labor, material, and equipment requirements. In this study, the AHSP was prepared with reference to the Regulation of the Minister of Public Works and Housing Number 8 of 2023. An example of the unit price analysis for lightweight brick masonry is presented in Table 2.

Table 2. Unit Price Analysis for Lightweight Brick Masonry

No	Component	Code/Unit	Coefficient	Unit Price (Rp)	Total Cost (Rp)
A	**Labor**				
1	General worker	L.01 / OH	0.1667	160,000.00	26,672.00
2	Mason	L.02 / OH	0.0833	175,000.00	14,577.50
3	Head craftsman (lead mason)	L.16 / OH	0.0083	200,000.00	1,660.00
4	Foreman	L.17 / OH	0.0028	230,000.00	644.00
	Total labor cost				**43,553.50**

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B	Materials				
1	Lightweight brick block (10 x 20 x 60 cm)	M.27 / piece	8.750	13,440.00	117,600.00
2	Thin-bed mortar / adhesive cement	M.504 / kg	2.571	65,000.00	167,115.00
	Total material cost				**284,715.00**
C	**Equipment**				**0.00**
D	**Total direct cost (A+B+C)**				**328,268.50**
E	**Overhead and profit (10% x D)**				**32,826.85**
F	**Final unit price (D+E)**				**361,095.00**

Based on the unit price analysis in Table 2, the cost of each work item was calculated by multiplying the quantity by the unit price. The material descriptions in Table 2 were aligned with the lightweight brick masonry item in the RAB so that the work description, material input, coefficient, and unit price were consistent. For example, the cost of lightweight brick masonry was calculated using a quantity of 1,851.75 m² and a unit price of Rp361,095.00/m², as shown below:

$$\text{Work Cost} = \text{Quantity} \times \text{Unit Price} \quad (2)$$

$= 1{,}851.75\ m^2 \times Rp361{,}095.00/m^2$

$= Rp668{,}657{,}666$

Table 3. Cost Budget Plan Recapitulation for the Construction of Estate Sepaku Housing

No	Work Description	Volume	Unit	Unit Price	Total Price
1	**Preparatory Work**				
	Land Clearing	2,211	m²	30,250	Rp66,882,750
	Bouwplank layout measurement	262	m	101,608	Rp26,621,296
	SubTotal				**Rp93,504,046**
2	**Earthwork**				
	Soil excavation	105	m³	27,176	Rp2,847,947
	Soil backfilling	48	m³	214,500	Rp10,352,628
	SubTotal				**Rp13,200,575**
3	**Septic Tank Work**				
	Septic tank formwork	570	m²	79,794	Rp45,473,005
	Septic tank reinforcement	570	kg	13,550	Rp7,721,874
	Septic tank concrete	17	m³	1,262,036	**Rp21,703,788**
	SubTotal				**Rp74,898,667**
4	**Foundation Work**				
	Foundation formwork	58	m²	79,794	Rp4,596,134
	Foundation reinforcement	1,823	kg	23,128	Rp42,161,417
	Footing concrete	10	m³	2,841,894	Rp28,064,414
	SubTotal				**Rp74,821,965**
5	**Wall Work**				
	Lightweight brick masonry	1,852	m²	361,095	Rp668,657,666
	Wall plastering	3,704	m²	80,947	Rp299,787,215
	Wall finishing	3,704	m²	63,294	Rp234,409,329
	SubTotal				**Rp1,202,854,210**
6	**Structural Work**				
	Column formwork	113	m²	212,239	Rp23,876,925
	Column reinforcement	2,464	kg	22,810	Rp56,206,121
	Column concrete	11	m³	2,839,694	Rp31,946,558
	Tie beam formwork	421	m²	205,895	Rp86,743,564
	Tie beam reinforcement	2,627	kg	22,810	Rp59,930,538

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No	Work Description	Volume	Unit	Unit Price	Total Price
	Tie beam concrete	23	m³	2,839,694	Rp65,256,168
	Beam formwork	276	m²	176,691	Rp48,724,310
	Beam reinforcement	2,609	kg	22,810	Rp59,500,715
	Beam concrete	14	m³	2,839,694	Rp39,153,701
	SubTotal				**Rp471,338,599**
7	**Roofing Work**				
	Lightweight steel structure ex Taso AZ 150 truss C.75.75 & TR 40.45	1,506	m²	99,484	Rp149,796,565
	Metal ridge cap	114	m	110,109	Rp12,552,426
	GRC fascia board 8 mm × 20 cm	278	m	114,940	Rp31,953,320
	"Aluzinc Spanrib" roof covering, 0.3 mm thick, high-grade Army Green color, ex Kencana	1,506	m²	162,935	Rp245,336,973
	Meranti wood ceiling frame, painted with red oxide primer, size 4 × 6	780	m²	181,192	Rp141,329,760
	9 mm gypsum ceiling	780	m²	150,050	Rp117,039,000
	K3 wooden profile molding	980	m	93,341	Rp91,474,180
	SubTotal				**Rp789,482,224**
8	**Flooring Work**				
	Concrete plastic sheet	1,055	m²	65,403	Rp69,000,165
	7 cm thick smooth-finished concrete floor	74	m³	1,140,656	Rp84,237,446
	25 × 25 cm bathroom floor tiles	45	m²	317,703	Rp14,296,635
	25 × 40 cm bathroom wall tiles	180	m²	315,112	Rp56,720,160
	SubTotal				**Rp224,254,406**
9	**Sanitary Work**				
	Squat toilet "DUTY/equivalent"	20	unit	611,975	Rp12,239,502
	Plastic corner bathtub/tub, material approval	20	unit	1,316,336	Rp26,326,729
	Onda plastic faucet	20	unit	23,088	Rp461,760
	Onda plastic bathroom floor drain	20	unit	52,170	Rp1,043,400
	PVC plastic water tap for water tank outlet	20	unit	70,900	Rp1,418,000
	1/2" PVC stop valve for water tank inlet	20	unit	70,900	Rp1,418,000
	550 L water tank	20	unit	1,024,500	Rp20,490,000
	SubTotal				**Rp63,397,391**
10	**Door and Window Frame Work**				
	Ulin wood door frame, window frame, and jalousie	9	m³	6,034,886	Rp52,061,755
	Wooden panel door, smooth finishing	60	unit	1,501,806	Rp90,108,360
	Engineering panel door	40	unit	1,501,806	Rp60,072,240
	Ulin Door 70cm x 210cm	20	unit	2,341,911	Rp46,838,220
	Complete framed glass window	140	set	931,064	Rp130,348,960
	"Belluci" lever door lock	120	unit	508,333	Rp60,999,960
	4" stainless steel door hinges	360	pcs	133,334	Rp48,000,240
	Rust-resistant mosquito netting, steel wire	74	m²	4,218	Rp312,132
	PVC-coated chain-link mesh wire Ø2.5 mm for kitchen	11	m²	167,500	Rp1,792,250
	SubTotal				**Rp490,534,117**
11	**Water Installation Work**				
	1/2" Rucika PVC clean water installation	60	m	72,688	Rp4,361,280
	1" Rucika PVC AW clean water installation	100	m	141,240	Rp14,124,000
	2" PVC AW clean water pipe installation	114	m	141,240	Rp16,101,360
	4" Rucika PVC AW wastewater installation	80	m	525,008	Rp42,000,640
	3" Rucika PVC AW wastewater installation	150	m	141,240	Rp21,186,000
	SubTotal				**Rp97,773,280**

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No	Work Description	Volume	Unit	Unit Price	Total Price
12	**Painting Work**				
	Wall water-based paint "Jotun Jotaplast"	3,704	m²	57,300	Rp212,210,550
	Ceiling water-based paint "Jotun Jotaplast"	780	m²	44,744	Rp34,900,320
	Oil paint for frames, doors, and windows "Platone/equivalent"	893	m²	53,221	Rp47,499,519
	Oil paint for fascia board	56	m²	51,128	Rp2,842,717
	SubTotal				**Rp297,453,106**
13	**Electrical Installation Work**				
	Lighting installation using LMK/SPLN Eterna NYM 2 × 2.5 mm cable	1,400	m	35,020	Rp49,028,672
	Socket outlet installation using LMK/SPLN Eterna NYM 3 × 2.5 mm cable	800	m	35,020	Rp28,016,384
	Wall socket outlet ex Broco	80	unit	55,112	Rp4,408,967
	Single switch ex Broco, material approval	60	unit	40,000	Rp2,400,000
	Double switch ex Broco, material approval	40	unit	46,620	Rp1,864,808
	Philips 9-watt LED lamp	20	unit	49,950	Rp999,000
	Philips 14-watt LED lamp	120	unit	62,160	Rp7,459,200
	Grounding panel box	10	unit	460,000	Rp4,600,000
	SubTotal				**Rp98,777,031**
14	**Drainage Work**				
	Drainage excavation	21	m³	27,176	Rp558,698
	Sand backfill	2	m³	456,082	Rp841,471
	U-ditch installation	233	unit	457,241	Rp106,537,153
	SubTotal				**Rp107,937,322**
15	**Road Work**				
	Road cleaning and leveling	337	m²	30,250	Rp10,179,125
	Paving block installation	337	m²	290,966	Rp97,910,059
	Installation of streetlight poles and lamps	5	point	2,950,000	Rp15,286,364
	SubTotal				**Rp113,196,423**
16	**Green Open Space Work**				
	Green open space grass installation	176	m²	34,163	Rp6,010,379
	Paving block installation	40	m²	290,966	Rp11,657,553
	Green open space lighting installation	6	point	1,523,944	Rp9,143,664
	SubTotal				**Rp26,811,596**
	TOTAL				**Rp4,240,234,957**

Table 4. Dominant Cost Components and Cost-Control Priority

Rank	Work group	Cost (Rp)	Share of total (%)
1	Wall Work	1,202,854,210	28.37
2	Roofing Work	789,482,224	18.62
3	Door and Window Frame Work	490,534,117	11.57
4	Structural Work	471,338,599	11.12
5	Painting Work	297,453,106	7.02

Based on Table 3 and Table 4, the total construction cost of Estate Sepaku Housing was Rp4,240,234,957. Wall work was the largest cost component, amounting to Rp1,202,854,210 or 28.37% of the total project cost. The second-largest component was roofing work at Rp789,482,224 or 18.62%, followed by door and window frame work at Rp490,534,117 or 11.57%, and structural work at Rp471,338,599 or 11.12%. These four work groups accounted for approximately 69.67% of the total cost.

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Normalized against the delivered scope, the total corresponds to Rp212,011,748 per housing unit and Rp4,019,180 per m² of building floor area, or Rp1,917,791 per m² of site area. These per-unit figures include a proportional share of the supporting site infrastructure drainage, road, and green open space work which together amount to Rp247,945,341 or 5.85% of the total; excluding that shared infrastructure, the cost attributable to the 20 housing units and their immediate services is Rp199,614,481 per unit. Expressing the RAB in this normalized form allows the estimate to be compared against other housing projects and used as a first-order benchmark for similar developments in the IKN buffer area, which a single aggregate total cannot support.

DISCUSSIONS

The cost of the Estate Sepaku Housing Project is not distributed evenly across the sixteen work groups but is strongly concentrated. Four of the sixteen groups carry 69.67% of the total, while the remaining twelve together account for only 30.33%. In the authors' view this concentration, rather than the total figure itself, is the most practically important outcome of the analysis, because it means that budget control effort does not need to be, and should not be, spread uniformly across the whole RAB. The groups that follow the leading four, namely painting (7.02%), flooring (5.29%), and road work (2.67%), are already substantially less influential, carrying at most a quarter of the weight of wall work, and the six smallest groups together account for only 8.17% of the project. Allocating supervision, procurement attention, and price monitoring equally over all sixteen groups would therefore misdirect managerial effort. Recapitulated in this way, the RAB delivers not merely a budget figure but a ranking of where cost risk actually sits.

The dominance of wall work is explained by the interaction of quantity and unit price rather than by unit price alone. Lightweight brick masonry alone accounts for Rp668,657,666, 55.6% of the wall subtotal and 15.77% of the entire project because 1,851.75 m² of masonry carries the highest unit price among the wall items at Rp361,095/m². Plastering and skim-coat finishing then apply to 3,703.50 m² each, twice the masonry area, adding a further Rp299,787,215 and Rp234,409,329 respectively. Because the 20 houses repeat an identical unit, each of these quantities is multiplied twentyfold, so an error or price movement in a single wall item propagates across the whole package: a 10% increase in wall-work cost alone would add Rp120,285,421, equal to 2.84% of the total project budget. This sensitivity is consistent with Delsi et al. (2022), who emphasized that work quantities and material unit prices are the key determinants of construction cost estimates, and with Rianto et al. (2026) and Nurcahyani and Sari (2023), who reported comparable sensitivity to material selection in house rehabilitation and in the comparison between precast concrete panels and conventional concrete.

Roofing work ranks second for a different reason: it is driven by specification rather than by area. The roofed area is 1,506.00 m², well below the wall area, yet the group totals Rp789,482,224 because it stacks five separately specified layers aluzinc spanrib covering (Rp245,336,973, or 31.1% of the group), the lightweight steel truss (Rp149,796,565), the meranti ceiling frame (Rp141,329,760), the gypsum ceiling (Rp117,039,000), and profile molding (Rp91,474,180). Each layer carries its own material specification and procurement price, so roofing cost is largely fixed at the design and procurement stage rather than on site. The same logic governs door and window frame work, where cost accumulates from the repeated fittings of 20 units 140 glazed window sets, 120 doors, and 360 hinges rather than from any single expensive item. Compared with Sa'adah et al. (2025), who highlighted the importance of RAB analysis in disaster logistics warehouse planning, this study extends the discussion by identifying cost-control priorities in repetitive housing construction in the IKN buffer area. For implementation, the RAB should be compared with actual construction costs and monitored using project-control methods such as earned value analysis, as demonstrated by Alwarizi and Sari (2024).

Comparison with previous cost studies has to be made through normalized indicators rather than through totals, because scope, year, and price basis differ from one project to another. Expressed per square metre of floor area, the estimate obtained here is Rp4,019,180/m², derived from AHSP under PUPR Regulation No. 8 of 2023 combined with the 2023 regional SHBJ. Ferdinand and Pamadi (2023) and Permadi et al. (2018) showed that the choice of price reference alone, whether SNI 2008, AHSP 2013, AHSP 2016, AHSP 2022, or a contractor's own calculation, shifts the estimated cost of otherwise comparable houses, and Nurcahyani and Sari (2023) reported the same effect between AHSP 2016 and AHSP 2022. It follows that the absolute value reported in this study is specific to the 2023 price basis and to Penajam Paser Utara conditions, and should not be transferred to another region or another AHSP edition without re-pricing. This is precisely why the study reports the cost structure and its normalized indicators rather than the total alone. The percentage composition of the work groups is governed by the physical design and by the repetition of identical units, whereas the absolute rupiah value is governed by the price basis; the composition is therefore the more transferable of the two. The new contribution offered here is

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that cost-driver map for housing construction in the IKN buffer area, together with the benchmark values of Rp212,011,748 per unit and Rp4,019,180/m², which give owners, contractors, and consultants a defensible starting point for planning and for checking the plausibility of future estimates in the same area.

4. CONCLUSION

The Cost Budget Plan of the Estate Sepaku Housing Project totals Rp4,240,234,957 for 20 housing units and supporting site infrastructure, equivalent to Rp212,011,748 per unit and Rp4,019,180 per m² of building floor area. Four work groups wall (28.37%), roofing (18.62%), door and window frame (11.57%), and structural work (11.12%) account for 69.67% of that total, and they dominate for different reasons: wall cost is driven by repeated large quantities, roofing by layered material specifications, and door and window frame cost by the repetition of fittings across the 20 units. For procurement planning and cost control this concentration is directly actionable. Specifications and prices for lightweight brick, mortar, aluzinc roofing, and steel truss components should be fixed early, before they are locked in by design; the repeated door, window, and frame items should be consolidated into volume procurement across the 20 units; and wall-material prices warrant the closest monitoring, since a 10% movement in wall-work cost alone shifts the budget by Rp120,285,421, or 2.84%. Managing these four groups therefore governs roughly seven-tenths of the project's cost exposure.

The limitation of this study is that the analysis was based on secondary planning documents and did not compare the planned RAB with actual construction realization. In addition, VAT, contingency, escalation, land acquisition, and design/supervision costs were outside the calculation scope. Future research is recommended to compare the planned RAB with actual project costs, evaluate cost deviations during construction, and perform sensitivity analysis on material price changes, particularly for lightweight brick, roofing material, reinforcement steel, and finishing work.

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