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Housing Transfer Inspection: What Are the Priorities?

Jieh-Haur Chen [1,2,3,4,*], His-Hua Pan [1], Ting-Kwei Wang [5] and Hsi-Hsien Wei [6]

[1] Department of Civil Engineering, National Central University, Zhongli, Taoyuan 320317, Taiwan; teid.tw@gmail.com
[2] APEC Society of Project Forensics, Zhongli, Taoyuan 320317, Taiwan
[3] Research Center of Smart Construction, National Central University, Zhongli, Taoyuan 320317, Taiwan
[4] Safety and Health Association of Taiwan, Zhunan, Miaoli 350007, Taiwan
[5] Department of Civil Engineering, National Kaohsiung University of Science and Technology, Kaohsiung 81164, Taiwan; tingkwei@nkust.edu.tw
[6] Department of Building and Real Estate, The Hong Kong Polytechnic University, Hong Kong; hhwei@polyu.edu.hk
* Correspondence: jhchen@ncu.edu.tw; Tel.: +886-3-422-7151 (ext. 34112); Fax: +886-3-425-0675

Abstract: This study aims to discern and assign significance to the crucial inspection items preceding housing transfers, subsequently unveiling their prioritized sequence. Initiating with a literature review, a robust groundwork was laid for expert interviews, which subsequently defined eight distinct facets encompassing a total of 38 items pertinent to housing transfer inspections. Employing the Analytic Hierarchy Process (AHP), the results of an expert survey are analyzed, incorporating 27 valid responses. The outcomes of this research encompass the following: (1) the delineation of eight distinct facets, (2) the compilation of a comprehensive list comprising 38 items, (3) a short list of the top 15 items easier for inspectors to complete for a quick transfer, and (4) the establishment of a priority sequence for housing transfer inspection items. This study effectively resolves the predicament faced by practitioners concerning the selection of appropriate inspection items for housing transfers, and offers clarity regarding their relative significance.

Keywords: priority ranking; housing transfer inspection; AHP; expert survey; property management

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1. Introduction

The dynamics of the housing market were relatively straightforward, with potential homebuyers primarily seeking stable and uncomplicated living spaces. However, evolving lifestyles and increased affluence have ushered in a shift towards a preference for more comfortable, luxurious, and livable homes. Modern consumers now prioritize well-designed spaces, modern amenities, and convenient living environments, which have become fundamental considerations for those in the housing market [1]. Furthermore, recent advancements in the information and communication sectors, coupled with a growing emphasis on smart cities and contemporary lifestyles, have further reshaped buyer preferences. This evolution has transcended the mere structural aspects of buildings, spurring a demand for properties with multifunctional capabilities. The final inspection and handover of properties play a profoundly significant role in the housing market transaction process, whether dealing with new constructions or existing properties. This critical step is essential for all transactions [2]. However, it is worth noting that there are currently no established standard or systematic criteria for property handover, and policy direction remains uncertain. Presently, housing safety inspection and assessment policies are placing increased emphasis on raising public awareness of residential safety, leading to more thorough examinations of housing safety aspects [3–6].

The Construction and Planning Agency has developed specific strategies to promote relevant policies in this field in Taiwan. Furthermore, the Ministry of Internal Affairs has put forth a policy proposal that mandates health check certifications for older homes when they

are being sold. This approach is designed to safeguard the interests of consumers who are purchasing previously owned properties, enhance transparency in property information, and ensure that buyers have access to information regarding the safety of their selected homes. The housing market encompasses various types of transactions, including the resale of preowned homes, the sale of newly constructed properties, and transactions involving properties auctioned by the court or by banks. The scope of these transactions during the final inspection and handover phase goes beyond merely considering structural aspects alone. The pervasive issue of information asymmetry in the market has adverse effects on the rights and interests of homebuyers, potentially undermining their confidence when making purchasing decisions [4].

The absence of a standardized procedure for the final inspection and handover not only has adverse effects on the housing market but also erodes the confidence of property sellers. The establishment of standardized inspection criteria for property handover is imperative for effective quality management. It serves as a crucial means to rectify the issue of information asymmetry within the housing market and helps mitigate transaction-related disputes. The persistent litigation associated with housing transactions underscores the pressing necessity for standardized processes. This study aims to discern and assign significance to the crucial inspection items preceding housing transfers, subsequently unveiling their prioritized sequence.

2. Literature Review

Prior to engaging in housing transactions, it is crucial to conduct a comprehensive series of inspections that assess the safety and aesthetics of the entire building, spanning from its foundation to its roof. Existing examples of inspection items and related reports have been presented in prior research [7]. For instance, the Illinois home inspector's examination covers the content outlined in the Illinois Regulations [8]. Individuals who successfully pass this examination receive licenses to practice as home inspectors within the state. In the United States, the role of home inspectors typically involves evaluating eight critical domains: (1) structural integrity; (2) electromechanical systems; (3) water systems; (4) heating and cooling systems; (5) indoor environments; (6) outdoor elements; (7) insulation; and (8) housing security. These aspects, in conjunction with housing policies, can serve as a valuable reference, providing a foundational framework for conducting more objective assessments.

In the realm of real estate transactions, the primary causes of disputes can be categorized into three main classes [9,10]. The first category pertains to contractual performance issues, encompassing matters such as the return of earnest money, delays in property delivery, termination of agency or purchase–sale agreements, disputes regarding service fees, and contractual review rights, among others. The second category pertains to ethical concerns within transactions, notably the concealment of vital information. Lastly, the third category centers around defects and flaws, including issues related to water leakage in properties and construction deficiencies [11]. Numerous factors contribute to disputes in real estate transactions, with the most prevalent ones being "water leakage in properties", "concealment of crucial information", "termination of agency or purchase–sale agreements", "construction deficiencies", and "earnest money refund". These aforementioned dispute causes can be broadly categorized into five primary classes: "information asymmetry", "property rights disputes", "breach of contract terms", "construction quality deficiencies", and "financial disputes" [11,12]. The current mechanisms for resolving disputes comprise two main avenues: the litigation mechanism and the alternative dispute resolution (ADR) mechanism [13]. The litigation mechanism falls under the purview of the judicial system, while the ADR mechanism primarily encompasses the avenues of complaint mechanisms and mediation mechanisms. In cases where consumers encounter disputes related to goods or services, they may file complaints with institutions such as consumer protection associations or service centers. If their grievances are not addressed through these channels, they can escalate their complaints further by approaching the consumer protection ombudsman

within their local county or city government. In instances where the previously mentioned complaints fail to receive satisfactory resolution, consumers have the option to seek mediation by applying to the local county or city government's Consumer Dispute Mediation Committee [14–18].

Integrating quality control into building inspections is essential for elevating overall living standards and prolonging the lifespan of the structure [19]. This is inherently connected to building maintenance, which involves a range of activities, including enhancements, preventative measures, and regular upkeep tasks [20]. The evaluation of housing defects is of paramount importance for consumers, as it ensures the structural integrity of their homes, thereby safeguarding both lives and property [21]. This practice is equally advantageous for both buyers and sellers, as it provides a wealth of housing-related information that helps mitigate disputes stemming from information asymmetry. It also upholds the reputation of the construction company and ensures the quality of the project [19]. Across Taiwan's prevalent concrete structures, seven common types of defects frequently emerge, which include cracks, fractures, water leakage, rust, weathering, hives, and component detachment. Certain defects may originate during the construction process, while others may become apparent primarily during the final inspection phase, with water leakage and cracks being notable examples. In a separate research endeavor, an analysis of records from the Housing Guarantee Fund (HGF) in Australia sought to quantify the array of defects observed in newly constructed houses. The findings revealed that approximately one-eighth of these houses exhibited defects, with repair costs averaging around 5 percent of the total construction contract value. Among these factors, water leakage exhibited the highest incidence rate [22]. Given the considerable expenses associated with building maintenance, the prioritization of performance inspections becomes imperative, with the goal of acquiring secure and healthy homes at reasonable costs [23]. Facility maintenance for residential buildings encompasses inspections and additional value-added services. These essential inspection items should encompass safety-related features. It is worth noting that value-added services extend to auxiliary facilities, such as sports and entertainment amenities such as gyms and swimming pools, which are beyond the scope of this study [24]. The primary elements for residential housing inspection, as gleaned from existing literature, are summarized in Table 1.

Table 1. Residential housing inspection items.

Inspection Items	Suggestions and Citations
Elevator system	Kim et al. [1]; Frauley [2]; Horner 1997 [7]
Water supply system	Velmurugan and Dhingra [20]; Goulden and Spence [23]
Power supply system	Hassanain et al. [14]; Aishah Kamarazaly [22]
Fire protection system	Josephson [8]; Xin and Huang [25]
Housing security system	Hassanain et al. [24]; Xin and Huang [25]

3. Methodology

3.1. Expert Interviews

Obtaining an initial understanding of the present state of housing inspection is imperative. In pursuit of this understanding, a series of interviews were conducted with experts who occupy various roles within the housing inspection domain. The set of interview questions for these experts was formulated by drawing from pertinent literature sources [7–27] and referring to Table 1 for guidance.

1. Can you describe your role within the inspection-related industry?
2. From a consumer's standpoint, what outcomes or objectives can they anticipate from the housing inspection process?

3. Considering the perspective of an expert, what outcomes or objectives can customers or consumers anticipate from the housing inspection and handover process? Is the customer's demand for the housing inspection process substantial?
4. In the context of housing inspection and handover, which aspects are typically subjected to inspection? Are there any value-added services provided as part of the process?

The interviews were conducted with professionals whose expertise is closely related to the housing inspection industry. The selection criteria for these experts were determined based on the following criteria: (1) having a minimum of five years of hands-on experience in fields relevant to housing inspection and handover; and (2) occupying various roles within related sectors, including but not limited to construction contractors, property owners, suppliers, and others. Prior research has indicated that an appropriate number of expert interviews typically falls within the range of 8 to 16 participants. In line with the aim of this study, and for the sake of practicality, a total of 8 experts were interviewed. Each of the 8 experts possessed a minimum of 10 years of work experience within their respective organizations. They held diverse job titles, including senior engineers, specialists, department heads, and vice presidents, spanning across various departments such as construction, design, power systems, structural engineering, fire safety, water supply, and customer service. It is worth noting that most of these companies were based in the northern region of Taiwan. A concise summary of the insights gathered from the expert interviews is provided below as follows: (1) The interviewed experts hold a diverse range of roles, including those of house sellers, buyers, employees of construction-related companies, and individuals connected with the real estate sector. Their involvement, whether as sellers or employees in construction/real estate firms, is geared towards minimizing potential issues during housing transactions. In pursuit of this objective, housing transfer inspections are deemed essential, comprising eight key dimensions: appearance and functionality, building structure, fire safety systems, water supply and drainage, power systems, water leakage, environmental quality, and contract documentation. (2) A unanimous consensus among the experts is the expectation of customers for their homes to undergo assessment by seasoned professionals to safeguard their rights. Additionally, it is recommended that a third-party entity be engaged to ensure the thoroughness and quality of housing inspections. (3) A shared objective in housing inspections revolves around bridging potential information gaps between sellers and buyers. To achieve this goal, the establishment of a standardized operating procedure for housing inspections is considered crucial. In addition to the aforementioned 8 overarching aspects, a detailed list of 38 specific items is included. Figure 1 visually presents the framework encompassing the housing inspection items, synthesizing insights from references [7–27] and expert interviews.

3.2. Design of AHP Questionnaire

The Analytic Hierarchy Process (AHP), introduced by Satty in 1971, presents a systematic framework for decision making. It is particularly valuable in situations characterized by uncertainty, where decision making involves the consideration of multiple evaluation criteria [28–30]. Due to its simplicity and practicality, the AHP methodology has found extensive application in various domains since its inception [31]. This includes areas such as social sciences, manufacturing, political studies, engineering, education, and government. Given its ability to structure, quantify, and systematize complex issues, the AHP approach aligns seamlessly with the objectives of this study [32–37]. The AHP process entails the creation of a comparison matrix, which is then used to derive eigenvectors for assigning priority and weight to each measurement element within hierarchical levels. Eigenvalues are subsequently calculated to assess the consistency of the comparison matrix, indicating its strength or weakness. The evaluation of consistency involves several parameters, including the Consistency Ratio (CR), Consistency Index (CI), Random Index (RI), and Consistency Ratio of Hierarchy (CRH). The CRH is employed to assess overall consistency. A CI value of 0 signifies complete coherence among the relative importance levels within a specific category of elements. Conversely, a CI value greater than 0 indicates inconsistency

in judgments. It is suggested that a tolerance threshold for CI be set at less than 0.1. A CR value less than 0.1 indicates that the consistency of the pairwise comparison matrix falls within an acceptable range.

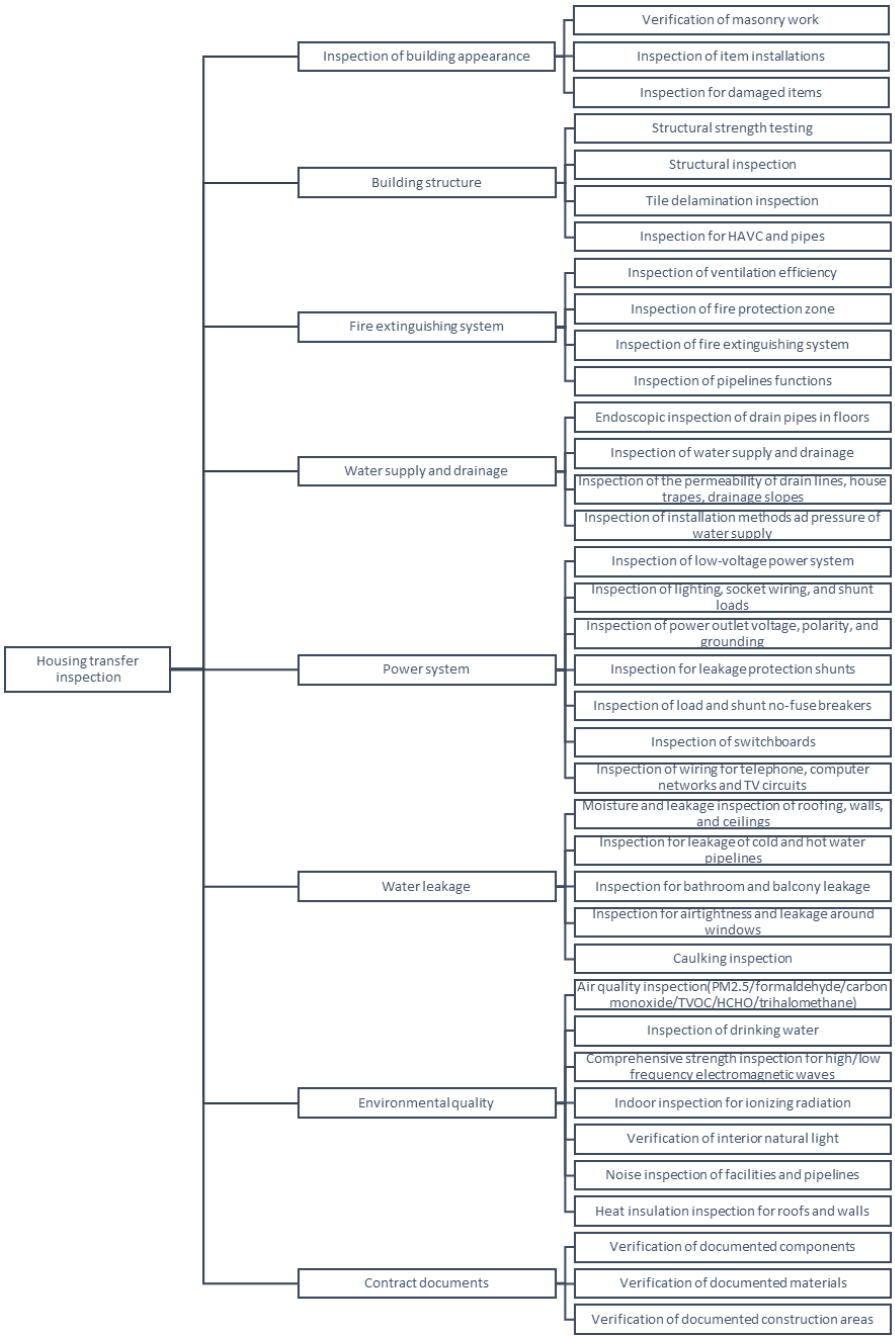

Figure 1. Framework of the housing inspection item.

The process of designing and conducting the questionnaire and survey involves two distinct stages. (1) Formulating the questionnaire: This step involves creating the questionnaire by combining insights from a literature review and case analysis. The questionnaire is structured in accordance with the framework outlined in Figure 1, covering 8 thematic aspects and comprising a total of 38 questions. The relative importance of each question is assessed using a standard nine-point scale. (2) Conducting a pilot survey: After formulating the questionnaire, a pilot survey is carried out to evaluate the suitability of the questions and descriptors from the perspective of practitioners. This assessment is

performed with the aim of ensuring acceptability, with a threshold of CR < 0.1. Following this protocol, the initial questionnaire was administered to 8 experts using a convenience sampling approach [38]. These experts collectively possess over 5 years of experience in relevant industries and hold various professional titles, including engineers, specialists, and department heads, spanning domains such as construction, third-party inspection associations, academia, and design practice. The computed CR value of 0.03 (<0.1) confirms the effectiveness of a well-crafted questionnaire that resonates with the respondents.

4. Results and Discussion

In line with previous research recommendations [38–41], an AHP survey typically involves around 30 participants. Consequently, a total of 30 questionnaires were distributed, resulting in 27 valid responses. The key characteristics of these valid respondents are succinctly summarized in Table 2. Regarding their professional backgrounds, the participants represented various sectors, including construction firms, housing inspection organizations, real estate enterprises, academic institutions, and other relevant fields. In terms of their years of experience, a substantial 77.7% of the respondents had accumulated over a decade of work experience, indicating that a significant majority were seasoned professionals.

Table 2. AHP respondent statistical data.

Respondents' Features	Group	Percentage (%)
Employer	Construction companies	33.3
	Housing inspection (third party)	25.9
	Real estate	18.5
	College/university	11.1
	Other related business	11.1
Work experience	11–15 years	62.9
	16–20 years	14.8
	6–10 years	7.4
	10–15 years	7.4
	5 years or less	7.4

The survey's overall CR value stands at 0.001, and the CR values for the eight distinct aspects are as follows: 0.030, 0.001, 0.006, 0.004, 0.010, 0.009, 0.005, and 0.020. All of these values fall below the threshold of 0.1, affirming the high consistency of the questionnaire. As shown in Table 3, the aspect of water leakage carries the greatest weight, representing 21% of the total. This result is consistent with expectations for a region characterized by relatively high annual precipitation. Densely populated areas of Taiwan receive over 2000 mm of rainfall each year. Following closely is the fire extinguishing system, which holds a weight of 17.4%. This finding suggests a strong inclination towards improved fire protection among residents, likely influenced by regulatory requirements aimed at enhancing resident safety. The building structure aspect does not emerge as the top concern, indicating that residents appear to be relatively satisfied with the construction quality of building structures. Consequently, it may not be the primary focus of housing transfer inspections. Conversely, appearance and functionality, along with environmental quality, occupy lower positions. This trend is understandable, as building appearance and functionality are immediately apparent to buyers during the purchasing decision process, and these aspects tend to align with the contracted or promised conditions. In essence, builders and construction contractors in Taiwan have performed satisfactorily in these areas. The situation mirrors that of environmental quality, as it is pre-determined and remains unchanged after construction completion. Together, their combined weights amount to merely 12.7%, constituting less than one-sixth of the total weight.

Table 3. Detailed analysis of AHP survey.

Aspect	Weight	Ranking	Factor	Factor Weight in the Aspect (%)	Factor Ranking in the Aspect	Factor Weight among All (%)	Factor Ranking among All
Appearance and function	6.6	7	Inspection for item installations	53.5	1	3.5	12
			Inspection for damaged items	25.6	2	1.7	22
			Verification of masonry work	10.1	4	0.7	32
			Inspection of building appearance	10.7	3	0.7	32
Building structure	11.4	5	Structural strength test	49.8	1	5.7	3
			Structural inspection	15.2	3	1.7	22
			Tile delamination inspection	12.9	4	1.5	26
			Inspection of HVAC and pipes	22.0	2	2.5	17
Fire extinguishing system	17.4	2	Inspection of ventilation efficiency	16.2	4	2.8	13
			Inspection of fire protection zone	21.3	3	3.7	9
			Inspection of fire extinguishing system	38.5	1	6.7	1
			Inspection of pipeline functions	24.0	2	4.2	8
Water supply and drainage	13.9	3	Endoscopic inspection of drainpipes in floors	18.3	4	2.6	16
			Inspection for water supply and drainage	35.7	1	5.0	5
			Inspection of the permeability of drain lines, house traps, and drainage slopes	19.5	3	2.7	15
			Inspection of installation methods and pressure of water supply	26.4	2	3.7	9
Power system	12.4	4	Inspection of low-voltage power systems	13.5	6	1.7	22
			Inspection of lighting, socket wiring, and shunt loads	13.7	5	1.7	22
			Inspection of power outlet voltage, polarity, and grounding	14.3	4	1.8	21
			Inspection of leakage protection shunts and functional test	17.5	1	2.2	18
			Inspection of leakage protection shunts	16.2	3	2.0	20
			Inspection of switchboards	16.6	2	2.1	19
			Inspection of wiring for telephones, computer networks, and TV circuits	8.1	7	1.0	31
Water leakage	21	1	Moisture and leakage inspection for roofing, walls, and ceilings	29.9	1	6.3	2
			Inspection for cold and hot water pipeline leakage	25.8	2	5.4	4
			Inspection for bathroom and balcony leakage	23.2	3	4.9	6
			Inspection for airtightness of windows	14.3	4	0.3	38
			Caulking inspection	6.8	5	1.4	28
Environmental quality	6.1	8	Air quality inspection	22.7	2	1.4	28
			Inspection of drinking water	25.2	1	1.5	26
			Comprehensive strength inspection for high/low frequency electromagnetic waves	18.7	3	1.1	30
			Indoor inspection for ionizing radiation	10.0	4	0.6	34
			Verification of interior natural light	7.6	6	0.5	35
			Noise inspection for facilities and pipelines	8.6	5	0.5	35
			Heat insulation inspection of roofs and walls	7.2	7	0.4	37
Contract documents	11.2	6	Verification of documented components	24.7	3	2.8	13
			Verification of documented materials	32.6	2	3.6	11
			Verification of documented construction areas	42.7	1	4.8	7

In terms of specific items, the top five items include the inspection of pipeline functionality, moisture, and leakage assessment for roofing, walls, and ceilings, structural strength testing, examination for leaks in cold and hot water pipelines, and scrutiny of water supply and drainage systems, in that order. It is noteworthy that four out of these five items are related to water or piping systems, which aligns with the living conditions expected by residents. The inclusion of structural strength testing underscores the necessity for buildings in Taiwan to withstand the intense and frequent earthquakes, ensuring safety for residents.

In contrast, the bottom five items that residents tend to give less attention to include inspections for airtight window leaks, insulation for roofs and walls, noise assessments for facilities and pipelines, natural light verification, and indoor checks for ionizing radiation. While these items do influence the quality of life, none of them are directly and immediately associated with lifestyle safety. Residents prioritize lifestyle safety over living quality, which aligns with the hierarchy of human needs and satisfaction rankings. The subsequent 10 items (from No. 6 to 15) encompass all the essential safety inspections (ventilation efficiency, fire protection, and pipeline functionality) and contractual verifications (documented components, materials, and construction areas). A rapid inspection should cover these top 15 items, which address the most critical aspects of lifestyle safety and contractual specifications. A condensed list of the top 15 items may suffice for meeting basic requirements and can be more manageable for inspectors to conduct in cases requiring a quick transfer of property or for straightforward scenarios. The remaining items follow a similar pattern, emphasizing that inspections related to basic living necessities and safety take precedence over those tied to lifestyle quality. In total, there are 38 items to be checked and satisfied in the recommended order for a comprehensive housing transfer inspection. However, conducting inspections for all 38 items could be time-consuming, potentially taking days or even weeks to complete.

5. Conclusions

The demands of daily life have become increasingly intricate and demanding, underscoring the complexity and significance of housing transfer inspections. By employing the Analytic Hierarchy Process (AHP), an investigation was conducted to identify the 8 crucial aspects and 38 specific items relevant to housing transfer inspections. The resulting priority ranking, based on their respective weights, is as follows: water leakage, fire extinguishing systems, water supply and drainage, power systems, building structure, contract documentation, appearance and functionality, and environmental quality. This ranking aligns with the expectations for a region characterized by relatively high annual precipitation, where residents prioritize fire protection, and it conforms to regulations mandating builders to ensure resident safety. Notably, the structural integrity, appearance, and functionality as well as the environmental quality of houses remain unchanged from the contracted or promised conditions. This observation indicates that builders and construction contractors in Taiwan excel in these three aspects. Further examination of the 38 items reveals that the top 5 items, in order, are the inspection of pipeline functionality, assessment of moisture and leakage in roofing, walls, and ceilings, structural strength testing, examination for leaks in cold and hot water pipelines, and scrutiny of water supply and drainage. Interestingly, four of the top five items are related to water or piping systems, reflecting the crucial role such systems play in residents' basic quality of life. Additionally, this study generates a streamlined checklist for expedited housing transfer inspections, encompassing the top 15 items that encompass the majority of lifestyle safety and contractual requirements. Both rapid and comprehensive checklists for housing transfer inspections are established.

The significant contribution of this research is underscored by its provision of (1) the delineation of 8 crucial aspects, (2) a comprehensive 38-item inventory, (3) a short list of the top 15 items easier for inspectors to complete for a quick transfer, and (4) a priority ranking for housing transfer inspections. These findings address the originality for the dilemma faced by professionals in selecting appropriate inspection items. Future improvements to

this research could include conducting cost–benefit analyses for various items to optimize the allocation of limited resources. Workflow diagrams and practical procedural guidelines could be developed to aid in the implementation of these findings. Corresponding documentation aligned with these lists could be created to simplify the housing transfer inspection process. It is worth emphasizing that the details of individual items may require adjustments to account for regional variations. Furthermore, future work could delve into topics such as evaluating the presence and competence of inspectors, addressing ethical and legal considerations, assessing customer satisfaction and feedback, and exploring potential conflicts or disputes among the parties involved in the housing transfer process.

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