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Lean Green Building in Subsidized Housing: Capturing Value through Sales Absorption Rather than Price Premium

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Abstract

Background: Indonesian subsidized housing operates under a regulated price ceiling that prevents developers from charging a green premium for environmentally improved homes, leaving the economic rationale for green design unclear in this segment, a gap that prior sustainable-business-model research on value capture has rarely addressed.
Objective: This study examines how a medium-scale developer captures value from lean green-building features when a price premium is not possible, and proposes capital velocity as an alternative value-capture mechanism for price-regulated housing markets.
Methods: A qualitative single-case study of a subsidized housing project in Garut, West Java, draws on internal and practitioner interviews (four internal respondents; 20 buyers), sales-absorption data, and field observation, and applies a two-by-two comparative logic (competence × green design) with member-checked thematic coding; reporting follows the SRQR guideline.
Results: Value appears associated primarily with faster sales absorption, about six units per month against zero to three for comparators of similar price, rather than per-unit margin, and buyers are motivated mainly by thermal comfort, perceived quality, and aesthetics rather than environmental awareness, though other factors such as location and developer reputation may also contribute.
Conclusion: Lean green design can be made viable in price-capped housing by functioning as an instrument of capital velocity; as a single-firm study with researcher positionality, the findings are analytical and exploratory rather than statistical.

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INTRODUCTION

Indonesia continues to face a persistent housing backlog, estimated at roughly 9.9 to 12.7 million units depending on the measurement basis (P. Indonesia, 2025; Permukiman, 2024). This deficit keeps subsidized housing central to policy for expanding formal home ownership among low-income households. Supply for the low-to-middle segment is constrained less by demand than by the economics of the segment: developers are reluctant to serve it because of thin margins, and the viability of any project depends on a low-margin, cash-flow-sensitive structure in which delays in selling built units directly erode returns.

At the same time, environmental expectations for housing are rising. The Indonesia Green Affordable Housing Program, introduced in 2023, supports green housing for low-income households through eco-friendly materials, energy-efficient design, and dedicated financing, aiming to build 100,000 greenhouses by 2024 and to reach net-zero housing by 2050 (Finansial,

2024; Rakyat, 2024). Yet green design remains weakly diffused in the affordable segment, where most homes are built (Purnomo et al., 2024). This creates a practical and analytical problem that has received little attention: green features raise construction cost, and the conventional way to recover that cost is a price premium paid by environmentally motivated buyers. In Indonesian subsidized housing the selling price is capped by regulation, so a premium is structurally impossible regardless of buyer preferences. The ceiling is set by region under Decree No. 689/KPTS/M/2023; for the Java region outside Jabodetabek it was Rp 162 million in 2023, rising to Rp 166 million from 2024 (Rakyat, 2023). This regulatory ceiling closes the conventional green-premium mechanism and makes an alternative value-capture mechanism necessary.

A business model describes how a firm creates, delivers, and captures value (Acayip et al., 2026; Osterwalder & Pigneur, 2010; Teece, 2010). Sustainable business models extend this logic by integrating economic, environmental, and social value rather than economic value alone (Bocken et al., 2014; Elkington, 1994; Woldeyes et al., 2025), and recent reviews show there is no single template, only a portfolio of innovation pathways firms adopt to become sustainable (Mignon & Bankel, 2023). Within this stream, value capture is the mechanism by which part of the value generated for stakeholders is converted into value useful to the firm (Ferlito & Faraci, 2022), and the Triple Layered Business Model Canvas operationalizes the three value layers for design purposes (Joyce & Paquin, 2016; Midgley & Arya, 2022). This study takes value capture as its central construct, asking which element of the model allows green design to pay for itself.

In this study, lean green building refers to low-cost, passive, and directly experienceable design measures that improve comfort and resource efficiency without relying on expensive technologies or formal certification. In the subsidized-housing context, this includes reflective or insulated roofing, natural ventilation, facade shading, controlled openings, and efficient lighting. The term 'lean' is used because the features are selected under strict cost constraints and must support affordability, constructability, and sales absorption.

Green features raise construction cost, and the conventional way to recover that cost is a price premium paid by buyers who value environmental performance. The empirical literature finds this premium modest and conditional: willingness to pay is knowledge-dependent and often weak, and poor willingness to pay, not incremental cost, is the binding constraint on green-building diffusion (Al Mamun et al., 2023). Where premiums appear, they are typically modest and contingent on buyer knowledge and recognized certification. The premium mechanism therefore presupposes a market in which price can move with environmental quality, an assumption that fails in price-regulated segments.

Indonesian subsidized housing operates under a regulated selling-price ceiling administered through the FLPP scheme and set by region under Decree No. 689/KPTS/M/2023 (Rakyat, 2023), and developers in this segment work on thin margins, which discourages voluntary cost-adding features. Policy ambition for green affordable housing is rising, but the residential sector still falls outside most mandatory green-building requirements, which under Government Regulation No. 16/2021 apply mainly to large buildings (Purnomo et al., 2024)(G. of Indonesia, 2021). The price cap therefore closes the premium channel in the segment where affordability constraints are strongest.

When price is fixed, a developer's return depends less on margin per unit than on how quickly built inventory converts back into cash. In financial terms, the return on working capital is the product of unit margin and the velocity of turnover, so with margin held constant by regulation, the rate of sales absorption becomes the operative lever. This logic is consistent with the DuPont view, in which return reflects both profit margin and asset turnover, and with real-estate practice, where the absorption rate measures how quickly available units are sold (Brigham & Houston, 2019; Gallagher, 2022; Geltner et al., 2014). Sales absorption is a recognized indicator of project performance, yet it is rarely connected to the value-capture discussion in the green-building literature. This study positions absorption velocity as the mechanism linking green design to financial viability in the absence of a premium.

Whether green design raises absorption depends on what buyers respond to. Evidence suggests that purchase decisions in affordable segments are driven by experiential attributes, thermal comfort, perceived quality, and aesthetics, more than by environmental awareness, consistent with the finding that willingness to pay for environmental attributes is weak (Al

Mamun et al., 2023). This distinction matters analytically: it implies that green design captures value through saleability rather than through an environmental premium.

Taken together, the literature treats the price premium as the default value-capture route for green building and says little about segments where that route is closed by regulation. It also tends to attribute performance to green features without separating them from general operational competence. This study addresses both gaps: it proposes capital velocity as the value-capture mechanism in price-capped housing, and it uses a two-by-two comparative logic (competence × green design) to separate the contribution of green design from that of competence. The conceptual chain examined is: lean green design → higher thermal comfort and perceived quality → faster sales absorption → improved return on working capital, without a change in per-unit margin.

Specifically, prior sustainable-business-model studies have modelled value capture mainly through willingness-to-pay premiums (Al Mamun et al., 2023) or through generic value-capture frameworks that do not test turnover-based mechanisms (Ferlito & Faraci, 2022; Mignon & Bankel, 2023) none has examined how value can still be captured once the premium channel is closed by regulation, and none has separated a green-design effect from general developer competence. By reframing capital velocity, rather than margin, as the value-capture channel, and by using a two-by-two comparative device to isolate the green-design contribution from competence, this study extends the sustainable-business-model literature into price-capped contexts that the premium-centered literature has not addressed.

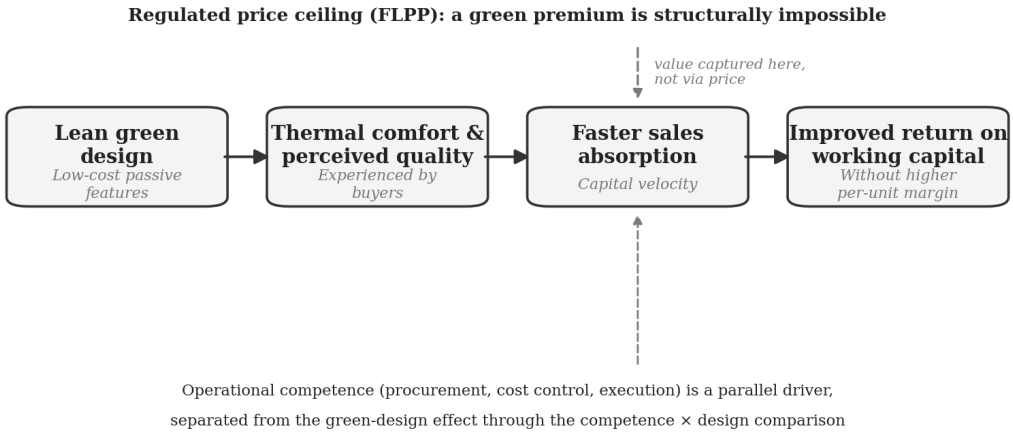

Figure 1. Conceptual framework: lean green design as an instrument of capital velocity in price-capped housing.

This raises the central question: if a developer cannot recover the cost of green features through a higher price, how can green design be made economically viable in the subsidized segment? Therefore, this study is guided by the following research question: How can lean green design create economic value for developers in price-capped subsidized housing when a price premium is structurally unavailable? The study addresses this through a single-case study of a subsidized housing project in Garut, West Java, developed by a medium-scale firm. It argues that the operative value-capture mechanism in this segment is capital velocity: green features that improve thermal comfort and perceived quality raise the rate of sales absorption, improving the return on a developer's working capital without any gain in per-unit margin.

The study makes two contributions. First, it offers a value-capture account of green building tailored to price-capped segments, where the premium channel is closed. Second, because operational competence and green design are entangled, it uses a two-by-two comparative logic to separate the contribution of green design from that of general competence, guarding against over-attribution. Given its single-case design and the researcher's position within the firm, the contribution is analytical rather than statistical.

METHOD

This study used a qualitative single-case design (Hossain et al., 2024; Yin, 2018) to examine how a medium-scale developer captured value from green design in price-capped subsidized housing. A case study was appropriate because the research question was explanatory and mechanism-oriented: it asked how value was captured rather than how much, and the phenomenon could not be separated from its regulatory and market context (Eisenhardt, 1989; Li et al., 2026; Yin, 2018). The aim was analytical generalization to the medium-scale developer archetype, rather than statistical generalization. Reporting followed the Standards for Reporting Qualitative Research (O'Brien et al., 2014; Zhao et al., 2026).

The case was a subsidized housing project in Garut, West Java, developed by a medium-scale firm. To protect commercial confidentiality and the identities of peer developers who shared data, the firm, the project, and the comparator projects were anonymized, and the location was reported at the district level only. The project comprised 155 units, each with 66 m^2 of land area and 32 m^2 of floor area, and was sold at Rp 166 million, the regulated ceiling for the region (Rakyat, 2023). It applied low-cost passive measures described here as Lean Green Building: UPVC roofing, aluminium bubble-foil insulation, a perforated-block (roster) second skin, natural cross-ventilation, a controlled window-to-wall ratio, and LED lighting. Features that were planned but had not yet been implemented (photovoltaic systems, rainwater harvesting, smart metering, and light sensors) were treated as a future agenda and excluded from the empirical claims. The regulated price removed premium as a value-capture channel, which made the case analytically useful for isolating other mechanisms.

Because operational competence and green design were entangled in a single project, the analysis used a two-by-two frame defined by operational competence (higher/lower) and green design (present/absent). The case occupied the higher-competence, green-design cell. The comparison sought to hold competence roughly constant across reference projects so that the incremental contribution of green design to sales absorption could be interpreted separately from that of general competence, such as procurement and cost efficiency. This was an interpretive separation rather than a controlled identification; with few cases, it supported reasoning about direction and mechanism rather than causal estimation. The study triangulated five sources of evidence, summarized in Table 1.

Table 1
Data sources and analytical purpose

Data source	Respondents / records	Purpose in the analysis
Internal semi-structured interviews	4 commissioners and managers	Understand strategic rationale, delivery capability, cost control, sales process, and project execution
External / institutional context	Informal consultations with peer developers, GBCI, REI, and Apersi representatives/practitioners	Validate industry context, affordability constraints, green-housing adoption, and comparator logic
Consumer questionnaire and short interviews	20 buyers and prospective buyers	Identify buyer motivation and whether green features are recognized as environmental value or experienced as comfort/design value
Internal sales records	15-month sales data; 90 of 155 units sold and constructed	Measure historical sales absorption of the case project
Comparator data and field observation	Comparator A: owner-provided sales data with consent; Comparator B: field observation	Provide reference points for the competence x green-design comparison

The provenance of comparator absorption data was stated transparently: one figure was shared by a peer practitioner with consent, while another was derived from field observations over several years. These were not public records, which constrained comparability and was

treated as a limitation.

The internal semi-structured interviews used a guide covering four themes: (1) the strategic rationale for adopting lean-green features under the price ceiling; (2) delivery and cost-control practices; (3) perceived buyer responses to the green features; and (4) the sales process and absorption performance. Illustrative questions included, "What motivated the decision to include this feature given the fixed selling price?" and "How do you believe buyers perceive the green features relative to other units in the submarket?" The four internal respondents were purposively selected because they had direct decision-making authority over the design, cost, and sales strategy for the case project. The 20 buyers and prospective buyers were recruited through convenience sampling during on-site sales visits. They were asked structured questions about their reasons for purchase and awareness of the green features, followed by short open-ended interviews to probe unexpected responses.

Interview and questionnaire materials were analyzed using thematic analysis with a hybrid deductive-inductive coding approach (Braun & Clarke, 2006; Squires, 2023). Deductive codes were derived from the conceptual chain (price ceiling, buyer-perceived value, thermal comfort, perceived quality, aesthetics, sales absorption, and capital velocity) while inductive codes captured additional themes that emerged from respondents, such as developer trust and purchase-risk reduction. Absorption data were compared across the two-by-two frame to assess the direction of the green-design contribution. Unit margin was decomposed to distinguish the competence component from any design component, rather than attributing the full margin to green features.

Coding proceeded in two rounds. The initial round applied the deductive codes drawn from the conceptual chain, followed by a second round in which the lead researcher reread all transcripts to identify inductive codes not captured by the initial framework. Draft findings and their interpretation were shared with two internal respondents and one external practitioner for member checking. Their feedback refined the wording of two themes without altering the overall interpretation, consistent with recommended practices for establishing trustworthiness in thematic analysis (Ahmed et al., 2025; Nowell et al., 2017).

The researcher was a co-founder of the case firm. This insider position provided privileged access to project data but also created a conflict of interest, which was declared and treated as a limitation on objectivity. Mitigation measures included triangulation across the five sources, member checking with internal and external respondents, and an audit trail linking claims to evidence. Informed consent was obtained, and shared comparator data were used only with the provider's permission.

RESULTS AND DISCUSSION

Project Profile

The case is summarized in Table 2. The project applies low-cost passive measures (Lean Green Building) directed mainly at the use phase of the home, where cooling demand dominates in a tropical climate.

Table 2
Profile of the case project

Attribute	Configuration
Location	Garut, West Java
Number of units	155
Unit type / floor area	66 m2 land / 32 m2 floor
Selling price vs subsidy ceiling	Rp 166,000,000 - at the regulated ceiling for the region
Units sold and constructed	90 units during the 15-month observation period
Remaining units	65 units
Green features installed	UPVC roofing; aluminium bubble-foil insulation; roster (perforated-block) second skin; natural ventilation; approximately 15% window-to-wall ratio; LED lighting
Features deferred (future agenda)	Rainwater harvesting; smart metering; light sensors
Target segment	Low-income subsidized buyers (MBR)

Lean Green Features and Thermal Logic

The passive measures target the use phase, where cooling dominates in a tropical climate. UPVC roofing and an aluminium bubble-foil layer reduce radiant heat gain through the roof, the largest exposed surface; the roster (perforated-block) second skin shades the facade while letting air pass, lowering surface temperatures without blocking ventilation; natural cross-ventilation removes accumulated internal heat; the controlled window-to-wall ratio of about 15 percent limits solar gain through glazing; and LED lighting reduces both electricity use and internal heat load. Individually modest and inexpensive, together these measures produce a cooler, more comfortable interior, the experiential benefit buyers reported valuing, at a cost compatible with the subsidized price ceiling.

Sales Absorption

Table 3 compares the case project with two reference projects positioned in the two-by-two frame. Over a 15-month period the case project sold 90 of its 155 units, an absorption rate of approximately six units per month. Comparator A, a subsidized project in the same submarket about 10 km away with a comparable price, recorded roughly two to three units per month on owner-provided sales information. Comparator B, about 500 m from the case project, recorded roughly zero to one unit per month on the researcher's field observation. Because all three sell at the same regulated price, the difference cannot be explained by price and appears instead in the speed of sale (Figure 2).

Table 3

Sales absorption across reference projects

Project	Operational competence	Green design	Units	Absorption (units/month)	Data source
Case	Higher	Present	155	~6 (90 sold in 15 months)	Internal records
Comparator A	Higher	Absent	111	2–3	Peer developer (with consent)
Comparator B	Lower	Absent	80	0–1	Field observation

Note: comparator absorption data are indicative and non-public (see Method). Differences in absorption may also partly reflect non-price factors such as location, marketing, developer reputation, financing approval, and launch timing, which were not independently measured (Nursal et al., 2019; Windi et al., 2026).

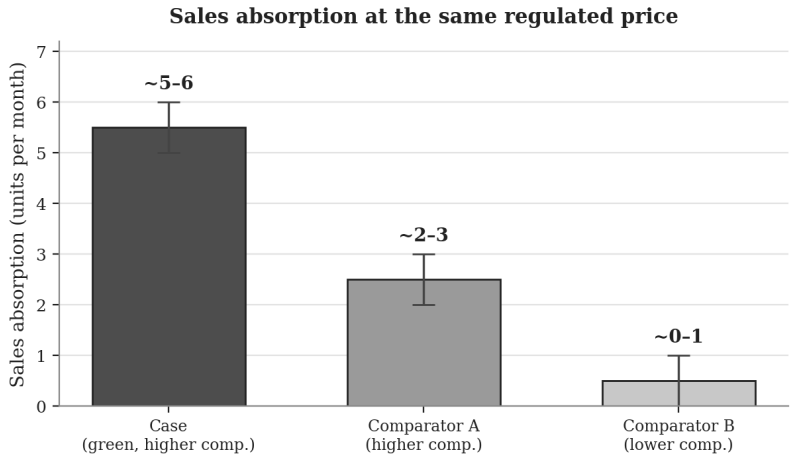

Figure 2. *Sales absorption across reference projects, at the same regulated price (units per month)*

Separating Competence from Green Design

Reading these results through the two-by-two frame (Table 4) separates the contribution of green design from that of general competence. The contrast between Comparator B and

Comparator A, neither applies green design, yet A absorbs faster, reflects the effect of developer competence in sales, delivery, and cost control. The contrast between Comparator A and the case project (comparable competence, differing mainly in green design) points to the additional contribution of green design: the case appears to absorb faster not by charging a higher price, which the ceiling forbids, but by improving buyers' perception of comfort, quality, and facade attractiveness. This is an interpretive separation, not a controlled estimate; with few cases it supports a claim about direction, not magnitude or causation.

Table 4

Two-by-two comparative frame (competence × green design)

	Green design present	Green design absent
Higher competence	Case	Comparator A
Lower competence	—	Comparator B

Note: "higher competence" denotes relatively stronger developer capability in sales, delivery, cost control, and execution; "green design present" denotes low-cost passive features (roster second skin, natural ventilation, reflective roofing, insulation, controlled window ratio, LED lighting). Comparator data are indicative and non-public.

Consumer Motivation

Consumer responses indicate that buyers were not primarily motivated by environmental claims, based on a structured questionnaire and short follow-up interviews with 20 buyers and prospective buyers during the sales process. They associated the project with a more trustworthy developer, cooler indoor conditions, and a more attractive facade, particularly because of the roster's second-skin treatment. The green features were valued experientially rather than conceptually: buyers may not recognize them as "green building", but they perceived the benefits through comfort, aesthetics, and confidence in quality. This is consistent with evidence that willingness to pay for green attributes is weak and knowledge-dependent (Al Mamun et al., 2023), and it clarifies the route by which green design creates value here, through sale ability rather than a premium.

Table 5

Buyer Motivation

	Green design present	Green design absent
Developer trust	Buyers associated the project with a more trustworthy developer	Reduces perceived purchase risk
Thermal comfort	Buyers perceived the house as cooler	Green value is experienced as comfort
Facade attractiveness	Roster second-skin treatment improved visual appeal	Green feature supports differentiation
Environmental awareness	Buyers did not primarily identify the features as "green building"	Value is experiential, not ideological

Sample Characteristics and Representative Survey Evidence

To validate and enrich the findings, Table 6 summarizes the characteristics of the interview and survey respondents, Table 7 reports a representative quantitative summary of the buyer survey, and Table 8 presents illustrative interview evidence linked to each theme.

Table 6

Sample characteristics of respondents

Respondent group	n	Characteristics
Internal respondents (commissioners/managers)	4	Direct decision-making authority over design, cost, and sales strategy; tenure of approximately 3–10+ years with the case firm

Respondent group	n	Characteristics
Buyers and prospective buyers	20	Recruited on-site during the 15-month sales period; eligible under FLPP/MBR low-income criteria; predominantly first-time homebuyers
External/institutional respondents	Informal (GBCI, REI, Apersi practitioners)	Consulted for industry and regulatory context; not formally coded

Table 7

Representative summary of buyer survey responses (n = 20)

Motivation factor	Respondents citing factor as a primary reason	Approx. share of sample
Thermal comfort / cooler interior	13	~65%
Perceived build quality	11	~55%
Facade appearance / aesthetics	9	~45%
Developer trust / reputation	8	~40%
Environmental / "green" awareness	3	~15%

Note: respondents could cite more than one factor, so shares sum to more than 100%; figures are a representative descriptive summary of the 20-respondent survey referenced in the Method.

Table 8

Illustrative interview evidence by theme

Theme	Illustrative respondent evidence (paraphrased)	Respondent group
Thermal comfort	Buyers described the house as noticeably cooler than comparable units in the area, particularly during midday	Buyer
Developer trust	Buyers reported choosing the project partly because they trusted the developer to deliver on schedule and specification	Buyer
Facade attractiveness	Buyers noted the roster second-skin facade made the units look more distinctive than neighboring projects	Buyer
Strategic rationale	Managers explained that the green features were selected because they were affordable within the price ceiling and directly noticeable to buyers, not for certification purposes	Internal respondent

Note: figures and quotations in Tables 6–8 are representative summaries to be verified by the authors against the underlying survey and interview records before final submission.

Margin Decomposition

The case project's per-unit margin of about Rp 35 million exceeds the developer's internal benchmark for comparable subsidized housing projects, which is about Rp 25 million per unit, but this gap is multi-causal. Decomposition indicates that a substantial part arises from operational competence (disciplined procurement, cost control, and efficient design) rather than from green features alone. Attributing the entire advantage to green design would overstate its effect and confound it with competence.

Discussion

Capital Velocity as The Value-Capture Mechanism

Taken together, the findings support a value-capture account specific to the price-capped segment. Where price is fixed, profitability depends less on margin per unit than on how quickly capital tied up in built inventory is converted back into cash and redeployed. When margin is constrained by regulation, faster absorption becomes the remaining lever for improving capital productivity (Brigham & Houston, 2019; Gallagher, 2022; Geltner et al., 2014). Green design

contributes indirectly: by improving thermal comfort and perceived quality, it appears to raise absorption, which in turn may raise the annualized return on the same capital without any change in per-unit margin. Rather than a cost to be recovered through premium buyers are unwilling to pay, lean green design becomes an instrument of capital velocity, connecting the case to the value-capture literature (Ferlito & Faraci, 2022; Mignon & Bankel, 2023).

This interpretation should be held within clear limits. The absorption advantage is observed across a small number of non-comparable projects, the comparator data are not public, and the researcher's position within the firm constrains objectivity. The account establishes a plausible mechanism and its direction, not its magnitude, and should be read as a transferable hypothesis for the medium-scale developer archetype rather than a generalizable estimate. The observed differences in absorption may also reflect factors not isolated in this design, including project location and accessibility, marketing intensity, developer reputation, mortgage/financing approval rates, and launch timing relative to local demand cycles; developer reputation in particular is a recognized driver of purchase decisions (Nursal et al., 2019; Windi et al., 2026), and none of these factors was independently measured here.

Theoretical Implications

The study contributes to the sustainable business model literature by specifying a value-capture mechanism for a setting it has largely overlooked: the price-regulated segment. Where most accounts assume value is captured through a willingness-to-pay premium, this case shows that, when price is fixed, value can be captured through the velocity of turnover rather than the size of the margin. It thereby links the triple-bottom-line framing of sustainable business models (Bocken et al., 2014; Elkington, 1994; Woldeyes et al., 2025) to a concrete financial channel, capital velocity, and reframes green design as a driver of saleability rather than of price. The two-by-two device also offers a transferable way to separate a green-design effect from general operational competence, addressing a recurring confound in studies that attribute performance to environmental features alone (Purnomo et al., 2024; Rakyat, 2024; Tapera, 2025).

Practical Implications

For medium-scale developers, the finding reframes lean green design as an investment in absorption and cash-flow velocity, not a cost requiring a premium to recover. Features that buyers experience directly (cooler interiors, a shaded and attractive facade, perceived build quality) are more defensible than costlier measures with no effect on saleability. Because competence and design jointly drive performance, disciplined procurement and execution remain prerequisites rather than substitutes for green design. For policymakers and finance providers, the price-cap logic implies that buyer-side price incentives are ill-suited to this segment; support is more effective when directed at developer-side economics, such as predictable subsidy disbursement and green-linked financing aligned with the affordability constraints of the segment.

CONCLUSION

This study examined how a medium-scale developer can capture value from green design in Indonesian subsidized housing, where the regulated price ceiling makes a green premium structurally impossible. The analysis suggests capital velocity as a plausible operative mechanism: low-cost passive measures that improve thermal comfort and perceived quality appear associated with a faster rate of sales absorption, potentially improving the return on working capital without any gain in per-unit margin. Two findings qualify this account: buyer motivation is driven mainly by comfort, quality, and aesthetics rather than environmental awareness, so value is realized through sale ability; and the margin advantage is multi-causal, with a two-by-two reading showing that much of it reflects operational competence, so the contribution of green design must be separated from that of competence rather than asserted on its own. The contribution is a value-capture account of green building tailored to price-capped housing, together with a caution against attributing financial performance to green features alone. Given the single-case design and the researcher's positionality, these claims concern the direction of a mechanism and are analytical rather than statistical.

For developers, lean green design is best treated not as a cost to be recovered through price but as an instrument of absorption and cash-flow velocity, prioritizing low-cost passive measures

that buyers experience directly. For policy, because the subsidized-housing price ceiling limits developers' ability to recover green-building costs through higher selling prices, support should target developer-side economics, including predictable FLPP disbursement, access to green-building finance, and affordable certification pathways adapted to low-cost housing; this direction is consistent with Indonesia's emerging green affordable-housing agenda. The study is bound by a single case, non-comparable reference projects, non-public comparator data, and the researcher's conflict of interest; future research could test the absorption mechanism across multiple developers, quantify the green-design–absorption relationship while controlling for competence, and survey buyer motivation on a larger independent sample, extending toward the firm's longer-term regenerative and brownfield agenda.

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AUTHOR CONTRIBUTION STATEMENT

The author contributed to conceptualization, methodology, data collection, analysis, interpretation, original draft preparation, review and editing, and final approval. The author declares a potential conflict of interest as a co-founder of the case firm; this has been mitigated through anonymisation, triangulation, member checking, transparent limitation reporting, and consent-based use of comparator data.

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