Density Zoning Indicators Worldwide: A Prisma-Guided Comparative Review of Regulatory Measures, Effective Development Capacity and Real Estate Implications

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ABSTRACT

Density zoning determines development rights, land value, housing yield and urban form, yet planning systems employ non-equivalent regulatory indicators that complicate international comparison. This study applies a PRISMA 2020-guided comparative review [1] to examine how regulatory density is defined, combined and translated into effective development capacity. Seven pre-specified searches across six scholarly databases covering 2000–2026 retrieved 69 records; 65 unique records remained after deduplication; and 14 substantive peer-reviewed studies formed the core synthesis following title/abstract and full-text screening against pre-defined eligibility criteria. Evidence was coded by jurisdiction, regulatory indicator, complementary controls, research methodology and real-estate outcomes. Nine regulatory families were identified: floor-space intensity, site coverage, dwelling yield, parcel-size controls, vertical height envelopes, building envelopes, open-space requirements, incentive density provisions and zoned functional capacity. The comparative evidence shows that nominal floor area ratio alone does not determine realizable development capacity, because lot morphology, building envelopes, approval processes, infrastructure constraints, market demand and incentive structures materially condition the development response. A systematic comparison of density regulatory thresholds across fourteen planning systems, spanning Asia, Europe, the Americas, the Middle East and Sub-Saharan Africa, reveals substantial variation in intensity controls, site-coverage maxima and height provisions that renders direct numerical comparison between jurisdictions unreliable without contextual adjustment. Governance differences — including discretionary versus rule-based plan implementation — further explain why equivalent density permissions produce unequal built outcomes across planning systems. The paper proposes and illustrates an indicator-profile framework separating nominal, effective and realized density for comparative planning, valuation and development feasibility analysis. Research limitations including geographical bias toward anglophone literature, the small synthesis sample and the absence of a pre-registered protocol are acknowledged, pointing to future research priorities in South Asian, African and Middle Eastern planning contexts.

Keywords: comparative planning; density zoning; effective development capacity; floor area ratio; real estate implications

INTRODUCTION

Density is central to compact-city policy, housing supply, infrastructure efficiency and real-estate feasibility, but it is not a single measurable condition. Population density, dwelling density, site coverage, building height and floor-space intensity can vary independently, so apparently similar high-density areas may embody different physical and regulatory structures [2, 3]. This distinction becomes critical when density is converted into statutory development rights.

Planning systems regulate intensity through floor area ratio (FAR), floor space index/ratio (FSI/FSR), gross plot ratio (GPR), site coverage, height limits, setbacks, minimum lot size, dwelling caps, open-space standards and incentive bonuses. Treating these controls as interchangeable can misstate development potential and land value.

The practical research problem is therefore not simply what density level is desirable, but how different regulatory instruments combine to determine the floor area and housing yield that can actually be delivered. This paper systematically compares that regulatory architecture across fourteen planning systems and links it to real-estate outcomes.

Translating statutory density permissions into actual development outcomes also depends on institutional and governance factors that vary considerably across planning systems. Rule-based systems — such as Japan's use-zone FAR designations or Singapore's gross plot ratio framework — prescribe development intensity directly in the statutory plan, limiting the discretion exercised at the approval stage. Discretionary systems — common in the United Kingdom and parts of Australia — allow case-by-case assessment of planning merit, so the gap between permitted and realized density reflects both the regulatory ceiling and the approval environment. In rapidly urbanizing contexts, particularly in South Asia, Southeast Asia, Sub-Saharan Africa and the Middle East, enforcement capacity and informal development further widen the gap between nominal regulatory provisions and realized urban form.

Objectives Of The Study

The study aims to develop a comparative framework for interpreting density-zoning controls across planning systems. It specifically seeks to: (1) identify and classify the principal regulatory density indicators used internationally; (2) compare their definitions, units and denominator conventions across a geographically diverse set of jurisdictions including developed and developing markets; (3) examine how FAR and equivalent controls interact with lot size, coverage, height, setbacks, open-space and approval requirements; (4) synthesize and critically evaluate recent evidence on housing supply, redevelopment, land value and development feasibility; (5) address governance, institutional and urban sustainability dimensions of density regulation; and (6) propose an indicator-profile approach that distinguishes nominal zoning permission from effective and realized development capacity, illustrated with a practical worked example.

LITERATURE REVIEW

Urban-density scholarship increasingly rejects single-metric interpretations. Dovey and Pafka [3] conceptualize density as an assemblage of measures, while Angel et al. [2] empirically decompose density into height, coverage, occupancy and floor-area allocation. Berghauser Pont et al. [4], reviewing densification effects across multiple contexts, similarly show that physical intensification produces context-dependent social, environmental and economic outcomes. These studies establish why a regulatory review must distinguish the instrument from the observed density outcome, and why comparison across jurisdictions requires a multi-indicator profile rather than a single headline ratio.

Recent land-use research shifts attention from nominal zoning to whether regulatory capacity is binding and developable. Monkkonen et al. [5] argue that unbuilt zoned housing capacity explains permitting variation more effectively than a single regulation such as FAR, because the relationship between regulation and housing production depends on how much slack exists between the ceiling and actual development. Freemark [6] finds that upzoning outcomes vary with demand, housing type, scale and time horizon, warning against deterministic assumptions that a zoning change automatically produces construction. This concern is reinforced by the emerging literature on regulatory interaction: Kulka et al. [7] show that combinations of density and other zoning restrictions jointly affect housing supply, prices and rents, while Gallagher [8] demonstrates that lot size, historical land use, amenity access and market conditions influence whether upzoned land is actually redeveloped.

The literature also reveals divergent policy logics and methodological approaches that complicate cross-study comparison. FAR may operate as a ceiling, while incentive zoning deliberately exchanges extra density or height for public benefits. Homsy and Kang [9] found density to be the most common incentive offered by surveyed United States municipalities, whereas Karampour [10] shows in Tehran that reliance on density-bonus revenue can reshape municipal planning incentives and blur the distinction between regulatory and fiscal objectives. Minimum lot-size regulation works differently again by constraining subdivision and redevelopment timing across the parcels affected [11]. Methodologically, however, the studies differ substantially: quasi-experimental

difference-in-differences designs [12], boundary-discontinuity approaches [7], longitudinal parcel-level analysis [8] and institutional case studies [10] each capture different causal pathways. Von Bergmann et al. [13] reinforce that identical density entitlements produce divergent outcomes once approval processes and complementary regulations are considered. Freemark [6] synthesizes a broader North American literature to caution that production effects in weak-market cities differ fundamentally from those in supply-constrained metros — a point not fully addressed by studies conducted in high-demand contexts. These strands together indicate that cross-jurisdictional comparison requires a regulatory profile rather than a single headline ratio.

Governance and institutional factors constitute a distinct explanatory layer. The effectiveness of a density control depends not only on its numeric specification but on how it is administered, enforced and interpreted in the approval process. Von Bergmann et al. [13] identify approval processes and parking requirements as explaining divergent redevelopment rates under identical density permissions. Karampour [10] shows how the density-bonus instrument became a revenue mechanism in Tehran, shifting institutional incentives. Monkkonen et al. [5] argue that the gap between zoned capacity and housing production in California reflects not just the numeric ceiling but the cumulative effect of permitting requirements, environmental review, neighbourhood opposition and infrastructure conditions. In many rapidly urbanizing countries in South Asia, Sub-Saharan Africa and Southeast Asia, enforcement capacity is limited and a substantial proportion of the building stock is developed informally outside the formal regulatory system, rendering the nominal FAR largely notional for large segments of the urban area.

The relationship between density regulation and urban sustainability is a further dimension of the literature. Domingo et al. [14], through multi-scenario simulation for Spanish municipalities, demonstrate that the spatial allocation of permissible floor area affects land consumption and urban expansion. Incentive-zoning instruments, as shown by Karampour [10] and Homsy and Kang [9], can be calibrated to deliver affordable housing, public open space or sustainable transport infrastructure, linking density regulation directly to urban sustainability objectives. However, densification without adequate infrastructure provision raises carrying-capacity concerns — including wastewater, stormwater, public open space and urban heat island effects — that are exacerbated when regulatory controls increase built intensity without commensurate investment in supporting systems.

METHODS

A PRISMA 2020-guided systematic comparative review was undertaken [1]. The review period was 1 January 2000 to September 2026. Evidence discovery used seven pre-specified thematic search domains executed across six scholarly discovery platforms: Scopus, Web of Science, Google Scholar (supplementary verification only), Consensus AI-assisted scholarly search, ProQuest Planning Collection, and JSTOR, with direct journal database searches for the Journal of Urban Economics, Journal of Housing Economics, Journal of the American Planning Association, and Urban Studies. The seven search domains were: (i) FAR/zoning/development intensity/housing supply; (ii) minimum lot size/setback/height/site coverage; (iii) zoned or effective development capacity; (iv) upzoning/housing supply/rents/redevelopment; (v) density bonus/incentive zoning/affordable housing; (vi) urban morphology/plot ratio/site coverage; and (vii) zoning plans/sustainable urban growth. Search strings combined controlled vocabulary and free-text terms with Boolean operators AND/OR, adapted to each platform's syntax. The protocol was not pre-registered with PROSPERO because the review was designed as a conference-stage comparative synthesis; this is acknowledged as a limitation.

The identification stage retrieved 69 records. Four duplicates were removed, leaving 65 unique records for title and abstract screening. At the screening stage, 32 records were excluded: 14 addressed population or dwelling density without a regulatory link; 7 were non-urban studies; 6 were non-scholarly commentary or working papers; and 5 addressed density only as an incidental variable. The remaining 33 records were assessed for eligibility against full text. Nineteen were subsequently excluded: 8 did not explicitly define or measure a density-related regulatory instrument; 6 examined general land-use change without quantifying development capacity outcomes; and 5 were unavailable in full text from accessible databases. Fourteen substantive peer-reviewed sources formed the core comparative synthesis. All screening and eligibility decisions were made by the single author using the pre-specified eligibility criteria, which is acknowledged as a limitation; a future full systematic review should include independent dual-review and report Cohen's kappa inter-rater reliability.

For each included study, a structured extraction matrix recorded jurisdiction, regulatory indicator, formula or denominator where reported, study design, interacting controls, outcome domain and key inference. Studies are geographically concentrated in North America, Europe, Australia and New Zealand, with two from Asia — Karampour [10] from Iran and Domingo et al. [14] from Spain — and limited representation from Sub-Saharan Africa, South Asia and Southeast Asia. Evidence was synthesized through thematic framework comparison rather than statistical meta-analysis because indicator definitions, planning institutions and outcome measures were heterogeneous across studies. Greater interpretive weight was given to quasi-experimental, boundary-discontinuity, longitudinal and parcel-level designs over case studies and simulations. The synthesis distinguished three analytical states: nominal capacity permitted by zoning, effective capacity after interacting physical and regulatory constraints, and realized capacity delivered by the market.

Figure 01 illustrates the PRISMA-guided workflow applied in this review.

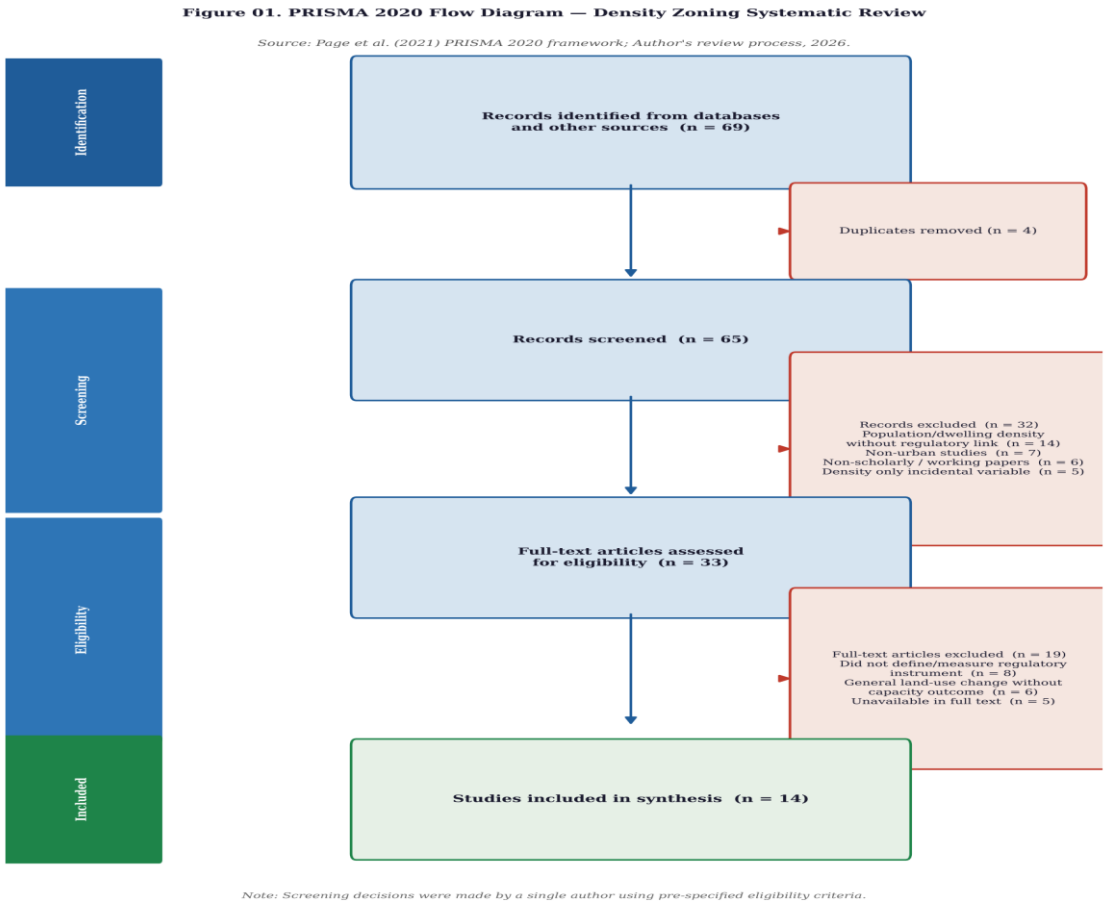

Figure 01. PRISMA 2020 flow diagram — density zoning systematic review

RESULTS AND DISCUSSION

Nine Regulatory Families and the Bundle Problem

The comparative synthesis identifies nine regulatory families: (1) floor-space intensity (FAR, FSI, FSR, plot ratio and GPR); (2) site occupation or coverage; (3) dwelling yield; (4) parcel-size controls; (5) height controls; (6) building-envelope controls such as setbacks and separation; (7) open-space requirements; (8) incentive or bonus density; and (9) zoned or functional capacity. The important result is not the taxonomy alone, but the evidence that these controls function as an interacting bundle. A nominal FAR can therefore overstate what can be physically, procedurally or economically realized, because site-coverage limits constrain the buildable footprint, height limits constrain the number of floors, setbacks reduce the net footprint further, and parking requirements may consume otherwise developable floor area or basement space.

Critical Synthesis of Supply Evidence: Methodological Comparison

Recent empirical work makes the distinction between nominal and realized density measurable. Büchler and Lutz [12], using a staggered difference-in-differences design across Swiss municipalities, find that increasing allowable FAR produced roughly 9% more living space and housing units over five to ten years, with stronger effects where zoning was genuinely binding before reform. Greenaway-McGrevy [15], using an urban-economic model calibrated to Auckland's land-price gradients, estimates that the city's large-scale zoning reform was consistent with approximately 23.7% more long-run floorspace. These studies demonstrate that zoning intensity can materially affect supply, but they also show that effects take time and depend critically on whether the regulation actually constrains development before the change.

The newest evidence explains why equal upzonings need not produce equal outcomes, and also highlights important methodological differences between studies. Von Bergmann et al. [13] compare similar multiplex reforms in British Columbia and observe much stronger redevelopment in Kelowna than Coquitlam, attributing the divergence to approval processes and parking requirements as well as the density entitlement itself — a finding that a purely zoning-focused analysis would not detect. Kulka et al. [7], using a boundary-discontinuity design in Greater Boston, show that interacting zoning restrictions matter jointly for supply and per-unit prices. Gallagher [8], through lot-level analysis in Brisbane, finds that lot size and historical land use continue to shape redevelopment on upzoned land even years after reform. However, Freemark [6] cautions that upzoning outcomes vary substantially with market demand, housing type and scale, and that the production effects in weak-market cities differ fundamentally from those in supply-constrained metros — a point not fully addressed by studies conducted in high-demand contexts such as Auckland, Greater Boston and metropolitan California.

These methodological differences carry substantive implications for comparative planning research. Quasi-experimental designs [12, 7] are better placed to identify causal effects but are constrained to contexts where suitable identification strategies exist. Longitudinal parcel-level studies [8] capture localized heterogeneity but may not generalize. Urban-economic models [15] can project long-run equilibria but rely on model assumptions about housing supply elasticity. Institutional case analyses [10] illuminate policy mechanisms but lack the counterfactual structure needed to establish causal effects. Land-use simulations [14] demonstrate scenario planning value but depend on model calibration. The synthesis therefore weights these contributions according to their design rigour while recognizing that the diversity of methods reflects the diversity of research questions addressed.

Table 01 Comparative evidence linking density regulation to effective development outcomes: Critical synthesis

Study / Context	Regulatory Focus and Method	Comparative Contribution
Büchler & Lutz (2024) Switzerland	FAR upzoning; staggered difference-in-differences	Binding upzoning increased living space and units by ~9% over 5–10 years; effects stronger where regulation was genuinely constraining.
Greenaway-McGrevy (2025) Auckland, NZ	Zoning reform; urban-economic model and land-price gradients	Large-scale upzoning implied ~23.7% greater long-run floorspace; supply response depends on whether regulation actually constrained development.
von Bergmann et al. (2025) British Columbia	Multiplex upzoning; comparative redevelopment analysis	Identical density permissions produced divergent uptake in Kelowna vs. Coquitlam; approval processes and parking requirements explain the gap.
Kulka et al. (2026) Greater Boston, USA	Multiple zoning controls; boundary-discontinuity design	Zoning restrictions interact jointly; regulatory bundles—not single indicators—drive supply, rents and prices at parcel level.

Monkkonen et al. (2024) California, USA	Unbuilt zoned capacity; housing-permit regressions	Zoned but unbuilt capacity is a richer regulatory measure than a single FAR; captures constraint variation across markets.
Gallagher (2026) Brisbane, Australia	Upzoning, lot size and historical land use; lot-level analysis	Zoning enables densification but lot morphology, historical use, amenity access and market demand condition whether entitlement is realised.
Karampour (2021) Tehran, Iran	Density bonus; institutional case analysis	Density can operate as a fiscal instrument; reliance on bonus revenue may redirect planning priorities toward property-market objectives.
Domingo et al. (2021) Spain	Zoning plans; multi-scenario land-use simulation	Spatial allocation of permitted floor area materially alters urban expansion, land consumption and sustainable-growth outcomes.

Source: Author's synthesis of included literature, 2026

International Comparison of Regulatory Thresholds

Table 02 provides a systematic comparison of density regulatory thresholds across fourteen jurisdictions drawn from Asia, the Pacific, Europe, the Americas, the Middle East and Sub-Saharan Africa. Intensity controls vary substantially in their nomenclature (FAR, FSR, GPR, GFZ, coeficiente de aproveitamento), denominator conventions and regulatory specification. Residential FAR equivalents range from 0.3–0.5 in low-density suburban zones of the United States to 8.0 in high-density urban blocks of Hong Kong, while commercial and mixed-use ceilings may extend to 15.0 in Hong Kong or 13.0 in Japanese commercial/industrial zones. Site coverage maximums range from 25% in New Territories Hong Kong to 80% in Singaporean high-rise residential areas. These ranges illustrate that the same numerical FAR value signifies very different urban outcomes depending on the jurisdiction: a residential FAR of 2.5 represents medium-density development in Singapore but constitutes a high-density provision in a typical Australian metropolitan suburb.

Countries in the Global South present additional complexity. In India, FAR provisions vary by city, zone classification and use type, with transit-oriented development corridors in Delhi permitted FAR up to 4.0, while outer suburban zones apply FAR as low as 1.2. Sri Lanka's Urban Development Authority Development Plans specify plot ratios that differ between Colombo urban core areas — up to 3.0 for high-intensity mixed use — and suburban zones (0.75–1.5), but enforcement and capacity for plan implementation remain constrained relative to the statutory provisions. In Sub-Saharan African cities such as Lagos, formal FAR provisions apply to a minority of the built stock because a substantial proportion of development occurs informally outside the regulated system. These patterns underscore that international comparison of density regulations must account not only for the nominal threshold but for the institutional capacity through which that threshold is implemented and enforced.

Table 02 International comparison of density regulatory controls across selected planning systems

Jurisdiction	Planning System	Primary Control	Typical Residential Intensity	Coverage Max	Height	Key Feature
Singapore	Plan-led (URA Master Plan)	Gross Plot Ratio (GPR)	1.4–3.5 (landed to high-rise)	50–80%	24–55+ storeys	GPR by use type; transit corridors up to GPR 5.6

Hong Kong (SAR)	Statutory development plans	Plot Ratio (domestic)	0.4–8.0 (urban blocks)	25–65%	Site-specific	Commercial non-domestic plot ratio up to 15
Japan	Use-zone designation (12 zones)	Floor Area Ratio (容積率)	0.5–13 (by zone class)	40–80% (BCR)	No statutory cap	FAR and BCR jointly designated by zone type
India (Delhi)	Master Plan 2041 (DDA)	FAR by use/zone	1.2–4.0 (varies by zone)	50–75%	15–30 m (mixed)	FAR augmentation permitted in TOD zones up to 4.0
Sri Lanka	UDA Development Plans	Plot Ratio	0.5–3.0 (urban area)	40–70%	10–40 m	Colombo high-intensity areas allow plot ratio 3.0+
Dubai (UAE)	Master Plan / District Codes	Plot Ratio / GFA	1.5–5.0 (by district)	40–70%	Unlimited in some zones	Height unrestricted in key districts; GFA + massing controls vary significantly
South Africa	Town-planning schemes	FAR	0.5–3.0 (urban areas)	40–75%	Plan-based	Historically fragmented zoning; ongoing consolidation post-apartheid
Nigeria (Lagos)	Development Control Regs	FAR / Plot Coverage	0.4–2.0 (formal areas)	25–60%	4–15 storeys	Enforcement variable; large proportion informally developed
UK (England)	NPPF / Local Plans	Density (dwellings/ha)	30–200 dph (variable)	30–70%	Local plan limits	No statutory national FAR; density expressed as dph
USA (typical)	Euclidean zoning (municipal)	Floor Area Ratio	0.3–6.0 (zone-dependent)	25–80%	10–45 m	Minimum parking requirements often co-constrain density
Australia (NSW)	Environmental Planning Instruments	Floor Space Ratio (FSR)	0.5–6.0+ (metro core)	50–80%	DA-based	FSR = gross floor area / site area; height also specified separately
New Zealand	Resource Management Act	Floor Area Ratio	0.5–3.0+	35–80%	8–45 m	Major zoning reform 2021–2023 (MDRS) allows up

						to 3 storeys by default
Brazil (São Paulo)	Plano Diretor Estratégico	Coeficiente de Aproveitamento	1.0–4.0 (by zone)	50–70%	Site-based	Outorga Onerosa allows CA above base; revenue used for affordable housing
Germany	Building Use Ordinance (BauNVO)	Floor Area Ratio (GFZ)	0.3–2.4 (residential)	20–60% (GRZ)	Varies (H)	GFZ and GRZ designated by plan; storey count independently stipulated

Source: Author's comparative review of statutory planning provisions and published planning studies, 2026. Note: Values are indicative ranges; local plan provisions vary by zone, use type and policy area within each jurisdiction.

Governance and Institutional Factors

The evidence reviewed consistently shows that institutional and governance factors mediate the relationship between statutory density permissions and realized development outcomes. Von Bergmann et al. [13] identify approval processes and parking requirements — institutional co-determinants of effective capacity — as explaining why identical density permissions produce divergent redevelopment rates across British Columbian municipalities. Karampour [10] shows in Tehran that the density-bonus instrument became a revenue mechanism for the municipality, shifting institutional incentives in ways that distorted the original planning rationale. Monkkonen et al. [5] argue that the gap between zoned capacity and housing production in California reflects not just the numeric ceiling but the cumulative effect of permitting requirements, environmental review, neighbourhood opposition and infrastructure conditions.

Comparative planning research also identifies the distinction between rule-based and discretionary systems as structurally significant. In Singapore's plan-led system, the Master Plan's gross plot ratio allocations are prescriptive, reducing the variance introduced at the approval stage and enabling developers to price land with greater certainty about realizable capacity. In the United Kingdom's discretionary system, local planning authorities assess applications against a range of material considerations, so a site's development capacity depends partly on the planning authority's interpretation at a given point in time. For developing-country contexts, the formal/informal dichotomy further complicates the picture: regulatory density controls apply de jure to the entire urbanized area but de facto to only the formally developed portion.

Urban Sustainability Considerations

The reviewed literature addresses urban sustainability dimensions most directly through the land-use simulation and incentive-zoning strands. Domingo et al. [14] demonstrate through multi-scenario modelling that the spatial allocation of permitted floor area shapes land consumption and the extent of urban expansion: compact zoning allocations reduce greenfield conversion relative to dispersed low-density provisions, with material implications for carbon emissions from travel, infrastructure extension and land cover change. Karampour [10] and Homsy and Kang [9] show that incentive-density instruments can be calibrated to deliver affordable housing, public open space or sustainable transport infrastructure, linking density regulation directly to urban sustainability objectives.

Beyond the literature reviewed, comparative planning evidence from transport geography consistently links higher residential densities with reduced per-capita vehicle travel and improved public transport viability — the basis for transit-oriented development approaches that explicitly align density thresholds with public transport catchments. However, densification without adequate infrastructure provision can generate negative externalities

including stormwater and wastewater overloading, urban heat island intensification, loss of green space and reduced daylight access. These concerns are most acute in rapidly urbanizing cities in South and Southeast Asia and Sub-Saharan Africa, where infrastructure investment lags behind population growth. Future comparative research should integrate environmental impact assessment data with regulatory threshold comparisons to provide a more complete sustainability evaluation.

Real Estate Implications: From Zoning to Land Value

The reviewed studies collectively demonstrate that density regulation has direct and quantifiable real-estate implications. Büchler and Lutz [12] find that binding upzoning increases housing supply and by implication affects site value. Greenaway-McGrevy [15] shows that land-price gradients respond to zoning reform, confirming that the market capitalizes regulatory capacity into land values. Monkkonen et al. [5] provide the clearest statement of the valuation implication: unbuilt but zoned capacity represents an option value whose realization depends on market conditions, approval certainty and infrastructure adequacy.

For practitioners — developers, valuers and planning economists — these findings suggest that zoning analysis should identify at least four distinct layers of capacity: base entitlement from the nominal density control; bonus or conditional entitlement available through incentive provisions; technically feasible capacity after the interacting physical constraints of coverage, height, setbacks and parking; and market-realized capacity reflecting absorption rates and financial feasibility at a point in time. The gap between these layers constitutes regulatory and development risk that is directly reflected in residual land value, highest-and-best-use conclusions and project timing. A residual land value analysis conducted using the full nominal FAR as the revenue-generating gross floor area will systematically overstate land value in contexts where the gap between nominal and realized capacity is large — precisely the contexts identified by von Bergmann et al. [13] and Gallagher [8] in which approval processes, parking requirements and lot morphology reduce effective capacity.

Framework Application: Worked Parcel Example

Table 03 applies the nominal–effective–realized framework to a hypothetical urban parcel to demonstrate its practical utility for valuation and development-feasibility analysis. The example uses a 1,000 m² residential site in a medium-density zone with a statutory FAR of 2.5, maximum site coverage of 60%, a height limit of 20 m (approximately five standard residential storeys), and perimeter setbacks of 3 m to the front and rear and 1.5 m to each side on a 20 m × 50 m lot. The example illustrates how the gap between the nominal 2,500 m² GFA permitted by zoning and the 1,800 m² NFA ultimately realized by the market translates into a residual land value that is materially lower than would be derived from the nominal capacity ceiling alone. The 28% gap (700 m² of GFA) between nominal and realized capacity would, if used as the basis for comparable-sales benchmarking without adjustment, lead to an overstatement of site value by approximately 63% at the gross development value level. This demonstrates that the framework is not merely a conceptual device but has direct implications for land valuation practice.

Table 03 Application of the nominal–effective–realized density framework: illustrative parcel example

Density Layer	Key Constraints	Definition	Illustration: 1,000 m² Site, FAR 2.5, Coverage 60%, Height 20 m
Nominal Capacity	FAR = 2.5 on 1,000 m² site	Maximum permissible GFA from zoning alone	1,000 × 2.5 = 2,500 m² GFA This is the statutory ceiling — the starting assumption in zoning analysis.
Effective Capacity	Site coverage (60%), setbacks, height (20 m), parking &	Physical and regulatory constraints filter	Buildable footprint after setbacks: ~570 m² (20×50 m lot; 3 m front/rear, 1.5 m sides) Site coverage constraint (600 m²) is not binding; setbacks are binding (570 m²) 5 storeys within 20 m height: 570×5

	structural efficiency	down from the nominal ceiling	= 2,850 m² gross — FAR cap (2,500 m²) is binding Parking basement excluded from FAR count Structural & circulation deduction (15%): 2,500×0.85 = 2,125 m² NFA
Realized Capacity	Market demand, development feasibility, approval timeline, finance	What is actually constructed and occupied after financial and market filters	Unit mix: 20 apartments × 90 m² NFA = 1,800 m² NFA Residual land value (RLV) at realized capacity: GDV (1,800 m² × USD 4,500/m²) = USD 8.10 m Construction cost (2,500 m² GFA × USD 1,200/m²) = USD 3.00 m Soft costs (design, legal, finance) = USD 0.50 m Developer's profit (20% on cost) = USD 0.70 m RLV = USD 3.90 m (USD 3,900/m² of site) Note: If the full 2,500 m² nominal GFA were realizable, GDV would rise to USD 11.25 m and RLV to ~USD 6.35 m — a 63% premium over the realized-capacity land value.
Capacity Gap	Nominal minus realized (28% of nominal)	Regulatory and market drag — the development-risk component in land valuation	700 m² GFA unrealised This gap is directly relevant to highest-and-best-use analysis, residual land valuation and regulatory impact assessment. A valuer using nominal GFA systematically overstates site value.

Source: Author's illustrative calculations, 2026. Note: Currency and construction cost values are indicative; actual values should be calibrated to local market conditions. RLV = residual land value; NFA = net floor area; GFA = gross floor area; GDV = gross development value.

Limitations

This review has several limitations that should be considered when interpreting its findings. First, the core synthesis encompasses fourteen peer-reviewed studies, which is a small evidence base relative to the breadth of planning systems and density instruments addressed. While this reflects the targeted eligibility criteria rather than a deficiency in search coverage, the small sample limits the generalizability of conclusions, particularly regarding effect sizes reported by individual studies. Second, the review exhibits a geographical bias toward planning systems in North America, Australasia, Europe and East Asia that are well represented in English-language peer-reviewed literature. South Asian, Sub-Saharan African, Latin American and Southeast Asian planning systems — which together account for a substantial proportion of global urban growth — are addressed primarily through factual regulatory description in Table 02 rather than through peer-reviewed empirical evidence, because systematic studies of density regulation and development outcomes from these regions are underrepresented in the searched databases. Third, the included studies are methodologically heterogeneous, precluding statistical meta-analysis of effect sizes; the thematic framework synthesis employed here is therefore interpretive rather than quantitatively aggregated. Fourth, the exclusion of non-English-language publications may have resulted in relevant studies from German, Japanese, Korean, Portuguese and Spanish planning scholarship being missed. Fifth, the review protocol was not pre-registered with PROSPERO, and all screening and eligibility decisions were made by a single reviewer without independent cross-checking. Future research should address these limitations through multi-language systematic searches, dual-reviewer screening with reported inter-rater reliability, and targeted primary research on density regulation in underrepresented global regions.

CONCLUSION

This review makes several original contributions to the comparative planning and real estate literature. Conceptually, it synthesizes evidence across fourteen planning systems to show that density zoning is best understood as an interacting system of development rights, physical constraints, institutional processes and

market filters rather than as a property of a single headline indicator. Empirically, it identifies nine regulatory families whose combined specification — not any individual control — determines effective development capacity, and it documents the cross-jurisdictional range of density regulatory thresholds through a structured comparison extending from Singapore, Hong Kong and Japan to South Asia, Sub-Saharan Africa, Latin America and Europe (Table 02). Methodologically, it evaluates the growing empirical literature on upzoning and housing supply with explicit attention to research design and causal identification, identifying the conditions under which the reviewed effect estimates are more and less transferable. Practically, it proposes and illustrates an indicator-profile framework that separates nominal, effective and realized density — a distinction directly applicable to development feasibility analysis, residual land valuation and highest-and-best-use assessments (Table 03).

FAR remains a useful cross-jurisdictional index because it is widely reported, dimensionally consistent and responsive to market incentives, but it cannot represent realizable development capacity without the denominator basis, lot configuration, coverage, height, setbacks, open-space requirements, incentive provisions, approval environment and infrastructure conditions. The practical implication for urban planners is that zoning reform should be evaluated through coordinated regulatory profiles and parcel-level development capacity modelling rather than isolated FAR adjustments. For property valuers and development economists, residual land value analysis should use realized-capacity gross floor area adjusted for site-specific constraints rather than the nominal zoning ceiling. For Sri Lanka and comparable rapidly urbanizing markets at an intermediate stage of regulatory formalization, the review suggests that effective density governance requires not merely updating FAR thresholds but strengthening the institutional chain from statutory plan to enforcement to market delivery.

The limitations identified — particularly the geographical bias and small evidence base — point to important future research priorities. Targeted empirical studies of density regulation and development outcomes in South Asian cities (Colombo, Mumbai, Dhaka), African urban systems (Lagos, Nairobi, Accra) and Southeast Asian contexts (Bangkok, Jakarta, Ho Chi Minh City) would substantially enrich the comparative evidence base. Further research is also needed on the sustainability co-benefits and infrastructure-capacity implications of density upzoning across different governance contexts, and on the integration of environmental impact assessment into regulatory density frameworks. The indicator-profile framework proposed here provides a structured instrument for organizing such comparative data as the evidence base develops.

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