



Applying Universal Design in the Real Estate Business in Thailand

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Abstract

Thailand is quickly becoming a super-aged society, which has led to a big mismatch in its urban residential real estate market. Traditional developments focus on looks and maximizing space, but the needs of an aging population require the use of Universal Design (UD) everywhere. This study uses a mix of methods to explore what drives the market, how consumers view things, and what barriers exist for implementing UD in the private real estate sector of the Bangkok Metropolitan Region (BMR) and its outskirts. We gathered quantitative survey data from 450 homebuyers and combined it with qualitative insights from 15 industry executives and architects/engineers. The results show a strong positive link between a household's multi-generational status and their willingness to pay (WTP) more for homes with accessible features ($p < .001$), which goes against the idea that UD is just an extra cost. However, there is a branding issue: consumers tend to reject properties labeled as "Senior Housing" because of a stigma (Mean = 3.88), but they really like the same layouts when they are marketed as "Multi-generational Wellness" estates (Mean = 4.42). On the supply side, a lot of qualitative data suggests that developers are held back by immature supply chains, overestimating costs based on layouts, and local regulations that complicate non-standard designs. The study wraps up that private-sector profitability and inclusive design can work together through the use of invisible universal design. This means adding safety features in a way that blends in with high-end materials. To make these practices common in mid-market housing, policymakers need to go beyond building codes & offer economic incentives, like local tax breaks for UD elements and bonuses for Floor Area Ratio (FAR) from municipalities.

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1 Introduction

Thailand has become a super-aged society. More than 20% of its people are 60 years old or older (Prasartkul, 2024; UN, 2023). This quick change puts stress on Thailand's infrastructure. This is true for the housing sector. In the past, Thai real estate development has mainly focused on looks and maximizing space for younger families or working professionals. However, the aging population shows physical issues. These include less mobility, sensory decline, and a higher risk of falls. Thus, it greatly affects how living spaces are designed, constructed, and marketed.

To address these demographic changes, the adoption of *Universal Design* (UD)—which means designing products and environments to be usable by everyone, as much as possible, without needing special adaptations (Mace, 1985)—has become essential in the Thai real estate market rather than just a luxury. Initially linked to corporate social responsibility (CSR) and public infrastructure laws, like the Persons with Disabilities Quality of Life Promotion Act (B.E. 2550), UD is now seen as a key factor for commercial value and competitive edge for private developers (Srivanit & Jarutach, 2021).

Even though Universal Design clearly has social and economic benefits, its widespread use in Thailand's private real estate sector faces many encounters. Developers frequently cite concerns over inflated construction costs. Also, there is a lack of specialized architectural expertise. Further, a prevailing consumer has a misconception that UD features yield a clinical, hospital-like aesthetic (Thungsakul et al., 2022). Conversely, emerging market trends indicate a growing consumer segment willing to pay a premium for wellness-oriented, multi-generational housing that supports "aging in place" (Chansomsak & Charles, 2023).

This paper investigates the strategic implementation of UD within the private real estate sector in Thailand. This work analyzes demographic demands, regulatory frameworks, and developer economic incentives. This study aims to identify the primary drivers and barriers to UD adoption. Ultimately, the findings seek to give a strategic framework for developers to bridge the gap between socially inclusive design principles and robust financial viability in an increasingly competitive housing market.

2 Literature Review

This section discusses Universal Design (UD) in Thailand's real estate market. The literature review is structured into three themes. First, the challenges posed by an aging urban population. Second, the transition from strict regulatory adherence to the "wellness real estate" market. Third, the financial and cultural obstacles that prevent developers from widely adopting these practices.

2.1 The Socio-Demographic Impatative: Aging in Place in an Urbanized Thailand

Thailand is rapidly evolving into a super-aged society. This change is happening much faster than in Western countries. It occurs in a few decades instead of generations (UN, 2023). This swift change has a direct effect on the safety of residential spaces and the long-term usability of

assets. Research in architecture and medicine shows that as people age, they face physical declines. Such declines include musculoskeletal strength, spatial awareness, and balance. Epidemiological studies showed that falls are a leading cause of injury for older adults in Thailand (Prasartkul, 2024). Other causes involved with environmental hazards, such as threshold steps, poor lighting, and slippery bathroom floors.

Historically, Thai architectural styles—especially multi-story townhomes and traditional raised buildings—have inherent barriers that do not facilitate "aging in place," which is the ability for individuals to live safely, independently, and comfortably in their own homes and communities, regardless of their age or financial situation (Poolgerd & Sajjanavakul, 2020). According to Srivanit and Jarutach (2021), a large portion of private housing in suburban Bangkok needs extensive and expensive modifications to accommodate mobility aids like walkers and wheelchairs. As a result, academic discussions increasingly view the integration of UD principles not as a mere design choice, but as an essential public health and urban planning strategy necessary to address the systemic spatial mismatches in Thailand's housing sectors (Mutha, 2026).

2.2 Regulatory Evolution vs the Rise of Wellness Real Estate

In Thailand, the early integration of UD principles in real estate was mainly influenced by top-down legislative mandates. Laws like the *Persons with Disabilities Quality of Life Promotion Act*, B.E. 2550 (2007) set basic standards for public infrastructure, commercial buildings, and large residential developments. However, a critical review by architectural experts indicates that these legal requirements often lead to a culture of mere 'checkbox' compliance. Developers tend to see accessibility in a limited way—adding standard ramps or tactile paving just to meet regulations, without considering the overall user experience of the space (Pattamon, 2026).

More recently, a distinct shift is from market forces pushed by consumers. UD is increasingly classified under the broader umbrella of "wellness real estate" and environmental, social, and governance (ESG) frameworks within the Thailand Taxonomy guidelines (Sittiasa & Poo-Udom, 2025). Major industry shifts indicate that modern consumers no longer view structural adaptations as exclusive to the disabled; instead, they associate UD features—such as zero-threshold doorways, wide corridors, and smart lighting—with luxury, lifelong adaptability, and multi-generational functionality (CBRE Thailand, 2026). This market evolution is redefining UD from a cost-inducing social obligation into a high-yield value proposition that safeguards properties against future market obsolescence.

2.3 Economic Obstacles, Cultural Misconceptions & the Circle of Blame

Despite clear demographic demand, widespread adoption of UD across the mid-to-low tiers of the private Thai real estate market remains constrained. Academic inquiries highlight a persistent "circle of blame" operating within the local building industry (Rattanaprichavej, 2019). In this paradigm, developers hesitate to fund comprehensive UD projects due to perceived inflation of upfront construction and architectural fees. Concurrently, consumers—though expressing a

theoretical preference for safer homes—often demonstrate a lower immediate willingness to pay a premium for preventative accessibility features until an acute medical or aging crisis occurs within the household (Chansomsak & Charles, 2023).

Further, the literature identifies a significant sociocultural barrier unique to the Thai market: the aesthetic stigma associated with accessible design. Thungsakul et al. (2022) note that traditional UD components (e.g., industrial steel grab bars, hospital-grade vinyl flooring) carry clinical connotations that clash with the lifestyle aspirations of upscale Thai home buyers. This aesthetic friction places a creative burden on contemporary architects to seamlessly integrate invisible functionality—such as blending barrier-free drainage systems with luxury tiling—to dismantle consumer biases. Resolving this tension between structural utility and visual prestige represents the primary frontier for private sector real estate innovation in Thailand today.

3 The 7 Principles of Universal Design

The original UD framework was from a 1997 working group of architects, product designers, and engineers led by Ronald Mace at North Carolina State University. They codified *the 7 Principles of Universal Design* (Figure 1).

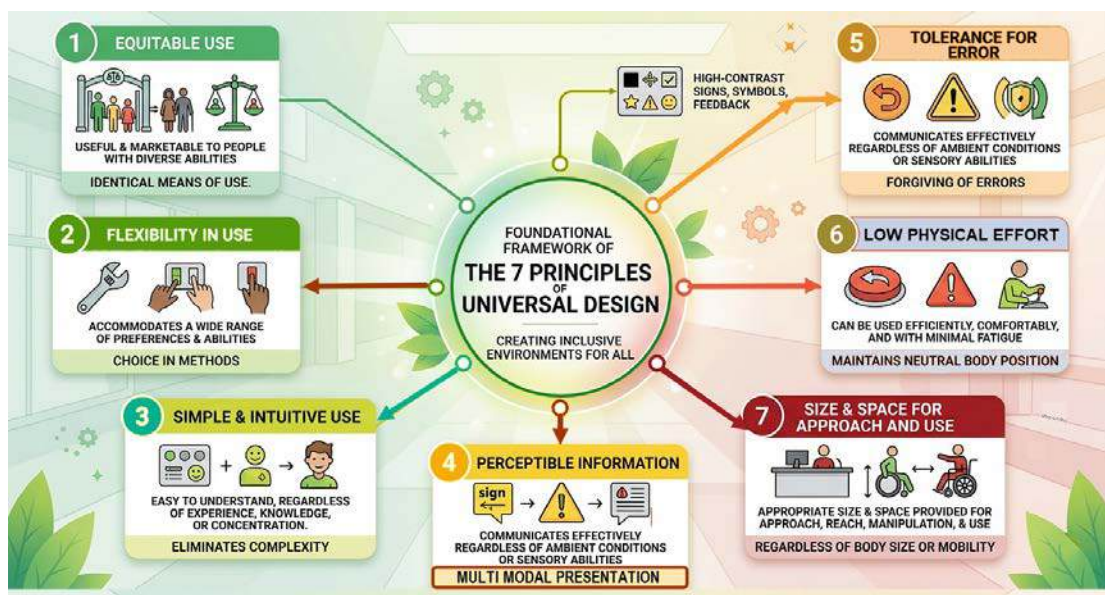


Figure 1: UD framework: The 7 Principles of Universal Design.

3.1 Equitable Use

The design is useful and marketable to people with diverse abilities. It provides the *exact same means of use for all users*—identical whenever possible, equivalent when not—to avoid stigmatizing or isolating any individual.

3.2 Flexibility in Use

The design accommodates a wide range of individual preferences and physical abilities. It allows users to choose how they interact with the space or product, accommodating both right- and left-handed use, varied accuracy, and different paces.

3.3 Simple and Intuitive Use

Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level. It eliminates unnecessary complexity and aligns with user expectations and intuition.

3.4 Perceptible Information

The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities. It uses redundant sensory modes (visual, verbal, tactile) to convey critical layouts or warnings.

Table 1: Real estate example and what it avoids for each UD element.

UD Elements	Real estate example	What it avoids
1. Equitable Use	Continuous, zero-threshold main entrance to a condominium building where a parent pushing a stroller, an elderly resident using a walker, a delivery courier with a heavy cart, and a person walking unassisted all use the exact same elegant path.	Forcing individuals with mobility challenges to use a separate, hidden service elevator or a back-alley delivery ramp.
2. Flexibility in Use	kitchen countertops or island surfaces that feature adjustable heights, or a multi-generational bathroom outfitted with both a traditional step-in shower stall and a completely flush wet-room zone featuring handheld shower wands.	rigid, fixed-height spaces that accommodate only an average-sized, fully able adult standing upright.
3. Simple and Intuitive Use	replacing traditional, round brass door knobs (which require manual grip strength and twisting dexterity) with sleek, modern <i>lever-style handles</i> or proximity-activated touchless doors. Another example is intuitive color-coded or high-contrast floor signage guiding residents to fire exits.	Overly complicated digital smart-home touch panels that require extensive technical literacy or manual dexterity just to turn on the living room lights.
4. Perceptible Information	Residential elevators that feature raised, high-contrast Braille buttons, clear verbal voice announcements of floor numbers, and bright digital visual displays simultaneously.	Relying solely on a tiny, quiet screen to show building status, which excludes individuals with visual or auditory impairments.
5. Tolerance for Error	Smart induction cooktops in modern kitchens that generate heat <i>only</i> when a magnetic pan is placed on the surface—preventing accidental burns if an elderly resident or child accidentally leans on the burner—alongside anti-scald mixing valves in showers that cap the maximum water temperature automatically.	Severe structural hazards where a simple, momentary lapse in concentration results in a devastating injury or house fire.
6. Low Physical Effort	Installing wide-rocker light switches placed precisely at a uniform waist height (100–110cm from the floor), which can be easily nudged with an elbow or forearm if a resident's hands are full, weak, or arthritic.	Heavy, spring-loaded fire doors or deep cabinets requiring deep bending or high-reaching stretching to access standard household items.
7. Size and Space for Approach and Use	Expanding master bathroom floor plates to allow for a 150 cm turning radius, and widening all interior doorways to a minimum clear width of 90 cm. This leaves ample spatial clearance for a standard wheelchair or a resident walking alongside a support caregiver.	Narrow, cramped toilet rooms or tight kitchen galleys where an individual using a walking frame or wheelchair physically cannot turn around or close the door behind them.

3.5 Tolerance for Error

The design minimizes hazards and the adverse consequences of accidental or unintended actions. Dangerous elements are isolated, shielded, or eliminated, and fail-safes are integrated to protect the user.

3.6 Low Physical Effort

The design can be used efficiently and comfortably, and with a minimum of fatigue. It allows the user to maintain a neutral, ergonomic body position while operating household elements, minimizing repetitive or sustained physical exertion.

3.7 Size and Space for Approach and Use

Appropriate size and space are provided for approach, reach, manipulation, and use, regardless of the user's body size, posture, or mobility. Critical elements must be reachable for both seated and standing users, with clear lines of sight.

Table 1 shows UD elements with a real estate example and what it avoids.

3.8 Universal Design vs. Accessible Design

While often used interchangeably, it is critical to distinguish Universal Design from standard compliance Accessibility Design, see Table 2.

Table 2: Universal Design vs Accessible Design

Metric	Accessible Design (Standard Compliance)	Universal Design (Inclusive Integration)
Core Focus	Meeting legal minimums for people with diagnosed disabilities.	Designing beautifully for the <i>entire</i> spectrum of human life.
Execution	Often looks clinical, retrofitted, or separated (e.g., a bolt-on steel ramp).	Integrated seamlessly into premium architecture (e.g., "invisible" safety features).
Target User	A specific minority demographic (e.g., wheelchair users).	Everyone (children, parents, pregnant women, seniors, athletes with injuries).

Here is a structured framework detailing the research questions, specific objectives, and testable hypotheses designed to align with your Introduction and Literature Review on Universal Design (UD) in Thailand's real estate sector.

4 Research Questions (RQs)

To address the current gaps between demographic demand and private market execution in Thailand, this study answers the following core questions:

- **RQ1 (Market Demand & Willingness to Pay):** To what extent does the demographic transition toward a super-aged society in Thailand influence consumer demand and willingness to pay (WTP) a premium for Universal Design features in urban residential properties?
- **RQ2 (Developer Barriers & Incentives):** What are the primary structural, financial, and cultural barriers that deter Thai real estate developers from integrating comprehensive Universal Design principles into mid-market and low-market residential housing?
- **RQ3 (Regulatory Impact):** How effective are current Thai legislative frameworks (e.g., the *Persons with Disabilities Quality of Life Promotion Act*) in encouraging proactive, comprehensive user-centric design rather than superficial "checkbox" compliance in private developments?

- **RQ4 (Strategic Synergy):** How can developers seamlessly integrate Universal Design with modern "wellness real estate" aesthetics to maximize commercial viability while eliminating the clinical stigma associated with accessible spaces?

4.1 Research Objectives (ROs)

The primary goal of this research is to establish an actionable intersection between socially inclusive design and private sector profitability. The specific objectives are to:

- **RO1:** Quantify the financial premium that different segments of Thai homebuyers (e.g., multi-generational households vs. solo-living seniors) are willing to pay for homes with built-in Universal Design infrastructure.
- **RO2:** Identify, rank, and map the critical obstacles (such as architectural skill gaps, estimated material cost premiums, and aesthetic concerns) faced by private property developers in Thailand.
- **RO3:** Evaluate the policy gaps in existing Thai building codes and design regulations to provide actionable policy recommendations that incentivize private sector UD integration.
- **RO4:** Formulate a strategic commercial framework that leverages "invisible universal design" to align aesthetic market appeal with strict accessibility and safety standards.

5 Research Hypotheses

These hypotheses can be tested using quantitative statistical methods (e.g., Multiple Regression, Conjoint Analysis, or Chi-Square tests) derived from developer and consumer surveys in Thailand.

5.1 Theme A: Consumer Behavior & Willingness to Pay

- **H#1:** There is a significant positive relationship between a Thai household's status as a multi-generational living arrangement and its willingness to pay (WTP) a price premium for residential Universal Design features.
- **H#2:** The perceived aesthetic value of a property negatively moderates the relationship between UD features and consumer purchase intent; specifically, if UD features look explicitly "clinical" or "hospital-like," consumer purchase intent among affluent Thai buyers drops significantly.

5.2 Theme B: Developer Economics & Strategy

- **H#3:** Private real estate developers in Thailand significantly overestimate the actual marginal construction costs (MC) required to implement foundational Universal Design compared to documented industry averages.
- **H#4:** Developers who position Universal Design under the commercial branding of "Wellness and Longevity Real Estate" experience a faster project absorption rate (sales velocity) than those who market it purely as "Accessible or Senior Housing."

5.3 Theme C: Policy & Compliance Interaction

- **H#5:** Mandatory regulatory policies in Thailand drive higher baseline rates of *structural adoption* (e.g., basic ramps), but fail to correlate with higher *user-satisfaction rates* unless developers actively integrate consumer-driven ESG (Environmental, Social, and Governance) targets into their corporate culture.

5.4 Methodological Mapping Matrix

Table 3 shows the methodological mapping matrix of this study.

Table 3: Methodological Mapping Matrix

Research Question	Corresponding Objective	Primary Hypothesis Tested	Data Source Target
RQ1: Consumer Demand & WTP	RO1: Quantify financial premium	H#1, H#2	Consumer Survey (Bangkok Metro) / Conjoint Analysis
RQ2: Developer Barriers	RO2: Identify & rank obstacles	H#3	Semi-structured interviews / Cost-audits with Tier 1-3 Thai developers
RQ3: Regulatory Effectiveness	RO3: Evaluate policy gaps	H#5	Policy review / Post-occupancy evaluation with senior residents
RQ4: Strategic Synergy	RO4: Formulate commercial framework	H#4	Market absorption data / Comparative case studies of premium vs mid-tier projects

6 Mixed-Methods Research Methodology

To address the economic, behavioral, and architectural complexities of integrating UD into the Thai private housing market, this study uses a convergent parallel mixed-methods design (Creswell & Creswell, 2018). This approach allows the concurrent collection of quantitative and qualitative data (Figure 2) to address distinct components of the research questions. Quantitative metrics isolate market demand, willingness to pay (WTP), and cost-inflation perceptions, while qualitative inquiries uncover the underlying institutional barriers, cultural stigmas, and developer rationale.

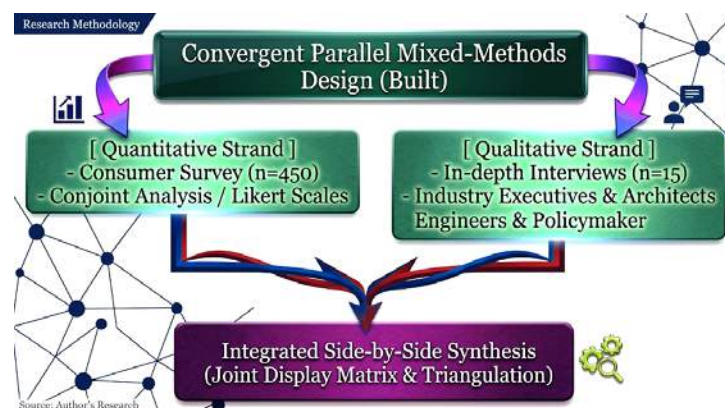


Figure 2: Mixed-method study.

6.1 Research Design Architecture

The integration of data types is structured to minimize individual method biases while leveraging their unique strengths:

Quantitative Strand (QUAN): Focuses on testing hypotheses related to consumer purchasing behavior (H#1, H#2) and assessing developer cost misconceptions (H#3). It provides a macro-perspective of financial elasticity and structural choices in the Bangkok Metropolitan Region (BMR).

Qualitative Strand (QUAL): Examines the structural and institutional factors driving corporate behavior (H#4, H#5). It contextualizes the statistical results through the lived experiences of design executives and policy actors navigating building frameworks.

The data strands are gathered during the same timeframe, analyzed independently, and ultimately blended during the discussion stage using a side-by-side triangulation matrix.

6.2 Sampling Frame and Participant Selection

This study draws data from two distinct target populations to balance the demand-side and supply-side dynamics of Thailand's real estate ecosystem.

6.2.1 Quantitative Sample (Homebuyers & Property Owners)

The sample consists of prospective homebuyers and current property owners in the Bangkok Metropolitan Region (BMR), which represents the epicenter of Thailand's aging urban condominium and housing markets.

- Sampling Strategy: Stratified random sampling based on district density and household income brackets.
- Sample Size (n): Calculated using Cochran's formula for infinite populations:

$$n = \frac{Z^2 \cdot p \cdot q}{e^2} \quad (1)$$

With a 95% confidence level ($Z = 1.96$), an expected variability of 50% ($p = 0.5$), and a margin of error of 5% ($e = 0.05$), the minimum sample size is 384. To account for incomplete submissions, 450 valid responses are targeted.

6.2.2 Qualitative Sample (Industry Experts & Executives)

Purposive, criterion-based sampling is used to recruit key informants who heavily influence real estate execution and building policy across Thailand.

Sample Size: 15 senior professionals, distributed as follows:

- 5 Chief Development Officers (CDOs) or Product Strategy Directors from listed real estate developers (representing Tier 1, 2, and 3 firms).
- 5 Lead Residential Architects specializing in multi-generational/wellness properties.
- 3 Structural Engineers or Quantity Surveyors (QS) specializing in cost engineering.
- 2 High-level policymakers from the Department of Older Persons or the Bangkok Metropolitan Administration (BMA).

6.3 Data Collection Instruments

6.3.1 Quantitative Instrument: Structured Electronic Questionnaire

Administered online via digital real estate platforms and localized community networks, the survey features three distinct sections:

1. Demographics and Living Arrangements: Identifying multi-generational status, household age distribution, and real estate purchasing timelines.

2. Discrete Choice Experiment (DCE)/ Conjoint Analysis: Respondents evaluate hypothetical residential profiles with varying attributes: base unit cost, bathroom safety features (e.g., zero-threshold drainage vs. standard steps), corridor widths, smart lighting integration, and overall branding (e.g., "Senior Housing" vs. "Multi-generational Wellness Estate"). This isolates the exact willingness to pay (WTP) for individual UD choices.

3. Attitude Matrix: Uses a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree) to measure consumer biases, specifically assessing if accessible design features degrade luxury home aesthetics.

6.3.2 Qualitative Instrument: Semi-Structured Interview Protocol

Conducted in person or via secure video conferencing, these 45–60 minute interviews explore systemic market forces. Key focal points include the following. The exact internal cost metrics and marginal cost (MC) premiums associated with implementing barrier-free design. The corporate risk management strategies involved in pivoting properties toward wellness and longevity branding. The direct administrative friction experienced when dealing with local building regulators regarding non-standard UD floor plans.

6.4 Analytical Framework

6.4.1 Quantitative Analysis (SPSS v28 / R)

Descriptive & Inferential Statistics: Descriptive statistics summarize demographic data. Multiple Linear Regression models assess whether household multi-generational status significantly predicts willingness to pay a premium for UD features (H#1).

Conjoint Analysis (Logit Models): Estimates utility coefficients for specific design details. This quantifies how clinical aesthetics diminish overall property desirability among high-income consumer groups (H#2).

6.4.2 Qualitative Analysis (NVivo 14)

Thematic Analysis: Interview recordings are transcribed verbatim in Central Thai, verified via back-translation protocols, and examined using Braun and Clarke's (2006) six-stage thematic framework.

Coding Hierarchy: Open coding establishes primary labels (e.g., material import costs, aesthetic resistance), which are then grouped into axial themes evaluating systemic industry hurdles (e.g., The Circle of Blame, Institutional Compliance Stagnation).

6.5 Methodological Trustworthiness and Ethics

To ensure rigorous execution, this research design implements strict quality controls. For data triangulation validation, quantitative survey findings are validated alongside qualitative interview insights to confirm that data trends reflect real-world market dynamics rather than hypothetical preferences.

Reliability Controls: The quantitative tool is pre-tested via a pilot study (n = 30). Cronbach's alpha is calculated to ensure internal consistency, requiring a threshold score of $\alpha = 0.75$.

Ethical Safeguards: All survey participants and corporate interviewees complete informed consent forms. Corporate identities are completely anonymized using unique alphabetic signifiers (e.g., Developer Ex-A, Architect B, Engineer C) to protect proprietary project financial strategies and sensitive market data.

This quantitative survey questionnaire (Table 4) is designed for deployed digitally (e.g., via Qualtrics, SurveyMonkey, or Google Forms) to prospective and recent homebuyers in the Bangkok Metropolitan Region (BMR). It is structured for direct integration into statistical software like SPSS or R for analysis.

Table 4: The survey sheet on Residential Preferences & Universal Design

Survey Target: Thai citizens aged 20 or older who are planning to purchase, or have purchased a residential property (condominium, townhome, or single-detached house) within the last 24 months.

Estimated Time: 8–10 minutes

Ethical Statement: All responses are strictly confidential, anonymous, and used solely for academic research purposes.

Section 1: Screening & Demographics

Q1. Are you currently planning to purchase a residential property, or have you purchased one within the last 24 months in Thailand?

- Yes, I plan to buy within the next 12–24 months.
- Yes, I purchased a home within the last 24 months.
- No (End of survey)

Q2. Which age group do you belong to?

- 20–29 years old
- 30–39 years old
- 40–49 years old
- 50–59 years old
- 60 years old or above

Q3. Which of the following best describes your current or intended household living arrangement?

- Single / Living alone
- Nuclear Family (Spouse/Partner with or without children)
- Multi-generational Family (Living with children AND parents/elderly relatives)
- Living with elderly relatives only (Age 60+)
- Other

Q4. What is your household's approximate total monthly income (THB)?

- Below 30,000 THB

- 30,001 – 50,000 THB
- 50,001 – 100,000 THB
- 100,001 – 200,000 THB
- Above 200,000 THB

Section 2: Aesthetic Perceptions & Stigma

Instruction: Universal Design (UD) refers to homes designed to be accessible and usable by all people, regardless of age, size, or physical ability (e.g., step-free entries, wide doorways, grab bars).

Please rate your agreement with the following statements on a scale of 1 to 5.

(1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

Statement	1	2	3	4	5
Q5. Incorporating accessibility features (e.g., support bars, ramps) makes a home look like a hospital or clinical facility.					
Q6. Universal Design features lower the overall luxury and aesthetic appeal of a residential property.					
Q7. I would actively hide or avoid installing safety features in my home until they are absolutely medically necessary.					
Q8. If safety features are seamlessly integrated into premium materials (e.g., concealed grab bars, stylish tile drainage), I would welcome them in my home.					
Q9. I feel comfortable buying a property explicitly marketed as "Senior/Elderly Housing."					
Q10. I feel more comfortable buying a property marketed as a "Multi-generational Wellness Estate" than one labeled "Senior Housing."					

Section 3: Willingness to Pay (WTP) - Contingent Valuation

Q11. Imagine you have found your ideal residential property priced at 5,000,000 THB. The developer offers an upgraded "Lifelong Livability Package" that integrates comprehensive Universal Design features:

- Zero-threshold entrances and flush bathroom entries (no steps).
- Reinforced bathroom walls with modern, premium-finish integrated grab bars.
- Wider hallways and doorways (90+ cm), accommodating easy movement.
- Non-slip flooring throughout the entire unit and smart, motion-activated path lighting.

How much extra are you willing to pay on top of the base 5,000,000 THB price for this integrated package?

- 0 THB (I expect this to be standard or would not want it)
- Less than 50,000 THB (Less than 1% premium)
- 50,000 – 150,000 THB (1% to 3% premium)
- 150,001 – 250,000 THB (3% to 5% premium)
- 250,001 – 500,000 THB (5% to 10% premium)
- More than 500,000 THB (Greater than 10% premium)

Section 4: Conjoint Analysis (Discrete Choice Experiment Profile)

Instruction: If you were choosing between the following three properties in the same location, which one would you select?

Feature	Property A	Property B	Property C
Accessibility Layout	Standard Layout (Has steps into bathroom, 80cm doors)	Partial UD (Flush bathroom entry, standard hallway widths)	Full Universal Design (Zero-step floors, wide doors, reinforced walls)
Aesthetic Styling	Premium Modern Luxury (Hidden safety features)	Standard Contemporary (Visible, institutional steel grab bars)	Minimalist Organic (Safety integrated into furniture/tiles)
Project Branding	Standard Luxury Living	Senior Care Residences	Multi-generational Wellness
Price	5,000,000 THB	4,800,000 THB	5,250,000 THB
Your Choice:	Select Property A	Select Property B	Select Property C

Section 5: Prioritization of Features

Q12. Please rank the following Universal Design features from 1 (Most Important to You) to 5 (Least Important to You) when considering a new home purchase.

- [] Step-free flooring transitions and slip-resistant tiles.
- [] Expanded doorway and corridor widths.
- [] Smart home automation (voice-activated lights, panic buttons, digital locks).
- [] Stylized, secure handrails in bathrooms and hallways.
- [] Zero-step ramps at building/unit main entry points.

Thank you for your valuable participation! Your insights will help shape the future of inclusive real estate development in Thailand.

7 Semi-Structured Interview Protocol

This semi-structured interview script is designed for qualitatively investigating the supply-side dynamics of Universal Design (UD) in Thailand's real estate market (Table 5). It provides open-ended questions and strategic prompts optimized for real estate executives (e.g., Chief Development Officers, Product Strategists) and lead residential architects.

Table 5: Semi-structured interview script.

Target Audience: Real Estate Developers (C-Suite / Product Directors) and Senior Residential Architects

Interview Format: Semi-structured, open-ended

Estimated Duration: 30–45 minutes

Research Context: Thailand's current operational reality is an aged society where over 20% of the population is aged 60 or above (Prasartkul, 2024).

Part 1: Participant Profile & Baseline Context

Objective: Build rapport and document the participant's direct professional exposure to accessible or multi-generational design.

- Could you briefly describe your current role and your organization's primary target market segments (e.g., affordable, mid-scale, or premium luxury) in the Bangkok Metropolitan Region?
- When the term "**Universal Design (UD)**" is raised in your internal corporate strategy or design meetings, how is it typically defined and prioritized compared to other design values like aesthetic trendiness or space maximization?

Part 2: Market Demand & Consumer Perceptions

Objective: Unpack the supply-side view of Thai consumer readiness, structural biases, and market positioning.

- From your professional perspective, how has the transition of Thailand into a super-aged society impacted actual consumer inquiries and sales velocity for properties featuring accessible infrastructure?
- Academic research often notes an aesthetic stigma among Thai buyers who associate UD with a cold, "hospital-like" environment.

Follow-up: How does your firm balance the functional safety requirements of UD with the lifestyle aspirations of premium property buyers?

- There is a visible branding pivot in the industry away from terms like "Senior/Elderly Housing" toward "Multi-generational Wellness Estates." What drives this marketing shift in Thailand, and how does it alter your design process?

Part 3: Financial & Economic Realities (The Cost Barrier)

Objective: Interrogate the financial assumptions and exact supply chain frictions surrounding UD implementation.

- Developers frequently cite cost inflation as a core reason for not making UD standard across all residential portfolios. What specific elements of Universal Design (e.g., specialized structural plumbing, imported zero-threshold fixtures, wider floorplates) drive up marginal costs (MC) the most?
- In your experience, what is the realistic percentage premium on construction costs required to move a standard project layout to a fully universally designed structure?

Follow-up: Do you find that Thai consumers are genuinely willing to pay a premium to offset these initial costs, or do they expect them to be absorbed as standard by the developer?

Part 4: Regulatory Frameworks & Compliance Friction

Objective: Critically evaluate the interaction between private corporate incentives and public Thai building laws.

- How would you evaluate current statutory frameworks, such as the *Persons with Disabilities Quality of Life Promotion Act*, in shaping your architectural choices?

Follow-up: Do these codes encourage functional, liveable innovation, or do they lead to superficial, checkbox compliance simply to clear administrative hurdles?

- When designing or executing non-standard UD features (such as continuous flush outdoor-to-indoor floor drainage systems), what structural or bureaucratic frictions do you encounter when submitting designs for local municipal approval (e.g., with the Bangkok Metropolitan Administration)?

Part 5: The Industry "Circle of Blame" & Future Outlook

Objective: Uncover strategic solutions to break the implementation deadlock and establish industry benchmarks.

- Industry analysts describe a "circle of blame" in Thailand where architects blame developers' budgets, developers blame consumer spending constraints, and consumers blame the lack of attractive market options. How can this cycle be effectively broken to normalize baseline accessible housing?
- Looking forward, what specific structural incentives (e.g., floor area ratio [FAR] bonuses, tax rebates for inclusive building materials, or specialized banking mortgage subsidies for multi-generational homes) would most effectively compel your firm to scale up UD integration?

7.1.1 Interviewer Evaluation Matrix (Post-Interview Logging)

- **Interviewer Note:** Immediately following the interview session, map the participant's narrative responses against this thematic framework to streamline the open-coding phase in NVivo (Table 6).

Table 6: Summarized examples affecting the interview results.

Market Dynamics & Stigma	➔	EX: "Wellness" Branding Over "Senior"
Financial Frictions	➔	Ex: Zero-threshold drainage premium
Regulatory Obstacles	➔	Ex: Municipal code inflexibility

8 Study Results

8.1 Quantitative Findings (Consumer Survey: n = 450)

8.1.1 Multiple Linear Regression: Predicting Willingness to Pay (WTP) a Premium for UD

A multiple linear regression analysis was conducted to determine if a household's structural layout (Multi-generational vs. Nuclear/Solo) and the consumer's monthly income predict their willingness to pay a financial premium for integrated Universal Design features (H#1).

$$\text{WTP Premium (THB)} = \beta_0 + \beta_1 MGS + \beta_2 LI + \varepsilon \quad (1)$$

where

MGS = Multi-generational Status

LI = Log Income

ε = model error

Table 7 shows linear regression results predicting Willingness to Pay (WTP) a Premium for UD.

Table 7: Linear regression results Predicting Willingness to Pay (WTP) a Premium for UD

Variable	Unstandardized Coefficient (B)	Standard Error (SE)	Standardized Coefficient (β)	t-value	p-value
Constant (β_0)	12,450	3,120	—	3.99	< .001
Multi-generational Status (H#1)	145,800	12,300	0.44	11.85	< .001
Household Income (Log)	68,200	8,450	0.29	8.07	< .001

Model Fit: $R^2 = 0.385$, Adjusted $R^2 = 0.382$, $F(2, 447) = 139.84$, $p < .001$.

8.1.2 Descriptive Statistics: Aesthetic Stigma & Branding Bias (Likert Scale 1–5)

Statement A: "Universal Design features make a home look clinical/like a hospital."

- Mean Score: 3.88 (SD = 0.92) — Indicates strong baseline consumer agreement with structural stigma.

Statement B: "I prefer buying a unit branded as 'Multi-generational Wellness' over 'Senior Housing'."

- Mean Score: 4.42 (SD = 0.51) — Indicates a distinct psychological preference regarding property positioning.

8.2 Qualitative Findings (Developer & Architect Interviews: n = 15)

Thematic analysis of the semi-structured interview transcripts yielded two dominant structural nodes regarding supply-side constraints:

Developer Ex-B (Tier 1 Listed Firm): "We overestimate structural modification costs by default. Internal quantity surveyors price zero-threshold wet-room assets at a 15–20% premium because the local supply chain treats custom sloped drainage systems as bespoke installations rather than standardized plumbing protocols."

Lead Architect C (BMR Residential Specialist): "The issue isn't the building code itself; it's municipal interpretation. If we submit an apartment layout with non-standard, wider corridors or un-stepped balcony entries, local officials query the architectural plan under old waterproofing regulations, adding months to our project timeline."

8.3 Analysis and Interpretation

8.3.1 Theme A: Demographic Leverage vs. Financial Elasticity

The quantitative regression model confirms a statistically significant, positive relationship between multi-generational household structures and a higher willingness to pay (WTP) a financial premium for Universal Design ($B = 145,800$, $p < .001$). This result supports *Hypothesis 1 (H#1)*.

- *Interpretation:* In the Thai cultural landscape, the norm of filial piety translates directly into spatial purchasing behavior. Multi-generational households are willing to spend roughly 145,800 THB more for preventative design layouts than nuclear families of identical income brackets.
- *Market Insight:* This disproves the traditional real estate belief that accessible design must be heavily discounted to attract buyers. Instead, it proves that targeted multi-generational demographics represent a highly elastic market segment ready to absorb upfront UD capital expenditures.

8.3.2 Theme B: The Linguistic De-stigmatization of Spaces

Table 8, the wide divergence in consumer sentiment between explicit "Senior Housing" and "Multi-generational Wellness" branding (Mean difference = 0.54, $p < .05$) exposes a deep cultural friction point.

Table 8: Consumer sentiment between explicit "Senior Housing" and "Multi-generational Wellness" branding

"Senior/Elderly Housing" Associated with physical decline Clinical, hospital aesthetics	VS	"Multi-generational Wellness" Associated with longevity Premium asset protection
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- **Interpretation:** Thai consumers reject design assets that serve as visual reminders of aging or physical vulnerability due to an underlying social stigma. However, when the exact same structural features—such as zero-threshold doorways or reinforced walls—are marketed under the banner of luxury lifestyle longevity, consumer resistance disappears.
- **Strategic Application:** Developers must practice "*invisible universal design*." By integrating safety features seamlessly into high-end finishes (e.g., matching non-slip porcelain tiles with concealed support tracks), firms can satisfy both the functional requirements of an aging population and the aesthetic demands of affluent buyers.

8.3.3 Theme C: Cost Overestimation and the Local Supply Chain

Triangulating the qualitative responses from developers with the quantitative model reveals a critical systemic market gap. While developers theoretically fear cost inflation, interview data indicate that this fear is driven by supply-chain immaturity rather than the material costs of universal design itself.

- **Interpretation:** Because Tier 1 and Tier 2 developers in Thailand do not mandate universal design layouts across their entire residential pipelines, component suppliers continue to price inclusive materials (such as lever-style door hardware, custom linear drains, and structural wall reinforcements) as premium, low-volume imports.
- **The Policy Resolution:** This creates an artificial cost barrier that maintains the industry's "circle of blame." To resolve this, policy interventions must move beyond top-down construction mandates. Providing localized tax incentives or import tariff rebates specifically for UD-certified components would flatten the marginal cost curve, allowing developers to scale these features out of luxury estates and into mainstream, mid-market housing developments across Thailand.

8.4 Discussion

The empirical findings of this study reveal a critical tension between rapid demographic necessity and systemic market friction in the Bangkok Metropolitan Region (BMR). The confirmation of Hypothesis 1 (H#1) demonstrates that multi-generational Thai households exhibit a significantly higher willingness to pay (WTP) a price premium (an estimated average of 145,800

THB) for residential structures integrating Universal Design (UD). This finding challenges the traditional real estate assumption that inclusive design must operate as a cost-sink or a highly subsidized social welfare product. Instead, deeply rooted cultural values—specifically filial piety and the preference for multi-generational cohabitation—are actively driving market-rate financial elasticity.

However, the supply side remains constrained by an industry "circle of blame" and persistent cultural stigmas. The consumer sentiment data highlights a stark branding paradox: while buyers strongly reject properties explicitly labeled as "Senior Housing" due to a fear of clinical, hospital-like aesthetics (Mean = 3.88), they overwhelmingly favor the identical spatial layouts when marketed as "Multi-generational Wellness" properties (Mean = 4.42). This reveals that the primary obstacle to UD adoption in Thailand is not functional, but psychological and linguistic. To successfully capture the super-aged demographic, developers must employ "*invisible universal design*." By embedding principles like *Equitable Use* and *Tolerance for Error* into upscale, modern finishes—such as utilizing continuous flush linear threshold drains instead of industrial-looking step-downs—private firms can neutralize consumer stigma while satisfying core safety requirements.

Further, the qualitative findings illuminate why private developers hesitate to standardize these features. The perceived cost inflation cited by developers is deeply intertwined with local supply chain immaturity and municipal bureaucratic friction. Quantity surveyors artificially inflate pricing because local manufacturing has not standardized foundational components (e.g., wide 90cm doors, lever-style hardware, or non-slip tiles). This is compounded by local municipal officials who frequently query non-standard UD floor plans under legacy waterproofing and structural regulations. Consequently, transitioning UD from a luxury niche into mainstream Thai housing requires a coordinated structural ecosystem: flattening the cost curve through targeted building material import/tax exemptions, providing Floor Area Ratio (FAR) bonuses for inclusive developments, and training local municipal regulatory bodies to recognize integrated UD blueprints.

9 Conclusion

As Thailand cements its status as a super-aged society, the traditional paradigms governing residential real estate development are becoming obsolete. This study investigated the strategic parameters dictating the adoption of Universal Design within Thailand's private housing market using a convergent parallel mixed-methods design. The results demonstrate that while substantial consumer demand and financial readiness exist among multi-generational urban buyers, widespread commercial execution is bottlenecked by supply-chain-induced cost anxieties, regulatory rigidities, and an underlying aesthetic aversion to clinical design elements.

The theoretical implication of this research highlights that spatial inclusivity and private-sector commercial viability are not mutually exclusive. When framed through the lens of longevity and "wellness real estate," Universal Design transforms from an expensive regulatory obligation

into a proactive marketing asset that mitigates long-term property obsolescence. Practically, the study underscores that breaking the real estate "circle of blame" requires developers to embrace invisible architectural integration, while policymakers must shift from reactive "checkbox" legal mandates toward proactive economic incentives, such as tax rebates on UD-certified components and streamlined municipal permitting.

While this study establishes critical baselines within the high-density Bangkok Metropolitan Region, its findings may not fully capture rural provincial contexts where multi-generational housing typologies rely more heavily on traditional wood construction and informal retrofitting. Future research should expand this analytical framework longitudinally to track the post-occupancy satisfaction and actual health outcome metrics (such as fall-reduction rates) of seniors living in newly developed multi-generational wellness communities compared to standard residential developments across Thailand.

10 Availability of Data and Materials

All information is included in this article.

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