

Development and Field Validation of a Universal Design–Based Maturity Index for Healthy City Governance in Thai Municipalities

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ABSTRACT

Thailand's rapid demographic aging presents significant challenges for municipal governance, particularly in ensuring accessible and inclusive urban environments. Existing Healthy City and Age-Friendly frameworks provide domain-based guidance but lack structured mechanisms for measuring institutional integration of accessibility principles. This study develops and field-validates a Universal Design–Based Maturity Index designed to assess the degree of institutional embedding of accessibility within municipal Healthy City governance.

The instrument was constructed through synthesis of WHO Healthy City principles, Thailand's national Healthy City criteria, and the WHO Age-Friendly City framework, integrated with over two decades of fieldbased Universal Design implementation experience. Content validity was assessed by five interdisciplinary experts, yielding an overall mean score of 4.85 (S-CVI/Ave \approx 0.97). A 12-month pilot implementation in Ladsawai Municipality evaluated definitional clarity, administrative feasibility, and compatibility with planning and budgeting systems. Following refinement, the index was adopted under formal Memoranda of Understanding with five municipalities across five provinces.

Findings indicate that the staged maturity ladder enables differentiation between activity-based interventions and institutional policy integration. While longitudinal outcome evaluation remains ongoing, preliminary evidence suggests cross-context applicability within decentralized governance systems. The proposed index operationalizes Universal Design as a measurable governance variable, providing municipalities with a structured pathway toward inclusive Healthy City development.

Keywords: Universal Design; Healthy City Governance; Institutional Maturity Index; Municipal Planning; Accessibility Policy; Age-Friendly Development

INTRODUCTION

Thailand is currently experiencing an advanced demographic transition characterized by rapid population aging and a sustained increase in the number of persons with disabilities. According to national statistics, more than half of registered persons with disabilities are aged 60 years and above, indicating a structural overlap between aging and disability. This demographic pattern places increasing pressure on local governments to ensure that urban environments support independent living and social participation rather than institutional dependency. The issue is not merely clinical or social welfare–oriented; it is fundamentally spatial and administrative in nature.

The Healthy City movement, initiated by the World Health Organization (WHO) in the mid-1980s, conceptualizes health as a product of environmental, social, and governance conditions rather than medical care alone (WHO, 1986). Subsequent refinements emphasized intersectoral collaboration, participatory governance, and sustainability (WHO, 2015). In Thailand, the Ministry of Public Health adopted and localized Healthy City criteria to guide municipalities in improving environmental quality and community wellbeing. However, both

global and national frameworks primarily treat accessibility as one component among many, rather than as a structural determinant embedded in governance systems.

The WHO Age-Friendly Cities framework further expanded attention toward older persons by identifying domains such as outdoor spaces, transportation, housing, and social participation (WHO, 2007). While this framework provides a comprehensive checklist of environmental domains, implementation at the municipal level often remains activity-based rather than institution-based. Municipalities may complete discrete projects—such as installing ramps or modifying sidewalks—without integrating accessibility into budgeting logic, performance indicators, or long-term development plans. This gap between physical intervention and institutional integration has been noted in governance scholarship, particularly in contexts where local discretion and fiscal autonomy shape policy outcomes (Lipsky, 2010).

Universal Design (UD), originally articulated by Mace and further elaborated by Steinfeld and Maisel (2012), shifts the focus from adaptation for specific groups toward inclusive design for the widest possible range of users. Despite its strong theoretical foundation and technical standards, UD is frequently operationalized as a design guideline rather than a governance instrument. In practice, municipalities may lack a structured mechanism to assess their level of institutional maturity in embedding UD principles into planning systems.

This study addresses that gap by developing and field-validating a Universal Design–based Maturity Index for Healthy City Governance in Thai municipalities. Rather than proposing an abstract theoretical model, the research constructs an operational instrument that enables local authorities to evaluate and progressively strengthen their institutional integration of Universal Design within Healthy City policy structures.

The index was developed through a structured synthesis of three normative sources: WHO Healthy City principles, Thailand’s Ministry of Public Health Healthy City criteria, and WHO Age-Friendly City guidelines. These were systematically cross-mapped with over two decades of field-based Universal Design implementation experience across Thai municipalities. The resulting indicators were organized into a four-tier maturity ladder designed to guide progression from quantitative activity-based compliance toward qualitative best-practice governance.

To ensure methodological rigor, the instrument underwent content validation by five experts representing architecture, urban planning, evaluation science, and social sciences. Following expert review, a 12-month pilot implementation was conducted in Ladsawai Municipality to test definitional clarity, feasibility, and administrative integration. After refinement, formal Memoranda of Understanding (MOUs) were established with five municipalities across five provinces, enabling cross-context institutional application.

By positioning Universal Design as an institutional governance variable rather than a technical add-on, this study contributes an applied tool for municipalities seeking to advance Healthy City policy toward inclusive and sustainable urban development.

LITERATURE REVIEW AND CONCEPTUAL FOUNDATION

The Healthy City concept, initiated by the World Health Organization (WHO), frames urban health as a function of governance, environment, and community participation rather than healthcare services alone (WHO, 2015). Central to this approach is the recognition that municipal policies, intersectoral collaboration, and environmental conditions collectively shape population wellbeing. In many countries, including Thailand, Healthy City criteria have been adapted to guide local governments in promoting environmental quality, physical activity, and social cohesion.

Thailand’s Ministry of Public Health operationalized the Healthy City model into measurable local criteria to support municipal implementation. These criteria provide practical guidance for environmental sanitation, green space provision, and community engagement. However, while such indicators promote general wellbeing, they do not systematically integrate accessibility as a governance variable. Accessibility often remains a technical requirement within building standards rather than an embedded institutional performance dimension.

The WHO Age-Friendly Cities framework expanded the scope of urban health by identifying eight domains that directly affect older persons, including outdoor spaces, transportation, housing, and social participation (WHO, 2007). This model introduced a more explicit focus on environmental usability. Nevertheless, its application frequently takes the form of domain-based checklists. Municipalities may implement isolated improvements without establishing a staged progression mechanism that enables long-term institutional transformation.

Universal Design (UD), originally articulated by Mace and later elaborated by Steinfeld and Maisel (2012), proposes inclusive environments that accommodate the widest range of users without the need for adaptation. UD has significantly influenced architectural standards and accessibility regulations worldwide. Yet, in municipal governance practice, UD is often treated as a design guideline rather than as an evaluative instrument capable of measuring institutional maturity.

Governance theory suggests that policy implementation at the local level is shaped not only by regulatory frameworks but also by administrative discretion and fiscal constraints (Lipsky, 2010). In decentralized systems, municipalities require structured tools that translate normative principles into operational indicators compatible with budgeting cycles and performance evaluation systems. Without such tools, integration of accessibility principles remains dependent on individual leadership rather than institutional continuity.

Existing literature therefore reveals three structural gaps. First, Healthy City criteria insufficiently operationalize accessibility as a measurable governance variable. Second, Age-Friendly frameworks lack a graduated maturity pathway. Third, Universal Design scholarship has rarely been translated into municipal performance indices. Addressing these gaps requires an instrument capable of synthesizing normative health frameworks with practical governance mechanisms.

The present study responds to this need by constructing a Universal Design–based Maturity Index that systematically integrates Healthy City principles, Age-Friendly domains, and long-term field-based Universal Design implementation experience into a staged institutional assessment model. Rather than treating these frameworks as parallel policy references, the study synthesizes their overlapping domains into operational indicators that can be embedded within municipal planning and budgeting systems. The resulting model translates normative health and accessibility principles into measurable governance criteria, enabling municipalities to assess not only the presence of accessibility interventions but also the degree of institutional integration.

As illustrated in Figure 1, the integration process begins with the alignment of international and national Healthy City frameworks and converges through field-based Universal Design application, culminating in the development of a four-level institutional maturity ladder. The diagram visually represents the structural logic underpinning the index and clarifies the progression from conceptual synthesis to staged institutional assessment.

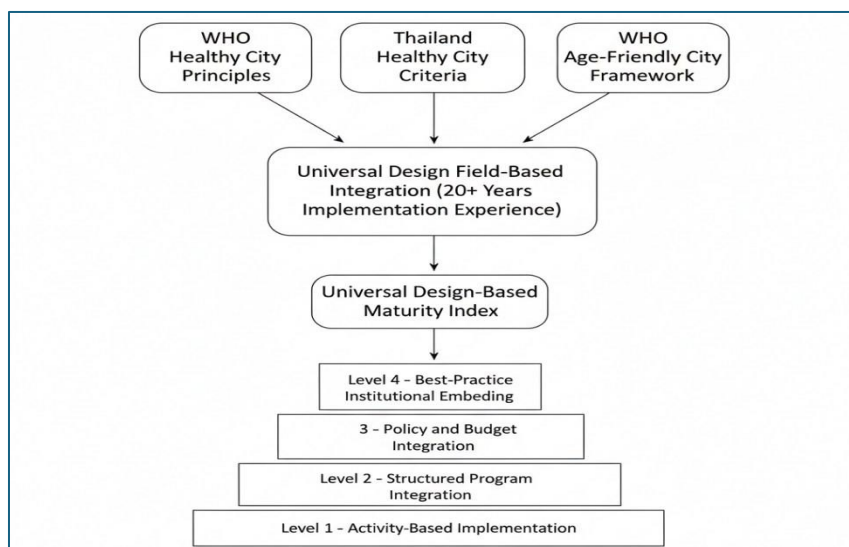


Figure 1 Conceptual integration framework of the Universal Design–Based Maturity Index.

Source: Developed by the author (2026).

METHODOLOGY

Research Design

This study employed a multi-stage instrument development design combining normative framework synthesis, expert content validation, pilot field testing, and cross-municipal institutional application. The objective was not to propose a conceptual model but to construct and validate an operational maturity index capable of assessing the degree of institutional integration of Universal Design (UD) within municipal Healthy City governance systems.

The research process consisted of four sequential phases:

- (1) indicator synthesis from normative frameworks,
- (2) expert content validation,
- (3) 12-month pilot implementation, and
- (4) multi-site application under formal research collaboration agreements.

Instrument Development

Indicator development began with systematic extraction of domains and measurable components from three primary sources: WHO Healthy City principles, Thailand’s Ministry of Public Health Healthy City criteria, and the WHO Age-Friendly City framework. These were organized into thematic clusters focusing on environmental accessibility, governance mechanisms, social participation, and intersectoral coordination.

The extracted indicators were then cross-mapped with more than two decades of field-based Universal Design implementation experience in Thai municipalities. This integration aimed to ensure contextual feasibility and administrative applicability within decentralized local governance structures.

Indicators were subsequently reorganized into a four-tier institutional maturity ladder. The four levels reflect progressive institutionalization:

- Level 1: Activity-Based Implementation
- Level 2: Structured Program Integration
- Level 3: Policy Alignment and Budget Integration
- Level 4: Best-Practice Institutional Embedding

This staged model distinguishes the index from checklist-based systems by introducing measurable progression criteria.

Table 1 Illustrative Example of Municipal Progression Across Maturity Levels

Governance Indicator	Level 1: Activity-Based	Level 2: Structured Program	Level 3: Policy & Budget Integration	Level 4: Institutional Embedding
Public Building Accessibility	Ad hoc ramp	Annual improvement plan adopted	Dedicated budget	Mandatory UD standards applied across departments

	installation		line for accessibility upgrades	
Budget Allocation	No specific allocation	Projectbased funding	Accessibility integrated into annual municipal budget	Multi-year fiscal framework with performance monitoring
Planning Integration	Isolated projects	Accessibility referenced in plans	UD indicators embedded in official development plan	Cross-departmental regulatory integration

Source: Developed by the author (2026).

The illustrative example demonstrates how municipalities may progress across maturity levels based on increasing institutional integration rather than isolated physical interventions.

Content Validation

Content validity was assessed using purposive expert sampling. Five experts were selected based on predefined criteria:

- (1) at least ten years of professional experience in architecture, urban planning, evaluation science, or social sciences;
- (2) minimum five years of experience related to Universal Design; and
- (3) interdisciplinary representation across physical design, measurement methodology, and social impact domains.

Table 2 Expert Panel Characteristics

Expert No.	Field of Expertise	Professional Experience	UD Experience	Primary Role in Review
1	Architecture	>20 years	15 years	Physical standards review
2	Urban Planning	>15 years	8 years	Urban accessibility network
Expert No.	Field of Expertise	Professional Experience	UD Experience	Primary Role in Review
3	Architecture & Structure	>12 years	6 years	Feasibility analysis
4	Evaluation Science	>18 years	5 years	Construct validity review
5	Social Sciences	>20 years	10 years	Social impact assessment

Source: Developed by the author (2026).

Experts independently rated seven evaluative dimensions using a five-point Likert scale (1 = least appropriate; 5 = most appropriate).

Table 3 Content Validation Results

Evaluative Dimension	Mean Score
Alignment with Healthy City Standards	4.80
Integration of Universal Design	5.00
Clarity of Operational Definitions	4.60
Municipal Feasibility	4.80
Maturity Progression Structure	5.00
Alignment with Social Outcome Indicators	4.80
Contextual Flexibility	4.80
Overall Mean	4.85

Source: Author’s expert validation data (2026).

The overall mean score of 4.85 corresponds to an estimated scale-level content validity index (S-CVI/Ave) of approximately 0.97, indicating strong agreement among experts. The comparatively lower score for operational clarity (4.60) informed subsequent refinement during the pilot phase.

Pilot Implementation

Following expert validation, the revised instrument was implemented in Ladsawai Municipality over a 12month period. The duration covered a complete municipal planning and budgeting cycle, enabling observation of indicator integration within planning documents, council deliberation processes, and fiscal allocation mechanisms.

Three dimensions were examined during the pilot phase:

- (1) interpretive consistency among municipal officers,
- (2) feasibility of integrating indicators into existing administrative workflows, and
- (3) compatibility with budgeting and reporting systems.

Minor ambiguities in indicator terminology were identified and addressed through clarification of operational definitions. The maturity ladder structure was retained without structural modification.

Multi-Site Institutional Application

After refinement, formal Memoranda of Understanding (MOUs) were established with five municipalities across five provinces in Thailand. The MOU framework ensured structured collaboration, standardized reporting procedures, and institutional commitment beyond informal adoption.

Municipalities varied in administrative scale, providing preliminary cross-context validation of the instrument’s adaptability. The multi-site phase remains ongoing, and comprehensive longitudinal evaluation of institutional embedding and outcome alignment will be completed in the subsequent fiscal year.

Methodological Limitations

The study primarily relies on expert content validation and pilot-based administrative feasibility testing. While these approaches strengthen internal validity, full longitudinal outcome validation across the five municipalities remains ongoing. Additionally, cross-national applicability has not yet been empirically tested beyond the Thai municipal governance context. These limitations suggest that the proposed maturity index should be interpreted as a structured institutional assessment tool undergoing progressive validation rather than a finalized performance measurement system.

RESULTS

Content Validation Outcomes

The expert review confirmed strong overall content validity of the Universal Design–Based Maturity Index. As presented in Table 3, the overall mean score was 4.85 out of 5, indicating a high level of agreement regarding conceptual alignment, feasibility, and structural coherence.

Two dimensions received the highest possible mean score (5.00): integration of Universal Design principles and maturity progression structure. Experts emphasized that the staged progression from activity-based implementation to institutional embedding provided a practical pathway for municipalities to advance beyond isolated infrastructure adjustments.

The dimension receiving the lowest mean score, clarity of operational definitions (mean = 4.60), revealed areas requiring refinement. Reviewers noted that certain indicators could be interpreted differently across administrative departments. This feedback informed revisions prior to pilot implementation.

No structural revisions were recommended for the maturity ladder itself. Modifications were limited to definitional clarification and the addition of explanatory notes for selected indicators.

Pilot Implementation Findings (Ladsawai Municipality)

The 12-month pilot implementation provided insight into the administrative feasibility of the index. Three primary findings emerged.

First, municipal officers were able to integrate the maturity indicators into existing planning documents without requiring structural reorganization of departments. Indicators were incorporated into routine reporting and annual development planning formats.

Second, the staged maturity ladder enabled clearer differentiation between short-term physical improvements and longer-term policy integration. For example, infrastructure adjustments such as ramp installation were categorized at Level 1, while budget allocation for inclusive design standards across departments reflected Level 3 progression.

Third, definitional refinement reduced reporting discrepancies observed during the initial implementation phase. Clarification of operational terminology improved cross-departmental consistency in indicator scoring.

The pilot did not reveal structural barriers preventing application of the instrument. However, variation in staff familiarity with Universal Design concepts influenced the speed of indicator integration.

Preliminary Multi-Site Application Observations

Following pilot refinement, five municipalities across five provinces adopted the instrument under formal MOUs. While full longitudinal evaluation remains ongoing, preliminary observations indicate cross-context adaptability.

Municipalities varied in administrative scale and resource capacity, yet the maturity ladder structure remained applicable without structural modification. Early-stage municipalities primarily identified Level 1 and Level 2 activities, whereas municipalities with prior accessibility initiatives demonstrated partial Level 3 integration through alignment with planning and budget frameworks.

The MOU structure facilitated structured data reporting and regular review meetings, supporting institutional continuity beyond individual leadership changes. At this stage, no municipality has been classified at full Level 4 (Best-Practice Institutional Embedding), reflecting the progressive nature of the maturity model.

Comprehensive outcome evaluation, including institutional sustainability and budget integration metrics, will be completed in the subsequent fiscal year.

Future longitudinal evaluation will incorporate measurable institutional indicators, including the percentage of annual municipal budget allocated to inclusive infrastructure, formal incorporation of Universal Design standards into municipal regulations, and documented cross-departmental coordination mechanisms within official planning reports. These indicators will enable more robust outcome-based assessment beyond administrative feasibility.

DISCUSSION

The findings of this study suggest that integrating Universal Design (UD) into Healthy City governance requires more than compliance with environmental standards. While existing Healthy City and Age-Friendly frameworks provide domain-based guidance, they do not offer a structured mechanism for measuring institutional progression. The Universal Design–Based Maturity Index addresses this structural gap by introducing a staged assessment model aligned with municipal planning and budgeting systems.

Unlike general governance maturity models that assess administrative capacity in broad organizational terms, the proposed index specifically operationalizes accessibility as a measurable governance variable embedded within fiscal and planning systems. Rather than evaluating overall bureaucratic efficiency, the model focuses on institutional integration of inclusion principles, thereby offering a domain-specific maturity structure aligned with municipal Healthy City governance.

The high content validity score indicates strong conceptual coherence between the proposed indicators and established health and accessibility frameworks. Expert agreement particularly emphasized the value of the maturity progression structure. This finding supports the argument that municipalities require graduated benchmarks rather than binary compliance criteria. In decentralized governance contexts, where administrative discretion and fiscal prioritization shape policy implementation, structured progression models can enhance institutional consistency (Lipsky, 2010).

The 12-month pilot implementation demonstrated that integration of accessibility indicators is administratively feasible without requiring major structural reforms. Instead of creating parallel reporting systems, the index was incorporated into existing planning and evaluation formats. This suggests that institutional embedding of Universal Design may be achieved through adaptive alignment rather than structural disruption.

Preliminary observations from the five MOU municipalities further indicate that the maturity ladder accommodates variation in administrative scale and prior accessibility experience. The absence of Level 4 classifications at this stage reflects the progressive design of the instrument rather than implementation failure. Institutional embedding of accessibility standards requires sustained political commitment, interdepartmental coordination, and fiscal alignment, processes that typically extend beyond a single planning cycle.

The study contributes to the literature in three respects. First, it operationalizes Universal Design as a governance variable rather than a technical design guideline. Second, it translates normative Healthy City and Age-Friendly principles into measurable institutional indicators. Third, it provides preliminary empirical evidence from municipal application rather than conceptual modeling alone.

Although developed within the Thai decentralized governance framework, the structural logic of the maturity ladder may be adaptable to other municipal systems where accessibility remains fragmented across departments. The staged integration model does not depend on a specific legal structure but on progressive embedding of inclusive criteria within planning and budgeting mechanisms. Comparative cross-national testing would further clarify its transferability.

Nevertheless, several limitations should be acknowledged. Full longitudinal evaluation across the five municipalities remains ongoing, and outcome measures such as sustained budget allocation and long-term policy continuity require extended observation. Additionally, the index was developed and tested within the Thai municipal governance context; cross-national applicability requires further validation.

Future research should examine long-term institutional outcomes, including fiscal integration, regulatory incorporation, and measurable social impact. Comparative studies across different administrative systems may further clarify the adaptability of the maturity model.

CONCLUSION

This study developed and field-validated a Universal Design–Based Maturity Index designed to assess institutional integration of accessibility within municipal Healthy City governance. Through synthesis of international frameworks and long-term field-based implementation experience, the research produced a staged assessment tool applicable to decentralized local governance contexts.

Expert validation confirmed strong content validity, and pilot implementation demonstrated administrative feasibility within a full planning and budgeting cycle. Multi-site application further suggests adaptability across municipalities with varying capacities, although longitudinal outcome evaluation remains ongoing.

By framing accessibility as a measurable governance variable rather than a technical add-on, the index provides municipalities with a structured progression pathway toward institutional embedding of inclusive principles. Continued empirical validation will strengthen its applicability within and beyond the Thai context.

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