



INFORMAL TRADERS AS HERITAGE STEWARDS: NEGOTIATING FLOOD RISK, LIVELIHOOD VULNERABILITY, AND CULTURAL PRESERVATION IN VIETNAM'S TRADITIONAL URBAN MARKETS: A SPECIFIC CASE STUDY OF THU DUC MARKET

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Abstract: Traditional markets in rapidly urbanizing Southeast Asia face the dual pressures of intensifying urban flooding and heritage commodification. Drawing on a mixed-methods study conducted at Thu Duc Market in Ho Chi Minh City, comprising a survey of 200 traders and 10 in-depth interviews, this paper examines how informal traders function as *de facto* heritage stewards. Quantitative findings reveal high livelihood vulnerability, with traders reporting revenue losses of 30–50% per flood event, alongside a strong willingness to participate in conservation activities (87%). Qualitative narratives illustrate traders' everyday adaptation strategies, gendered experiences, and critiques of top-down maladaptation, such as uneven plinth raising. The study conceptualizes “informal heritage stewardship” as a bottom-up governance mechanism that simultaneously reduces flood risk and preserves cultural identity. The findings challenge conventional views of informal traders as obstacles to heritage conservation, instead positioning them as critical agents of urban resilience. The paper recommends community-led “Green Heritage Market” models to disrupt the reinforcing cycle of flooding, physical degradation, and livelihood vulnerability.

Keywords: Traditional markets, Informal traders, Heritage stewardship, Flood risk, Sustainable livelihoods, Urban resilience.

1. Introduction

Traditional markets in rapidly urbanizing cities across developing countries serve as vital links in the informal economy, cultural identity, and everyday urban life. In Southeast Asia, these markets are far more than mere commercial spaces; they are living architectural and landscape heritage sites. Here, tangible architectural elements—such as wooden columns, brick facades, and tiled roofs—interweave seamlessly with intangible everyday practices: street vending performances, both material and performative, local culinary traditions, and the unconscious, intergenerational transmission of practical knowledge (Endres, 2014; UNESCO, 2024).

However, the increasing threat of urban flooding—driven by overly rapid urbanization, extreme climate change impacts, widespread concretization, and inadequate drainage systems—now poses an existential risk to both the physical fabric and the intangible cultural essence of these markets, as well as

to the livelihoods of the informal vendors who have long been their true custodians (Asian Development Bank, 2021; Intergovernmental Panel on Climate Change, 2022).

Ho Chi Minh City (HCMC), Vietnam's largest economic hub, stands as a classic example of this growing conflict. With a population exceeding 13 million and one of the highest urbanization rates in Southeast Asia, the city is suffering from increasingly severe flooding caused by heavy rainfall and tidal surges. Traditional fresh-produce markets, many of which originated between the 1950s and 1970s, are particularly vulnerable due to their low-lying locations, degraded infrastructure, and ever-denser concentration of informal commercial activities.

Among them, Thu Duc Market—a historically significant trading space in what is now Thu Duc Ward—is a particularly representative case. Once a bustling commercial center for the region, this market now faces chronic flooding during



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the rainy season from May to November. The inundation disrupts trading, community activities, and damages goods, while simultaneously accelerating the physical deterioration and cultural erosion of the architectural heritage embodied in Thu Duc Market.

Although urban flooding in Vietnam has attracted increasing scholarly attention over the past decade (Garschagen, 2015; Hung & Diep, 2022; Turner & Schoenberger, 2012), several significant research gaps remain insufficiently addressed. First, existing studies have predominantly framed informal traders as passive victims of environmental hazards, emphasizing livelihood precarity, environmental vulnerability, and economic losses while paying comparatively little attention to their agency as active actors and potential stewards of cultural heritage. Second, the intersection between flood risk, cultural and architectural conservation, and informal governance within traditional urban markets has yet to be thoroughly examined through mixed-method approaches that integrate large-scale survey data with the lived experiences and situated knowledge of traders themselves. Third, while contemporary urban policy discourses in Ho Chi Minh City increasingly foreground sustainable development agendas—particularly through sponge-city strategies (Phan Thien Kim & Nguyen Minh Quang, 2025) alongside heritage preservation—empirical evidence remains limited regarding how informal traders themselves perceive, negotiate, and actively contribute to these intertwined objectives of cultural heritage conservation and livelihood resilience.

This article seeks to address these gaps by examining how traders at Thu Duc Market navigate the often-competing demands between flood risk management and cultural preservation through everyday adaptive practices situated between individual initiatives and top-down governance mechanisms. Drawing on a mixed-method study conducted between 2024 and 2025, the research combines a structured survey of 200 participants, of whom 82% were informal traders and 75% were women, with ten semi-structured in-depth interviews. Quantitative results indicate that 81% of respondents perceived an increase in flood frequency over the past five years, with each major flooding event contributing to an estimated decline of 30–50% in monthly income. At the same time, 79% of traders regarded the preservation of the market's architectural and cultural heritage as important or very important, while 87% expressed willingness to participate in heritage conservation and flood mitigation initiatives if provided with appropriate institutional and technical support.

The qualitative narratives further illuminate everyday governance practices embedded in traders' lived experiences. These practices range from individually improvised adaptations—such as elevating goods on self-made platforms and routinely maintaining drainage channels surrounding market stalls—to collective forms of negotiation, including petitions urging local authorities to implement coordinated ground elevation strategies to prevent floodwater diversion from disproportionately affecting neighboring areas. Women traders frequently described a double burden during flood

events: simultaneously coping with commercial losses while carrying the primary responsibility for household care and family wellbeing.

Accordingly, this study reconceptualizes informal traders not merely as vulnerable groups disproportionately exposed to extreme weather events, but as *de facto* stewards of cultural heritage whose everyday practices, adaptive knowledge, and improvised routines collectively constitute an organic yet largely unrecognized form of urban governance. By emphasizing the importance of protecting, amplifying, and meaningfully incorporating traders' voices, this article contributes to scholarship on community-based heritage resilience in developing contexts and offers practical policy insights for Ho Chi Minh City's transition toward more sustainable, inclusive, and participatory governance.

1.1. Research Questions

This study is guided by three closely interrelated research questions:

1. How do informal traders at Thu Duc Market perceive and experience the interaction between intensifying urban flooding and the architectural and cultural heritage values of the traditional marketplace, particularly as these dynamics evolve through a negative cycle of deterioration?
2. Through what forms of everyday practice do traders perform governance roles in sustaining both their livelihoods and the market's tangible and intangible heritage values?
3. What institutional mechanisms are required to mobilize and strengthen traders' governance capacities in ways that can transform the current pathological cycle of flooding and degradation into a more constructive cycle of resilience and heritage preservation?

By addressing these questions, this article contributes to advancing theoretical understandings of informal heritage governance while offering practical recommendations for integrating community agency into urban planning processes in Vietnam and comparable contexts.

2. Literature Review

Traditional markets in rapidly urbanizing cities across developing countries constitute essential socio-economic and cultural infrastructures of urban life. In Southeast Asia, these markets function as hybrid spaces where informal economies, everyday livelihoods, and living heritage intersect (Endres, 2014; Koh, 2006; Kusno, 2010). Recent scholarship increasingly recognizes that such marketplaces are living heritage landscapes shaped through the interaction of tangible architectural features and intangible cultural practices (Herzfeld, 2009; UNESCO, 2024). Nevertheless, these spaces are facing mounting pressures arising from climate-induced urban flooding, accelerated urban concretization, and top-down administrative approaches that tend to commodify urban heritage through economically driven interventions (Asian Development Bank,

2021; Intergovernmental Panel on Climate Change, 2022; OECD, 2018).

2.1. Urban Flooding and Informal Settlements in Developing Countries

Urban flooding has emerged as one of the most pressing challenges confronting cities across the developing world. In Vietnam, Ho Chi Minh City experiences frequent severe flooding events (Nguyen Minh Giam et al., 2023), with substantial economic losses during recent periods (V. H. Bui & Nguyen, 2022; World Bank & Nguyen, Giang Thi Huong, 2015). Comparable studies conducted in Bangkok, Jakarta, and Manila reveal similar patterns, demonstrating that informal traders operating in traditional markets often bear the most severe consequences of flood-related disasters. Reported impacts include revenue losses ranging from 25% to 60% following individual flood events, alongside prolonged asset deterioration and cumulative economic vulnerability (Padawangi & Douglass, 2015).

2.2. Informal Economies and Livelihood Vulnerability in Traditional Markets

Informal traders constitute the backbone of traditional marketplaces across Southeast Asia. In Vietnam, informal economic activities account for a substantial share of urban employment within fresh-food markets (General Statistics Office of Vietnam, 2022). The Sustainable Livelihoods Approach (Department for International Development, 1999; Scoones, 2021) has been widely employed to examine how flooding and climate-related hazards erode the five core livelihood assets of informal traders, namely human, social, natural, physical, and financial capital. Gender dimensions are particularly pronounced, as women traders frequently experience a double burden, simultaneously confronting commercial losses while assuming increased caregiving and household responsibilities during periods of flooding (Resurreccion & Elmhirst, 2008).

2.3. Heritage Commodification and Cultural Preservation in Traditional Urban Markets

Alongside research on flood risk, scholarship in cultural and historical heritage studies has increasingly examined the modernization of traditional marketplaces. UNESCO's reports on living heritage and sustainable communities caution that state-led urban redevelopment projects may accelerate physical deterioration while eroding intangible everyday practices (UNESCO, 2024). In Vietnam, state-led heritage and cultural governance policies have frequently prioritized large-scale, tourism-oriented redevelopment schemes at the expense of everyday spatial practices and livelihood environments (Herzfeld, 2009; Turner & Schoenberger, 2012). This has generated an enduring tension between authorized heritage and living heritage (Harrison, 2013; Smith, 2006).

2.4. Community-Based Management and Informal Governance

The concept of community-based governance has gained prominence within the literature on urban resilience as a

bottom-up alternative to technocratic adaptation strategies (Boyd & Folke, 2012; Ostrom, 2009). In flood-prone settings, informal governance networks among market traders can facilitate rapid on-site responses, coordinate collective resources, and co-produce locally embedded knowledge (Padawangi, 2023). However, much of the literature remains conceptual or focused on formally organized community groups rather than fragmented yet persistent governance embedded in the everyday practices of small-scale informal traders.

2.5. Research Gaps and the Positioning of the Present Study

This study addresses these gaps by providing original mixed-method evidence from Thu Duc Market, drawing on a structured survey (n = 200, including 82% informal traders and 75% women) alongside ten semi-structured in-depth interviews. The research advances the concept of informal heritage stewardship, conceptualized here as the everyday, bottom-up practices through which informal traders simultaneously protect their livelihoods and sustain both tangible heritage values—including architectural structures and spatial arrangements—and intangible heritage values, including local culinary traditions, social relations, and intergenerational knowledge, under recurrent flood risk.

2.5.1 Positioning the Concept of “Informal Heritage Stewardship” in the Existing Literature

This study proposes Informal Heritage Stewardship as a theoretical framework for understanding the everyday, spontaneous, and collective practices through which informal traders protect their economic livelihoods while sustaining tangible and intangible heritage values under recurrent urban flooding. The concept differs from living heritage scholarship, which emphasizes cultural values maintained through community practices (Harrison, 2013; UNESCO, 2024); from informal governance scholarship, which highlights political negotiations and informal economic arrangements (Padawangi, 2023); and from community-based heritage management, which generally assumes formally organized and state-recognized community groups.

At Thu Duc Market, such practices include independently raising plinths around stalls; maintaining and making minor repairs to traditional architectural features; clearing waste and unblocking drains around trading spaces; coordinating with neighboring vendors to reduce sidewalk encroachment and prevent waste discharge; and participating in collective cleaning activities while sharing local knowledge on flood response. These practices differ from official heritage governance, which is usually top-down, state-led, expert-driven, and focused on restoration, tourism planning, and regulatory enforcement (Smith, 2006). Thus, Informal Heritage Stewardship is not merely adaptation, but a hybrid governance mechanism integrating livelihood protection, environmental management, and heritage maintenance.

2.5.2 Positioning Informal Heritage Stewardship in the Literature

While community stewardship and informal governance have gained traction in urban resilience studies, they remain insufficient when applied to traditional markets (Boyd & Folke, 2012; Ostrom, 2009; Padawangi, 2023). Existing heritage scholarship, particularly authorized heritage discourse and living heritage approaches, has largely concentrated on state-led or expert-driven conservation (Harrison, 2013; Smith, 2006; UNESCO, 2024). What remains underexplored is the active, everyday role of traders as de facto heritage stewards who co-produce and reproduce the market's heritage value while adapting to environmental threats.

The concept extends these literatures by shifting the analytical focus from vulnerability to agency, highlighting the hybrid economic, environmental, and cultural nature of traders' practices, and emphasizing the gendered dimension of stewardship. By foregrounding these dynamics, this study bridges urban flood resilience, informal economy, and living heritage studies.

3. Research Methodology

This study employs document analysis, field observation, sociological surveys, and in-depth interviews, structured through a sequential mixed-methods design (Creswell & Plano Clark, 2018), to investigate how informal traders at Thu Duc Market perceive, experience, and respond to the intersecting dynamics of urban flooding and heritage conservation.

3.1. Study Site

Thu Duc Market, located in Thu Duc City, Ho Chi Minh City (approximately 10.8500°N, 106.7540°E), is a long-established marketplace specializing in fresh produce, dried goods, textiles, and small-scale electronics and household commodities. With a trading history approaching three centuries, based on historical sources including the Thu Duc Gazetteer, French colonial administrative archives, and historical maps of Gia Dinh, the market represents an important historical commercial node in the region. Today, it serves approximately 300–400 informal traders and thousands of local residents. The market is situated in a low-lying area adjacent to Cau Ngang Canal, characterized by traditional low-rise timber and brick structures, narrow alleyways, and dense informal street vending.

Thu Duc Market exemplifies many structural vulnerabilities associated with traditional markets in Vietnam, including outdated drainage infrastructure, accelerated urban concretization, and gradual deterioration and modification of historic building structures. These conditions have intensified exposure to combined pluvial flooding and tidal inundation.

3.2. Quantitative Data Collection

A structured survey questionnaire was administered through face-to-face data collection between October 2024 and March 2025. The survey instrument comprised 68 items, including demographic, livelihood, and place-based

attachment characteristics such as age, gender, occupation, years of market engagement, monthly income, and profit margins; Likert-scale questions measuring perceptions of flood frequency, impacts on business activities and heritage values, satisfaction with market conditions, and willingness to participate in heritage conservation initiatives; and multiple-choice and open-ended questions addressing perceived flood causes, environmental intervention practices, and preferred policy responses.

A total of 200 valid responses were obtained, representing a response rate of 87%. The sample was purposively stratified to reflect the socio-economic composition of the market, including 82% informal traders ($n = 164$) and 75% women ($n = 150$), alongside a balanced representation of trading sectors and non-trading participants (Table 1). Survey administration was conducted on-site at market stalls and surrounding streets to minimize disruption to traders' commercial activities.

3.3. Qualitative Data Collection

Ten semi-structured in-depth interviews, with an average duration of 35–50 minutes, were conducted with key informants selected through snowball sampling. Participants included seven female and three male informal traders ranging in age from 37 to 70 years old, covering food vendors, dried goods traders, service providers, and one local resident with an on-site managerial role. Interviews explored flooding experiences, adaptive practices, heritage values, views on government interventions, and visions for a future Green Heritage Market. Interviews were audio-recorded with consent, transcribed verbatim in Vietnamese, translated into English, and anonymized.

3.4. Sampling Strategy and Participant Characteristics

Non-probability purposive sampling was employed to ensure representation of the most affected groups, including female traders, long-term vendors, and newer entrants. Survey participants had an average age of 45 years and an average market attachment of 18 years. Interviewees represented a cross-section of experience levels, from one year to over 40 years. Ethical approval was obtained from the Institutional Review Board of HO CHI MINH CITY UNIVERSITY OF TECHNOLOGY (HUTECH), anonymised for review. Both written and verbal informed consent were obtained, with attention to power dynamics between researchers and informal traders.

3.5. Data Analysis

Quantitative Analysis: Quantitative data were entered into SPSS Version 29 and analyzed using descriptive statistics, including frequencies, means, standard deviations, cross-tabulations, and Chi-square tests at $\alpha = 0.05$. The internal consistency of Likert-scale items was assessed using Cronbach's alpha, yielding a strong reliability coefficient ($\alpha = 0.87$).

Qualitative Analysis: Interview transcripts were analyzed using Braun and Clarke's (2022) reflexive thematic analysis approach, supported by NVivo 14 software. Initial codes included fragmented ground elevation, the double burden of

Table 1: Demographic Characteristics of Survey Participants ($n = 200$)

Characteristics	Frequency (n)	Percentage (%)
Traders / Market Vendors	164	82.0
Local Residents / Customers	24	12.0
Road Users / Passersby	12	6.0
Female	150	75.0
Male	50	25.0
Less than 5 years of engagement	48	24.0
5–20 years of engagement	82	41.0
More than 20 years of engagement	70	35.0
Mean age	45.2	–

Source: Authors' field survey (2024–2025).

women traders, and everyday governance practices. Member checking was conducted with three participants, allowing validation and refinement of emerging interpretations.

Data Integration: Quantitative and qualitative findings were integrated during the interpretive phase through joint display matrices, enabling identification of convergence, complementarity, and divergence (Fetters & Molina-Azorin, 2020).

3.6. Research Ethics and Researcher Positionality

This study prioritized the ethical principle of do no harm, particularly given participants' precarious economic circumstances. Interviews were scheduled during off-peak trading hours, and participants received financial compensation equivalent to an average hourly income. The principal investigator is a Vietnamese landscape architecture and sustainable heritage researcher, architect, and urban sociology scholar, with fieldwork experience in traditional markets across Ho Chi Minh City. The research team also included two architecture and landscape students. Throughout the study, researchers maintained a reflexive stance through positionality journaling, acknowledging both insider cultural familiarity and outsider scholarly distance.

3.7. Study Limitations

This study is limited to a single market context and represents a cross-sectional snapshot covering 2024–2025. Self-reported data may contain biases associated with memory recall, social desirability, and time constraints. Future longitudinal research could examine the long-term effectiveness of proposed interventions and how trader-led adaptive practices evolve under changing environmental and governance conditions.

4. Research Findings

The findings are organized into four closely interconnected themes, derived from the mixed-method dataset ($n = 200$ survey responses and 10 in-depth interviews). Quantitative findings are presented first, followed by qualitative narratives that provide contextual illustration and interpretive depth. The following tables provide detailed data summaries supplemented with Chi-square tests at $\alpha = 0.05$.

Preferred solutions by type of business are reported in

Table 2, with no statistically significant differences across business types (all $p > 0.05$). As shown in Table 3, women experience significantly greater economic impacts from flooding compared to men ($p = 0.0179$). Table 4 further shows that women have markedly higher willingness to participate in conservation and flood mitigation programs ($p = 0.0359$).

4.1. Perceptions of Flood Risk and Livelihood Impacts

The majority of survey participants reported that flooding has become increasingly severe over time. Eighty-one percent of respondents ($n = 162$) indicated that flooding had become more frequent or much more frequent over the past five years (Table 5). Among traders, 72% ($n = 118/164$) reported that their market stalls were directly affected during heavy rainfall or tidal inundation. Each major flood event was associated with a 30–50% reduction in monthly revenue, while 63% of traders ($n = 103$) reported having to temporarily close or significantly reduce business operations for at least one day.

Qualitative findings provide vivid insights. One female food vendor (P5, age 42) described: "After only about 15 minutes of rain, flooding starts immediately; at its worst, the water reaches motorbike seat level. Large vehicles passing by create waves that rush into the house, damaging refrigerators and everything inside." A male repair worker (P8, age 68) added: "In the past, flooding was much worse; water flowed down from Vo Van Ngan Street like a waterfall. It has improved somewhat since the roads were elevated, but surrounding streets still flood badly, and customers are reluctant to come in."

4.2. Heritage Perceptions and Informal Governance Practices

Traders demonstrated strong attachment to the market's cultural and historical significance. Seventy-nine percent ($n = 158$) regarded conservation of architectural and historical heritage as important or very important (Table 6). Furthermore, 87% ($n = 174$) expressed willingness to participate in heritage conservation and flood mitigation initiatives if provided with support. Interview participants positioned themselves as active governance actors rather than passive victims, describing routine self-governance such as clearing drainage channels, elevating goods, and reminding neighbouring vendors not to dispose of waste into drainage systems.

Table 2: Preferred Solutions by Type of Business (Traders Only, n = 164)

Preferred solution	Food/foodservice (n = 68)	Dry goods re- tail (n = 72)	Services (n = 24)	Total (%)	p-value
Upgrading drainage system and canal dredg- ing	72%	65%	67%	68%	0.6124
Uniform plinth raising while preserving traditional architecture	54%	49%	58%	52%	0.7213
Reorganizing trading space and reducing sidewalk encroachment	38%	46%	33%	41%	0.4287
Establishing a trader-led flood and heritage management group	44%	36%	42%	39%	0.4789
Applying flood monitoring technology (IoT and warning app)	29%	26%	33%	28%	0.8135

Table 3: Impacts of Flooding by Gender (n = 200)

Indicator	Female (n = 150)	Male (n = 50)	Total (%)	p-value
Flooding has become more frequent in the past five years	83%	74%	81%	0.2570
Stall/business activities directly affected	76%	62%	72%	0.0824
Average revenue reduction of 30–50% per major flood	68%	48%	63%	0.0179
Must self-invest in flood mitigation measures	62%	46%	58%	0.0688
Must suspend or reduce business for ≥ 1 day	67%	52%	63%	0.1123

Note: p < 0.05 is highlighted in bold.

4.3. Gendered Dimensions of Vulnerability and Agency

Women accounted for 75% of the survey sample (n = 150). Female traders frequently described a pronounced double burden: restoring business operations while also safeguarding homes and caring for children during flood events. A 52-year-old female trader (P2) explained: “When flooding happens, customers hesitate to come in, goods spoil easily, and I have to clean up early; then I go home and still have to clean the house and take care of the children.” Despite these burdens, women demonstrated stronger willingness to participate in collective action. Many proposed trader self-governance groups to share responsibilities related to cleaning, environmental monitoring, and landscape maintenance.

4.4. Critiques of Top-Down Adaptation Measures and Future Visions

A substantial proportion of participants criticized current government-led interventions. Forty-two percent (n = 84) identified fragmented and uneven ground elevation as a factor redirecting floodwater toward lower-lying stalls. Meanwhile, 71% (n = 142) noted that grease discharge and solid waste accumulation place pressure on an inadequate drainage system. Traders’ preferred solutions were pragmatic: drainage upgrading linked to the Cau Ngang drainage infrastructure (68%), coordinated ground elevation in a heritage-sensitive manner (52%), and community-led waste management and spatial reorganization (41%).

Overall, the findings reveal that although traders experience profound livelihood vulnerability and heritage-related losses, they continue to exercise active forms of everyday governance while proposing context-sensitive solutions tailored to the

market.

5. Discussion

Findings from Thu Duc Market reveal a complex socio-economic and socio-technical ecosystem shaped by multiple actors, sectors, and layered governance. Urban flooding, livelihood precarity, and heritage deterioration are interwoven through a self-reinforcing feedback loop.

5.1. From Vulnerability to Active Heritage Governance

The findings challenge the dominant framing of informal traders as passive victims. Quantitative evidence points to high livelihood vulnerability—81% reported increased flooding frequency and traders experienced 30–50% revenue decline—yet this coexists with strong commitment to heritage preservation. Qualitative narratives demonstrate informal heritage governance through clearing drainage channels, elevating goods, monitoring waste disposal, and sustaining cultural practices. Women traders emerged as significant governance actors, with 91% expressing readiness to participate in community-based programs.

5.2. Feedback Loops Between Flooding and Maladaptive Responses

Although traders’ short-term adaptive actions are rational at the individual level, they may unintentionally contribute to hydrological maladaptation. For instance, 42% criticized fragmented ground elevation practices, while 71% highlighted the cumulative impact of grease discharge and waste accumulation on drainage blockages. These findings reveal dynamic processes through which environmental risk and everyday

Table 4: Heritage Perception and Willingness to Participate by Gender

Indicator	Female (n = 150)	Male (n = 50)	Total (%)	p-value
Preservation of heritage is important or very important	82%	70%	79%	0.1088
Concern that excessive commercialization will erode traditional identity	62%	48%	58%	0.1154
Willing to participate in management, sanitation, and conservation programs if supported	91%	78%	87%	0.0359
Business activities contribute to preserving local culture and cuisine	74%	62%	71%	0.0921

Table 5: Flood-Related Impacts on Livelihoods and Commercial Activities

Indicators	Percentage (%)	Notes
Increased flood occurrence over the past five years	81	n = 162
Market stalls directly affected by flooding	72	Primarily informal traders
Average revenue decline per major flood event	30–50	Self-reported estimates
Suspension or reduction of business activities for ≥ 1 day	63	n = 103
Self-investment in flood adaptation measures	58	Elevating goods; raising stall platforms

adaptation mutually shape one another. The comparative analysis in Table 7 was informed by the following primary and secondary data sources:

- Data for Thu Duc Market were obtained from the authors' primary field survey (n = 200) and ten in-depth interviews conducted between 2024 and 2025.
- Data for the remaining markets were compiled and synthesized from credible secondary sources, including official government reports and recent peer-reviewed academic literature. Evidence on Ben Thanh Market and Dong Xuan Market was drawn from Chu (2010), Endres (2014, 2019), H. V. Bui and Nguyen (2024), General Statistics Office of Vietnam (2022), and Nguyen Minh Giam et al. (2023). Comparative evidence on Chatuchak Market and Pasar Tanah Abang was derived from Padawangi (2022) and Padawangi and Douglass (2015) and Oktarina et al. (2025), as well as reports published by the Asian Development Bank (Asian Development Bank, 2021, 2024), the World Bank (World Bank, 2023), and the Bangkok Metropolitan Administration (Bangkok Metropolitan Administration, 2023). Additional comparative insights were obtained from Porio (2014) and Schnuttgen (2024).
- Assessment levels, ranging from low to very high, represent a composite evaluation combining quantitative indicators, such as response percentages, official documentation, and empirical observations from field studies.

5.3. Theoretical Contribution: Informal Heritage Stewardship

The concept of Informal Heritage Stewardship bridges research on informal traders' livelihood adaptation, urban flooding, and heritage conservation. It recognizes informal traders not merely as victims of urban flooding, but as ac-

tive stewards whose everyday practices sustain traditional market environments. Through routine actions—maintaining drainage, protecting goods, preserving cultural practices, and reinforcing market identity—traders contribute to the management and conservation of tangible and intangible heritage.

These findings resonate with Ostrom's theory of polycentric governance and community-based governance (Boyd & Folke, 2012; Ostrom, 2009), while extending such frameworks into the context of informal economies within traditional urban markets. A gender-sensitive sociological lens further highlights how women traders transform vulnerability into everyday resilience.

5.4. From "Vulnerability" to "Agency and Heritage Stewardship"

This study proposes a theoretical shift from framing informal traders as passive victims toward recognizing them as active agents with capacities for adaptation and stewardship. Vulnerability should not be understood as an inherent or fixed condition. Under appropriate institutional support, vulnerability can be transformed into adaptive capacity, collective agency, and long-term heritage stewardship.

5.5. Policy Implications for Urban Planning and Governance: Breaking the Feedback Loop

The proposed six-pillar Green Heritage Market model offers a pathway for transforming the negative cycle of flooding and heritage degradation into a positive cycle of resilience and conservation (Figure 2).

Key policy recommendations include:

- **Sponge Infrastructure (40%):** Implementation of permeable brick pavements, water-sensitive streets, rain gardens integrated with traditional tiled roofing systems, underground rapid-drainage channels, and a proposed 13,000 m³ underground detention reservoir beneath

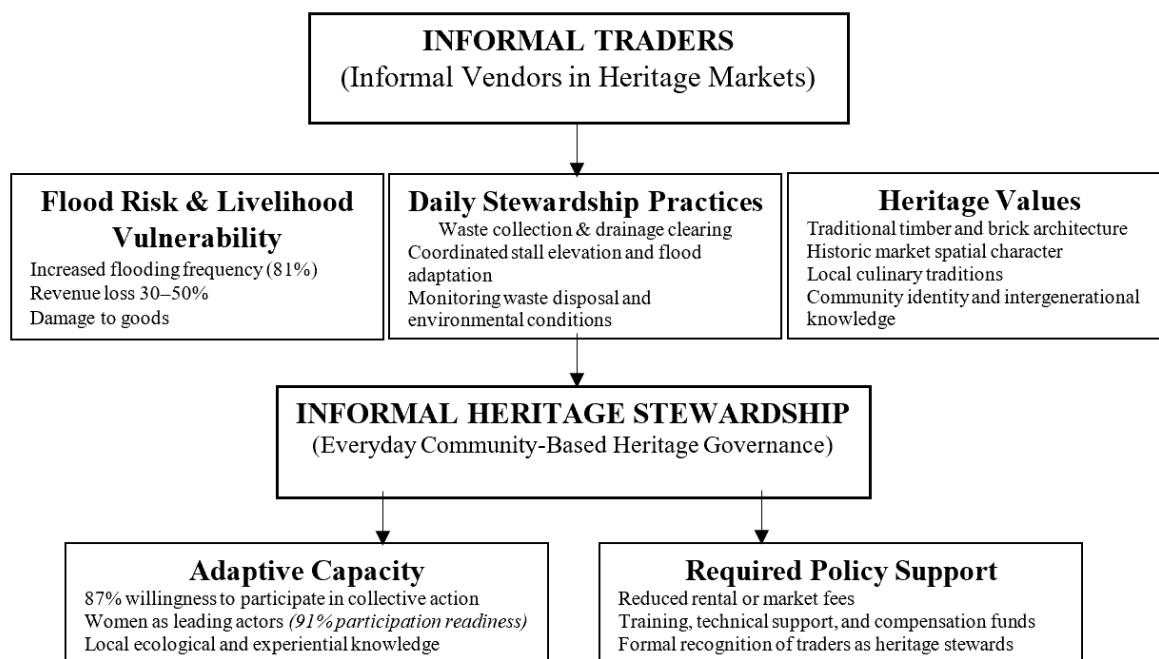


Figure 1: Proposed Theoretical Framework of “Informal Heritage Stewardship”

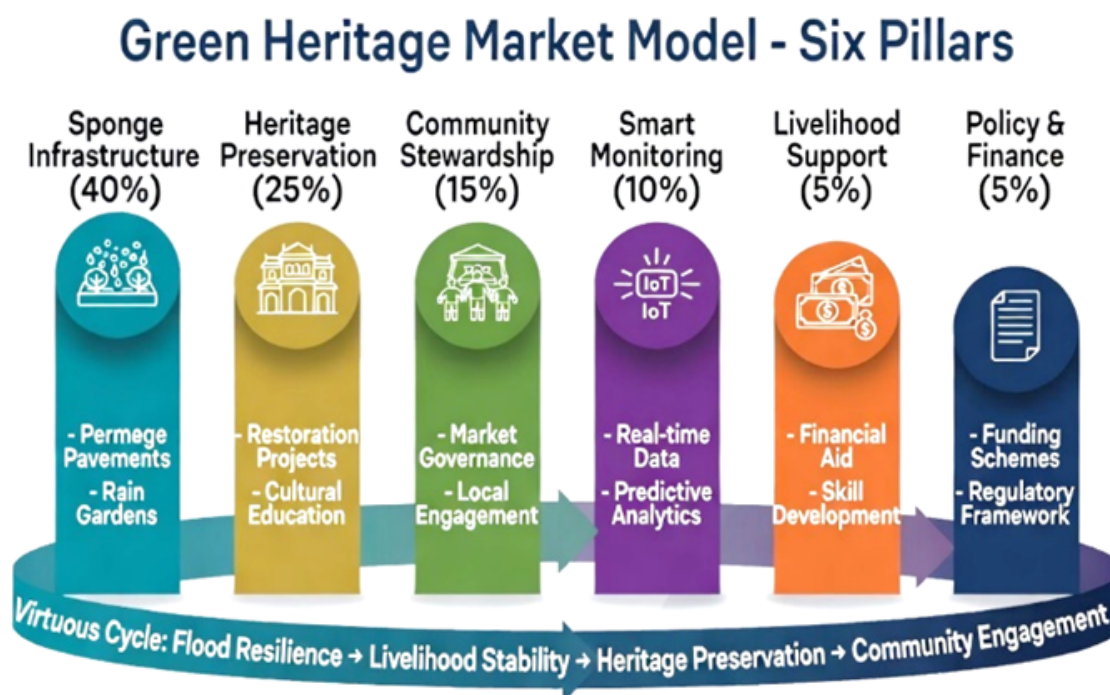


Figure 2: Six-Pillar Policy Framework of the Green Living Heritage Market Model

Table 6: Perceptions of Heritage Values and Informal Heritage Stewardship Behaviors

Indicators	Percentage (%)	Notes
Perceived heritage conservation as important or very important	79	n = 158
Concern that excessive commercialization may erode traditional identity	58	n = 116
Willingness to participate in management, sanitation, and conservation programs if support is provided	87	n = 174
Perceived trading activities as contributing to local cultural and culinary traditions	71	–
Recognition that trading practices place pressure on infrastructure	65	Waste, grease discharge, noise

Table 7: Comparative Analysis of Flood Vulnerability, Livelihood Impacts, and Heritage Conservation in Selected Traditional Markets across Vietnam and Southeast Asia

Criteria		Thu Duc Mar- ket		Ben Thanh Market		Dong Xuan Market		Chatuchak Market		Pasar Abang		Tanah Main sources	
Year / age		1950s (~70 years)	1914 (~110 years)	1889 (~135 years)	1948 (~76 years)	1700s (~300 years)	UNESCO; En- dres; ADB						
Scale		~300–400 traders	~1,500 stalls	~2,000 stalls	>15,000 stalls	>10,000 traders	GSO; Padawangi						
Current flooding		High (81% in- crease)	Low	Medium	Low	Very high	Survey; Bui; Nguyen; World Bank						
Livelihood im- pacts		High (30–50% loss)	Low	Medium	Low	Very high (40– 60% loss)	Survey; ADB; Po- rio; Padawangi; Chu						
Heritage preser- vation		Strongly deteri- orating	Well preserved	Under renova- tion	Highly mod- ernized	Rapidly deterio- rating	Survey; UN- ESCO; Oktarina						
Flood mitigation		Localized plinth raising	Modern drainage	Partially up- graded	Drainage + sponge city	Ineffective plinth raising	ADB; BMA						
Community par- ticipation		High (87% willing)	Medium	Medium	High	Low	Survey; Padawangi; Porio						
Main characteris- tics		Informal, tradi- tional	Tourism + her- itage	Informal + her- itage	Large-scale tourism	Informal, dense	Endres; Kusno						
Similarity with Thu Duc		–	High in her- itage	Highest	Low	High in flooding and informality	Authors’ synthe- sis						

Linh Tay Stadium, according to the city's water supply and drainage regulation planning project approved by the Ho Chi Minh City Department of Construction and expected to be completed in 2028, fully connected to the Cau Ngang drainage system scheduled for completion in 2026.

- **Heritage Conservation (25%):** Coordinated ground elevation interventions ranging from 30–50 cm, designed to respect the original architectural character of the market, alongside 10–15 heritage display stalls.
- **Community Governance (15%):** Formalization of Trader Self-Governance Groups through reduced market fees, public education, and regular Green Market–Clean Heritage Day campaigns.
- **Smart Monitoring Systems (10%):** Installation of 25 IoT-based flood sensors connected to the city's urban

operations center and a Safe Thu Duc Market mobile warning application.

These measures address traders' highest-priority concerns, including drainage improvement (68%), coordinated ground elevation (52%), and spatial reorganization (41%), while preserving historical and cultural identity. Figure 3 translates these measures into the conceptual structure of the proposed Thu Duc Sponge Market-green Market model.

5.6. Limitations and Future Research Directions

This study is limited to a single market context and represents a cross-sectional snapshot of 2024–2025. Self-reported data may contain biases associated with time constraints, memory recall, and subjective perceptions. Future longitudinal studies monitoring post-implementation performance of the Green Heritage Market Model would strengthen causal claims. Comparative research across traditional markets in Vietnam

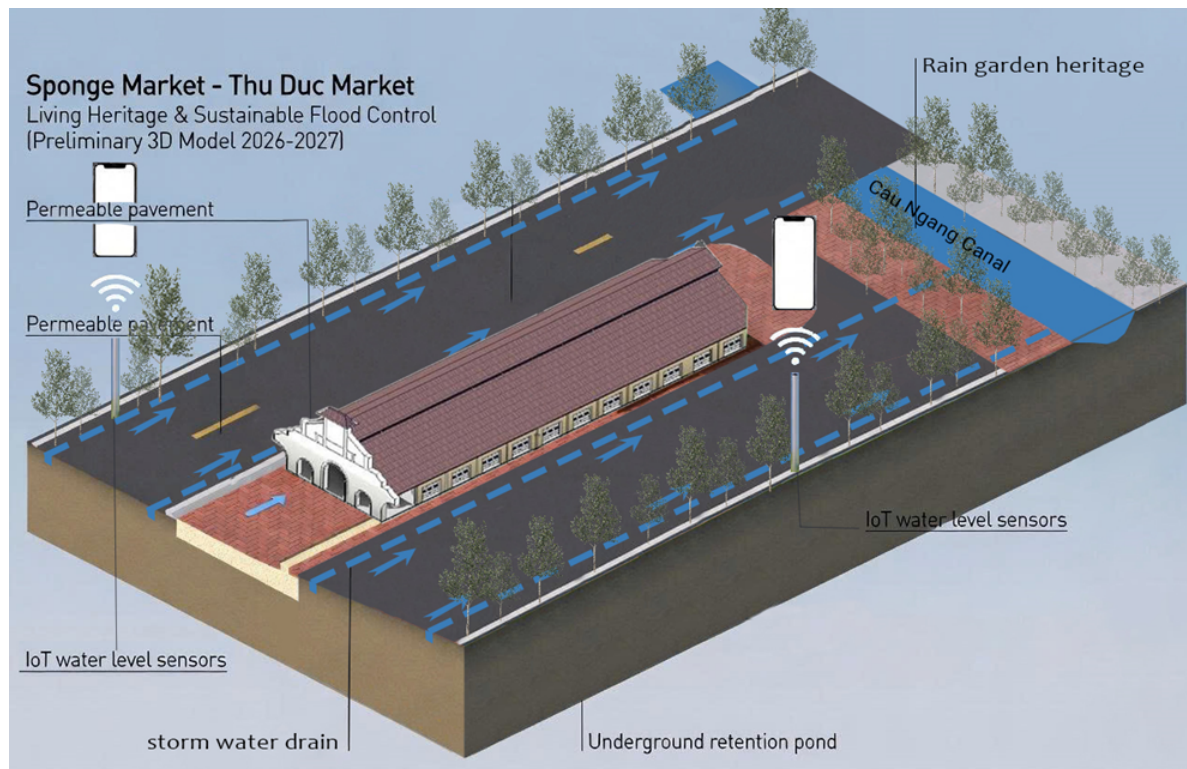


Figure 3: Conceptual Structure of the Thu Duc Sponge Market–Green Market Model

and Southeast Asia would further test the transferability of Informal Heritage Stewardship.

6. Conclusion and Policy Recommendations

6.1. Conclusion

This study demonstrates that informal traders at Thu Duc Market are not simply passive victims of urban flooding but active agents of informal heritage stewardship, continuously negotiating livelihood security, environmental pressures, and preservation of cultural and architectural heritage. Drawing on 200 surveys and 10 interviews, the findings reveal a self-reinforcing negative feedback loop: flood exposure contributes to livelihood disruption and heritage deterioration, while short-term coping strategies can unintentionally produce maladaptation.

More importantly, the findings reveal a high level of local initiative. Seventy-nine percent considered preservation of architectural and historical values important or very important, while 87% expressed willingness to participate in flood mitigation and heritage conservation programs. Women traders, 75% of the sample, emerged as particularly significant stewardship actors. These findings advance Informal Heritage Stewardship as a bottom-up governance mechanism linking urban flood resilience with cultural continuity.

6.2. Policy Recommendations

Based on the identified causes of flooding and the priorities expressed by market traders, the proposed interventions are organized into three mutually reinforcing strategic pillars.

6.2.1 Climate-Resilient Infrastructure and Smart Monitoring (50% Priority)

The highest priority should be given to upgrading the market's stormwater infrastructure, which 68% of surveyed traders identified as the primary cause of flooding. Recommended measures include permeable brick pavements, rain gardens integrated with traditional tiled structures, and a 13,000 m³ underground retention reservoir beneath Linh Tay Stadium. The reservoir should be developed in accordance with the city's water supply and drainage planning and connected to the Cau Ngang drainage system to ensure coordinated stormwater management.

These physical interventions should be complemented by a smart flood-monitoring network. Approximately 25 Internet of Things (IoT) sensors could be installed at critical locations and connected to the city's urban management center. A *Safe Thu Duc Market* mobile application should also be developed to provide traders and visitors with flood warnings up to 30 minutes in advance. Together, these measures would improve water retention, drainage capacity, emergency preparedness, and real-time risk communication.

6.2.2 Heritage-Sensitive Adaptation and Community Governance (40% Priority)

Flood adaptation measures should preserve the market's architectural and cultural identity. Ground levels may be elevated by approximately 30–50 cm, provided that the intervention is coordinated across the market and respects its original spatial form, façades, materials, and traditional tiled structures. In addition, 10–15 heritage display stalls could be

established as educational and cultural nodes, strengthening the market's identity and supporting heritage-based tourism.

Community participation should form an integral part of this conservation strategy. Trader-led Self-Governance Stewardship Groups should be formally established to support routine drainage maintenance, waste management, heritage protection, and flood preparedness. Participation could be encouraged through incentives such as a 50% reduction in market fees and quarterly *Green Market–Clean Heritage Days*. This approach would connect physical conservation with local responsibility and long-term stewardship.

6.2.3 Livelihood Protection and Policy–Financial Integration (10% Priority)

A dedicated compensation fund should be established to assist traders whose goods and equipment are damaged by flooding. The fund could be partially financed through tourism revenues and supplemented by municipal resources and private-sector contributions. Training programs on waste disposal, grease management, and drainage maintenance should also be provided, particularly because 71% of respondents expressed concerns regarding these issues.

For long-term implementation, the Sponge Heritage Market model should be integrated into the Ho Chi Minh City Master Plan to 2040 and the citywide flood-mitigation program. Financing should combine municipal budgets, official development assistance, public–private partnerships, tourism-sector contributions, and modest trader co-financing mechanisms. Clear institutional responsibilities, implementation phases, and monitoring indicators should be established to ensure coordination among municipal agencies, market authorities, traders, and surrounding communities.

Implementing these three strategic pillars at Thu Duc Market could establish the site as a pilot Sponge Heritage Market in Vietnam. The model would demonstrate how flood resilience, heritage conservation, community governance, and livelihood protection can be integrated within a traditional urban marketplace, while providing a framework that may be adapted to similar markets elsewhere. ““

6.3. Final Reflection

Traditional markets such as Thu Duc Market should not be understood as relics of the past, but as living cultural heritage spaces and laboratories of urban resilience. By recognizing informal traders as legitimate actors of informal heritage stewardship and providing institutional support, policymakers may simultaneously achieve climate adaptation and continuity of historical-cultural identity.

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Conflicts of Interest

The authors declare no conflict of interest.

Author Contribution

- **Xuan Son Do:** Lead implementation, conceptualization, data collection, simulation modeling, and result generation
- **Nguyen Bao Anh Do:** Data Collection, synthesis, and draft manuscript.
- **Quang Van Dang:** Supervision, critical review, research guidance, and manuscript editing.
- **Dominique Laffly:** Critical review, research guidance, and manuscript editing.

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