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Incidence percentage of factors and indicators determining the conservation status of buildings.

R. E. Malavé de Corrales[1]*, J. A. Yánez Mayorana[2]
*Contact author: rmalave@ucla.edu.ve
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ABSTRACT

The objective of this study is to consult the percentage valuation of factors and indicators used to determine the conservation status and calculate the physical depreciation of a building. A qualitative scientific method was applied using the Delphi technique with the participation of 34 experts. Indicators belonging to the inspection factor predominated with 47%, compared to property-related factors (34%) and environmental factors (19%). It was identified that the structural system, when presenting severe failures, represents the highest collapse risk; the most frequent pathological manifestations are fissures and seepages. Although the study relies on expert perception rather than direct measurements, it proposes weightings applicable to future quantitative estimation methods for calculating depreciation. In conclusion, technical inspection is a determining factor and must be prioritized over other variables.

Keywords: conservation status; indicator; factors; depreciation; environment.

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[1] Departamento de Construcción. Decanato de Ingeniería Civil. Universidad Centroccidental Lisandro Alvarado (UCLA), Barquisimeto, Venezuela.
[2] Profesional de la ingeniería civil en ejercicio independiente, Barquisimeto, Venezuela.

Contribution of each author
El autor Rosa Malavé contribuyó aportando su conocimiento relativo a la patología de la construcción, con la revisión bibliográfica. Elaboración de los cuestionarios, recolección de datos, escritura del trabajo, discusión de resultados, Con un 70%. El autor Juan Yánez, contribuyó con la idea original del trabajo por su experiencia en tasación, con la revisión bibliográfica, la recolección de datos y el análisis de los resultados con un 30%

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Incidencia porcentual de factores e indicadores que determinan el estado de conservación de inmuebles.

RESUMEN

Tiene como objetivo consultar la valoración porcentual de factores e indicadores para determinar el estado de conservación y calcular la depreciación física de una edificación. Se aplicó el método científico cualitativo mediante la técnica Delphi con participación de 34 expertos. Los indicadores del factor inspección dominaron con 47%, frente a los factores inmueble 34% y ambiente 19%. Se identificó que el sistema estructural, al presentar fallas graves, es el de mayor riesgo de colapso; las patologías más frecuentes son fisuras y filtraciones. Aunque el estudio depende de la percepción experta y no de mediciones directas, propone porcentajes aplicables a futuros métodos cuantitativos de estimación para calcular la depreciación. En conclusión, la inspección técnica es determinante y debe priorizarse sobre otros factores.

Palabras clave: Estado de conservación; Indicadores; Depreciación; Ambiente; Factores.

Incidência percentual de fatores e indicadores que determinam o estado de conservação de imóveis.

RESUMO

O objetivo é avaliar a ponderação percentual de fatores e indicadores para determinar o estado de conservação e calcular a depreciação física de uma edificação. Aplicou-se uma abordagem científica qualitativa por meio da técnica Delphi, com a participação de 34 especialistas. Os indicadores relacionados à inspeção representaram 47%, em comparação aos fatores do imóvel (34%) e ambientais (19%). Identificou-se que o sistema estrutural, ao apresentar falhas graves, constitui o maior risco de colapso; as patologias mais recorrentes são fissuras e infiltrações. Embora o estudo dependa do julgamento especializado e não de medições diretas, propõe valores percentuais aplicáveis a futuros métodos quantitativos de estimativa da conservação e da depreciação. Em conclusão, a inspeção técnica é determinante e deve ser priorizada em relação a outros fatores.

Palavras-chave: estado de conservação; indicador; fatores; depreciação; ambiente

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1. INTRODUCTION

In appraisal engineering, valuation is a key aspect for financial institutions, insurance companies, and property owners. There have been cases in which individuals invest their life savings in purchasing a home and later discover hidden defects (Yépez et al., 2016) that diminish the property's value. To reduce these risks, Venezuela approved the Venezuelan Standard NTF 4069 (2021) on Technical Safety Inspection of Buildings, which requires an assessment of the conservation status prior to purchase. Despite its relevance, this regulation is not widely known or applied.
Within this context, one of the most widely used models for real estate valuation is the depreciated replacement cost method proposed by Ross-Heideck (Camacaro, 2020). According to this model, the depreciation of a property is determined by two main indicators: its conservation status and its age. Depreciation is calculated based on the percentage of service life and the conservation status, applied to the already depreciated value, resulting in a simple mathematical expression for its estimation:

$$Varh = Vcn - Vcn[\propto + (1-\propto)c] \tag{1}$$

Where
Var_h= current value of the property,
V_{cn}= value of a new property,
α= depreciation factor due to age, and
c= depreciation factor due to condition (conservation status).

Heideck-Ross, the author of the method (Camacaro, 2020), developed a complete table of values to establish the condition depreciation factor c used in Equation (1). The evaluated conditions are classified as follows: 1 optimal, 1.5 very good, 2 good, 2.5 intermediate, 3 fair, 3.5 deficient, 4 poor, 4.5 very poor, up to 5 discardable. The appraiser, based on expertise and observation during the inspection, determines the property's condition; however, this process involves a degree of subjectivity.
As a contribution to the topic, a model published in 2003 established physical depreciation as the sum of the factorial values of the individual depreciations of the different components and systems of a building. This approach follows the guidelines of International Organization for Standardization (ISO 15686-1:2000) and is based on the expected service life of each element. The results showed a correlation between building depreciation and an exponential model, especially at early ages in buildings with little or no maintenance. Early depreciation was attributed to the shorter service life of certain components and systems, contrasting with traditional methods such as Ross-Heideck (Tiso et al., 2003).
Seeking more objective technical solutions, another model was published in 2009, together with its methodology and application. It was designed to evaluate the conservation status of a building while minimizing appraiser subjectivity. In this model, the building is broken down into elements and systems, directly relating the assessment of anomalies affecting each functional element to the characterization of the building as a whole. The macro-variables, or factors considered, include the morphological characterization of the site and the building, and the level of anomalies recorded in each of the 37 elements grouped into three categories: building components, common areas, and the evaluated apartment. These anomalies are classified into five levels, from 1 (very severe) to 5 (no anomaly), and weighted from 1 to 6 depending on the system (e.g., 6 for the structural system

and 1 for insulation). Using these values and the inspection data, an anomaly index is determined, which is linked to the conservation status (Branco et al., 2009).
The most recent study reviewed applied this model to a residential building in Brazil (Pimienta-Carrondo, 2011), highlighting the importance of studying pathological failures as support for real estate valuation. The model was evaluated under four scenarios: an ideal scenario in a new building without construction defects and not yet maintained; a second scenario in which the building presents fair conditions; a third scenario requiring major repairs; and a final scenario involving variation in age, estimating an apparent age. The results showed that applying the Ross-Heideck model while considering pathological failures significantly affects depreciation and, therefore, property valuation. However, the characterization of failures still depends largely on the appraiser's expertise (Oliveira et al., 2017).
To continue advancing this topic, it is important to define two key terms used in this research: durability and conservation status. According to the International Association for Quality Control and Construction Pathology (Castro-Borges, et al., 2020), *"Durability is the capacity of a construction material, element, or structure to resist physical, chemical, biological, environmental actions, and climate change in its surroundings for a specific period planned from the design stage, while maintaining its original form, mechanical properties, service conditions, and service life without unexpected maintenance costs."* In appraisal engineering, conservation status is defined as *"the aspect that quantifies the degree of preservation and maintenance of the asset at the time the valuation process is carried out"* (Artavia, 2012).
Based on the background and concepts presented above, this research aims to determine the percentage incidence of various factors and indicators on the conservation status of a property, considering their application in both appraisal processes and the diagnosis of construction pathologies. To this end, a consultation with a group of experts was conducted to obtain a technically grounded assessment supported by specialized criteria. This analysis forms the basis for the development and future validation of a model intended to quantify the conservation factor c, as proposed in Equation (1) of the Ross-Heideck model.
In this study, factors are understood as elements, variables, or conditions that directly or indirectly influence the appearance of pathological manifestations in construction and affect property valuation. These factors are grouped into three main categories: (i) property-related, (ii) environment-related, and (iii) inspection-related (Malavé-Corrales & Yánez, 2024). The first group relates to characteristics conceived in the original design and processes affecting the building over time; the second reflects the influence of geographic location and environmental conditions; and the third can be identified at any stage of the building's service life, as they express degradation and loss of characteristics derived from the first two factors, linked to material quality, construction procedures, deterioration mechanisms, and collapse risks. Each factor is operationalized through indicators, understood as specific, observable, or measurable characteristics that function as monitoring, comparison, and tracking tools.
According to construction pathology studies, some indicators have normative support, such as the Venezuelan Standard NTF 4015:2012 (Concrete. Durability), whose guidelines, when properly applied, allow for diagnostic assessments of conservation status at any stage of a building's service life. Likewise, through appropriate methodologies, these indicators can be adapted to quantify the degree of conservation of a property, which is essential for calculating depreciation.

2. METHODOLOGY

The methodological process was developed in three stages. The first stage consisted of exploring and gathering information from secondary and bibliographic sources, which supported the development of the initial questionnaire. In the second stage, the qualitative scientific method of expert consultation was applied through the Delphi technique for data collection (García-Ruiz & Lena-Acela, 2018; Hurtado-Mendoza & Méndez, 2007), aimed at achieving the highest possible degree of consensus. This consensus was evaluated through analysis of variance (ANOVA) applied to the responses obtained in the different rounds of the panel. This process included incorporating the improvements suggested by the panelists into the consultation instrument. The third and final stage consisted of the final evaluation of the questionnaires and their analysis.
The questionnaire was designed to fulfill two specific functions. First, the initial three questions assessed the competence of the experts to validate their participation in the study. Second, the remaining five questions collected the experts' assessments of the factors and indicators related to the conservation status of a property, as well as the risks, failures, and anomalies that may occur at any point during a building's service life.
Two consultation rounds were conducted with two groups of specialists: the first group (G1) and the second group (G2).

2.1 Selection and evaluation of experts

The selection, characterization, and evaluation of experts were based on voluntary participation and professional experience in diagnostic and repair projects for civil works. The professionals consulted work in various countries, although most reside in Venezuela (28), followed by Brazil (3), Colombia (3), the United States (2), the Dominican Republic (1), Paraguay (1), Spain (1), and Mexico (1). Both groups included researchers, engineers, and real estate appraisers.
Group G1 consisted of 18 professionals, most of whom are members of the Latin American Association of Quality Control, Pathology, and Recovery of Construction (ALCONPAT). Fifteen are civil engineers, two are chemical engineers, and one holds dual degrees in civil and mechanical engineering. Three members are real estate appraisers, and seven hold doctoral degrees.
Group G2 consisted of 22 professionals: one industrial chemist and twenty-one civil engineers, four of whom are real estate appraisers and four hold doctoral degrees. This second group received the modified questionnaire, which incorporated the observations, recommendations, and corrections provided by G1 during the first round, in order to move closer to the consensus required by the method. The initial group of forty experts (G1 + G2) was later adjusted and validated using the Expert Competence Coefficient (Ke).

2.2 Consulted factors and indicators

The indicators most commonly used in appraisal engineering to calculate physical depreciation include age, maintenance, service life, and use. For the purposes of this study, additional indicators that may affect durability were incorporated, including property type, construction typology, climatic zone, geographic location, climatic conditions, environmental aggressiveness, natural or accidental events, and inspection-derived indicators such as damage surveys (design errors, low-quality materials, corrosion, settlements, among others), failure mechanisms, and affected elements and systems.
For this reason, in the first round, the factors were grouped into two categories: property-related and environment/inspection-related. The questionnaire applied, with the adjustments and response options, was as follows:

- Question 1:

The conservation status of a civil structure can be evaluated by grouping three major factors: property-related, environment-related, and inspection-related. What percentage weighting do you assign to each factor, with the total summing to 100%? Experts selected one of the following ranges: 0–10%, 11–30%, 31–50%, 51–80%, or 81–100%. At the request of G1, after reviewing the consensus, this question was improved for G2 by explicitly including the three factors instead of the two initially proposed.

- Question 2: Experts evaluated the indicators associated with each factor:

Property-related: property type (house, building, industrial facility, agricultural facility, other); construction typology (reinforced concrete, steel structure, mixed structure, other); use (residential, commercial, educational, hospital, other); maintenance; and age. Environment-related: geographic zone (seasonal or tropical); geographic location (rural, semi-rural, urban); climatic conditions (temperature, humidity, wind speed, rainfall); environmental aggressiveness (non-aggressive, aggressive, highly aggressive, marine, industrial, mixed); and triggering event, if applicable (earthquake, landslide, hurricane, fire, other). Inspection-related: damage survey (cracking, corrosion, lack of cover, settlement, among others); failure mechanisms (physical, mechanical, chemical, biological); affected systems (structural, enclosures, installations, among others); affected elements (columns, beams, slabs, pipes, walls, among others). Experts selected the percentage range for each indicator. For G2, the question was improved by requiring the sum of indicators within each factor to total 100%.

- Question 3:

Experts ranked the collapse risk associated with severe failures in the following building systems: structural (foundations, columns, beams, walls, slabs), enclosures (walls, floors, roofs, façades), electrical installations, sanitary installations, gas installations, communication network systems, and fire protection systems. A score of 5 indicated the highest risk and 1 the lowest.

- Question 4:

Experts ranked the recurrence of pathological manifestations, with 5 being the most recurrent and 1 the least. For G1, more than 20 anomalies were evaluated across concrete, reinforced masonry, and steel structures. For G2, reinforced masonry was removed based on expert recommendations.

- Question 5:

Experts ranked the elements most affected by natural aging (excluding defects or damage from events such as earthquakes or fires), with 5 being the most affected and 1 the least. The evaluated elements included foundations, columns, beams, slabs, stairs, roofs, façades, walls, floors, sanitary pipes, water supply pipes, electrical installations, network installations, fire protection installations, basement areas, parking areas, roof coverings, among others

2.3 Evaluation of expert responses

The assessment of factors and indicators, as well as the risks associated with severe failures in systems, anomalies, construction elements, and aging-related damage, was carried out using absolute and relative frequency methods. This technique identifies the number of occurrences of each variable, facilitating subsequent statistical analysis through the calculation of means and standard deviations to identify trends and dominant values.

As noted, the research is based on a qualitative expert-based approach, in which expert opinions are transformed into valid percentage values that directly influence the evaluation of a property's conservation status. To continue this line of research, these results will later be integrated and tested in the quantitative model proposed by (Branco et al., 2009), aimed at reducing the subjectivity inherent in estimating the conservation status within the depreciated replacement cost method proposed by Ross-Heideck (Camacaro, 2020).

3. RESULTS

3.1 Scientific evaluation and validation of experts

The competence coefficient (Ke) was calculated for each expert in both groups. This coefficient represents the average of the knowledge and information coefficient (kc) and the argumentation or justification coefficient (ka). The maximum value of Ke is 1. According to the Delphi method (Hurtado-Mendoza & Méndez, 2007), for the study to achieve scientific validity, at least 60% of the group must have Ke ≥ 0.8, and no expert may have Ke < 0.5.

In Group 1 (G1), eleven experts reported Ke ≥ 0.8, with a maximum value of 0.95, while four experts reported Ke < 0.5. Therefore, the group was reduced from 18 to 14 experts. In Group 2 (G2), eleven experts reported Ke ≥ 0.8, with a maximum value of 1, and two experts reported Ke < 0.6. To meet the requirement that 60% of the group must have Ke ≥ 0.8, G2 was reduced from 22 to 20 experts. In total, the number of experts validated for scientific analysis decreased from 40 to 34

3.2 Valuation of factors influencing the conservation status

When assessing the conservation status (whether for depreciation calculations or pathological diagnosis) it is essential to understand the incidence of factors related to the property itself (characteristics defined in the original design and processes affecting it over time, such as age and maintenance), as well as those related to its geographic location and surroundings. Only after this analysis can inspection-related factors be evaluated, as they reflect potential degradation and loss of characteristics associated with material quality, construction procedures, failure mechanisms, and collapse risks.

The experts’ responses to Question 1 were as follows:

Group (G1) (14 experts): Regarding the property factor, all members reported values below 50%, distributed as follows: 6 placed it in the 31–50% range, 4 in the 11–30% range, and 4 in the 0–10% range. For the environment and inspection factors, the majority reported values exceeding 50%: 2 in the 31–50% range, 8 in the 51–80% range, and 4 in the 81–100% range.

Group (G2) (20 experts): Three factors were consulted. For the property factor, 2 experts placed it in the 0–10% range, 10 in the 11–30% range, 4 in the 31–50% range, 3 in the 51–80% range, and 1 in the 81–100% range. Regarding the environment factor, the distribution was: 4 in the 0–10% range, 13 in the 11–30% range, 2 in the 31–50% range, 0 in the 51–80% range, and 1 in the 81–100% range. For the inspection factor, 0 were in the 0–10% range, 5 experts placed it in the 11–30% range, 9 in the 31–50% range, 5 in the 51–80% range, and 1 in the 81–100% range.

Since specific percentages were requested from Group (G2) in addition to the ranges, the responses were observed to be consistent with those of Group (G1). The incidence of property-related factors on the conservation status yielded an average of 34%, falling within the 31–50% range. Environmental factors showed an average of 19%, while the incidence of inspection factors reported 47%. The sum of these last two percentages totals 66%, which falls within the 51–80% range, aligning with the opinion expressed by Group (G1). See Figure 1

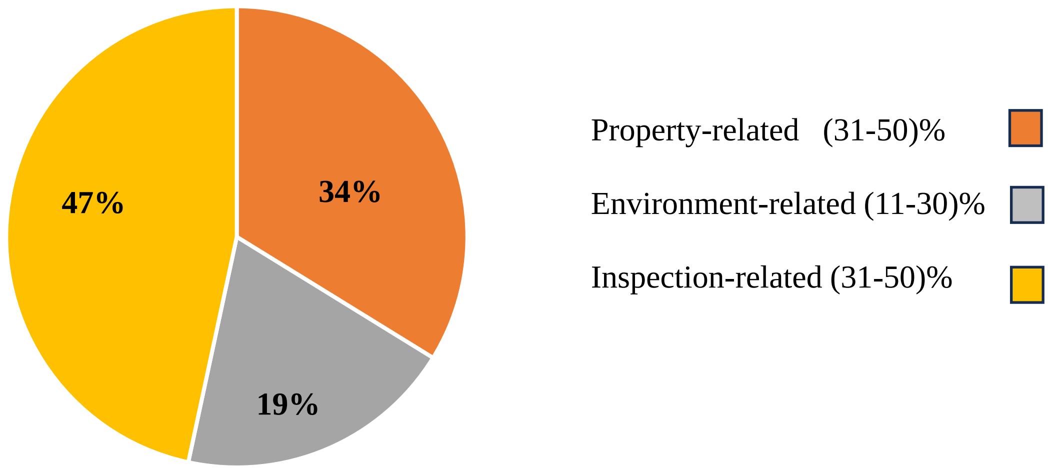

Figure 1. Percentage distribution of factors influencing a property's conservation status, according to the consensus of 34 consulted expert

The consultation highlights that the highest percentage assessment is given to the inspection of aspects related to the property and the environment in which it is located. It is worth inferring what this validation reaffirms, with this example, (Pimenta, 2011, p.43), if a property has exceeded its useful life, (current age/useful life), a depreciation factor of 100% is obtained, when applying the Ross-Heideck model it is considered that the property has no value, regardless of its state of conservation. But that is not correct, if you take into account that adequate maintenance has been carried out in that property, replacing short-lived elements and important rehabilitations. It may then happen that, although the theoretical useful life period was met, the circumstances in which the elements and systems performed functions were more favorable than expected and depreciation did not reach 100%. The opposite could also happen that halfway through its useful life, according to the appraiser its state of conservation is well appreciated, but because it has low quality materials, it has hidden defects, so when calculating depreciation, it shows values lower than the real ones.

3.3 Valuation of indicators

Upon evaluating Question 2, the results for the indicators are as follows.

3.3.1 Property indicators. A high level of agreement was observed between G1 and G2. Maintenance received the highest weighting, with an average of 37%, within the 31–50% range. Age followed with an average of 26%, confirming its relevance in the Ross-Heideck model. This finding supports the hypothesis that age and service life should not be considered in isolation when estimating depreciation, as 37% of the property factor corresponds to other indicators. Two experts did not respond to this question, possibly indicating difficulty or lower perceived relevance.

3.3.2 Environmental indicators. The environmental aggressiveness indicator showed the highest incidence, with an average of 28.3%, while geographic zone showed the lowest, with 12%. This suggests a strong relationship between maintenance and environmental aggressiveness: The more aggressive the environment, the greater the maintenance required.

3.3.3 Inspection indicators. All experts agreed that inspection-related indicators have similar weightings, ranging from 22% to 28%, within the 11–30% range. These indicators reflect degradation, loss of characteristics, deterioration mechanisms, and the systems and elements affected at the time of evaluation.

Table 1 summarizes the percentage incidence of the indicators, including normalized values. The results show: The highest weighting corresponds to inspection-derived indicators (damage survey, failure mechanisms, affected systems and elements), which are immediate indicators of risk. Maintenance and age are also highly relevant, reflecting the influence of conservation practices and life-cycle performance. Environmental indicators have lower weightings, suggesting that the model prioritizes the current physical condition of the property over contextual variables.
Overall, the results show a clear trend toward tangible and observable indicators (inspection and maintenance) rather than contextual characteristics (property attributes and environment).

Table 1. Incidence percentage of indicators on the conservation status issued by the group of 34 experts (G1) and (G2).

Factor	**Indicator**	**Valuation (%) (G1) and (G2) (G2)**		**(G2)**
		Range	**Average**	**Normalized**
Property-related	Construction typology (reinforced concrete, steel structure, composite structure, other)	(0-10)	13	4.4
	Property type (house, building, industrial facilities, agricultural facilities, other)	(0-10)	10	3.4
	Use (residential, commercial, educational, hospital, other)	(11-30)	14	4.8
	Age	(11-30)	26	8.8
	Maintenance	(31-50)	**37**	**12.6**
Environment-related	Geographic zone (seasonal or tropical)	(0-10)	12	2.3
	Climatological conditions (temperature, humidity, wind speed, rainfall)	(11-30)	19	3.6
	Geographic location (rural, semi-rural, urban)	(11-30)	14	2.7
	Environment type (non-aggressive, aggressive, very aggressive, industrial, marine, mixed)	(11-30)	**28**	**5.3**
	Event (seismic, flooding, landslide, tsunami, fire)	(11-30)	27	5.1
Inspection-related	Damage survey (cracking, corrosion, etc.)	(11-30)	27	12.7
	Failure mechanisms (physical, mechanical, chemical, electrochemical, biological)	(11-30)	22	10.3
	Affected systems (structures, building envelope, etc.)	(11-30)	23	10.8
	Affected elements (columns, beams, floors, piping)	(11-30)	**28**	**13.2**
			∑	**100**

3.4 Assessment of systems with severe damage, common pathological manifestations, and elements most affected in buildings

During the inspection, the appraiser must have the necessary tools to issue an objective judgment regarding the condition of the building, even without being a specialist in construction pathology. In severe cases, consultation with a specialist is recommended. As verified in the previous sections, inspection-related indicators prevail over those associated with the property and the environment. The following expert responses contribute to the development of such tools in future applications.

3.4.1 Valuation of systems with severe damage and their incidence of collapse risk. In response to Question 3, there was strong consensus among the panelists that the structural system, when exhibiting severe damage, represents the highest collapse risk, with an average rating of 4.88. In contrast, the system with the lowest perceived risk was the communication system, with a rating of 1.55. In Group G1, all 14 experts agreed with this assessment, while in Group G2, 18 of the 20 experts expressed the same opinion. Figure 2 presents the collapse-risk ratings for all analyzed systems. These results confirm that failures in any system are important indicators to incorporate into the assessment of the conservation status for depreciation purposes. However, their impact depends on the affected system, as the cost and implications of repairing the structural system are always greater than those of any other system—depending, of course, on the magnitude of the damage.

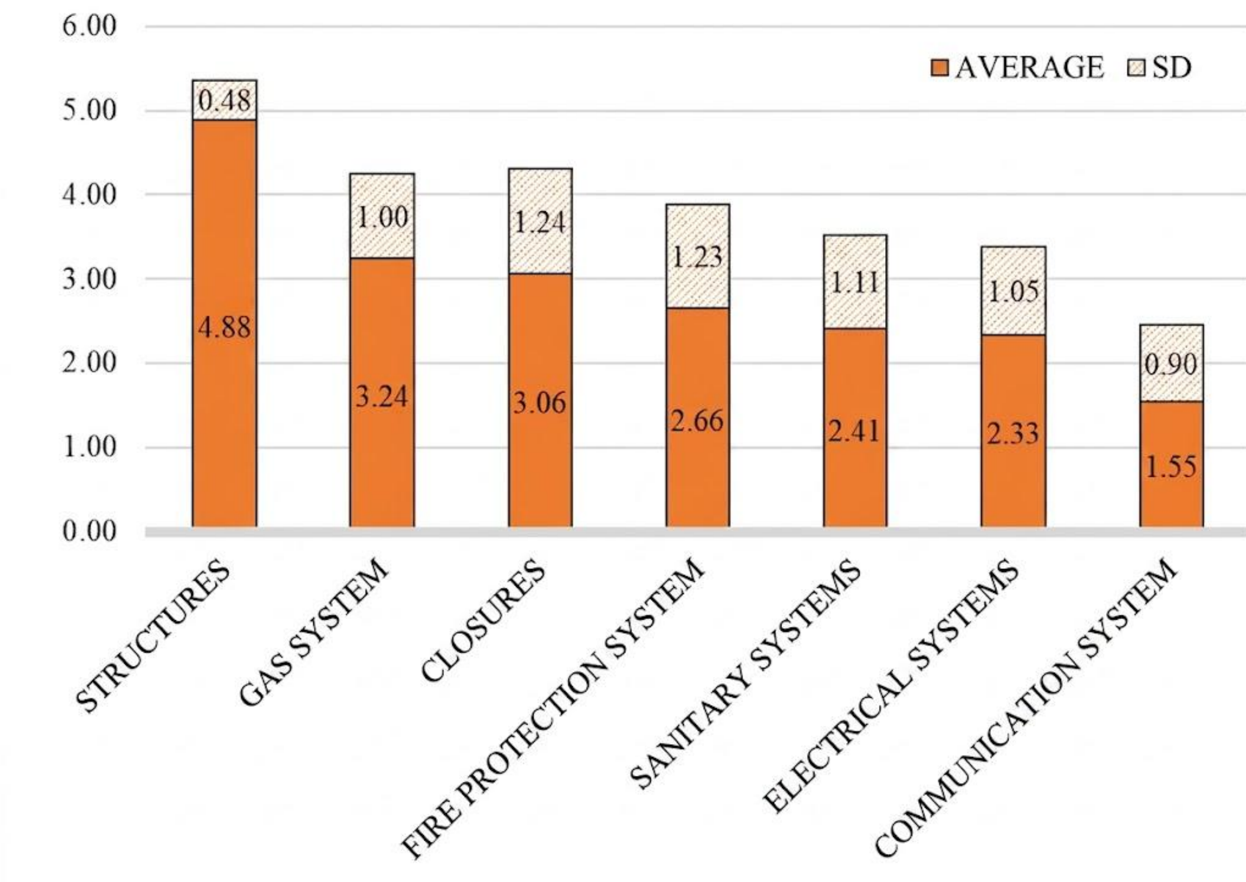

Figure 2. Collapse risk assessment for each system with severe failures (Survey of 34 experts)

3.4.2 Most common pathological manifestations. The first inspection indicator is the damage survey, where identifying failures or pathological manifestations is essential. In Question 4, experts were asked about the recurrence of these manifestations. They were grouped on a scale from 1 to 5, with 5 being the most recurrent and 1 the least. Table 2 presents all results, including the classification of each manifestation as structural, functional, or aesthetic. Among the most common symptoms (those with ratings above 4) were cracks, water infiltration, fissures, and moisture. Among the least frequent, with ratings below 2, was steel rupture. It is noteworthy that the symptoms with the highest disagreement among experts (i.e., highest standard deviation) were: corrosion, carbonation, segregation, bleeding, loss of cover, and coating detachment. This suggests that these symptoms may be more difficult to identify during inspection. Some recommendations that may help appraisers identify the origin of these manifestations include: Corrosion-related cracks run parallel to the reinforcing steel. Carbonation-induced corrosion occurs in porous concrete or concrete with insufficient cover. Segregation and bleeding indicate poor-quality fresh concrete, more visible during early construction stages, but may also appear later due to chemical attacks that induce corrosion. Cracks, fissures, and moisture have diverse origins and are often associated with structural mechanisms, differential settlements, corrosion, waterproofing failures, or material aging. Fungi, stains, and efflorescence indicate persistent moisture problems and lack of ventilation.

Table 2. Recurrence of pathological manifestations, standard deviation, and classification of failure types.

Pathological Manifestations	**Frequency**	**Standard Deviation**	**Failure Type**
Fissures / Hairline Cracks	4.8	Low	Structural
Cracks	4.3	Low	Structural
Corrosion	3.8	High	Structural
Carbonation	3.7	High	Structural
Exposed Reinforcement	3.4	Moderate	Structural
Honeycombing / Voids	3.0	Moderate	Structural
Settlements	2.9	Moderate	Structural
Deflections	2.4	Low	Structural
Segregation	2.5	High	Structural
Bleeding	2.3	High	Structural
Spalling / Exfoliation	2.1	Low	Structural

Steel Failure / Rupture	1.9	Moderate	Structural
Seepage / Leakage	4.3	Moderate	Serviceability
Dampness / Moisture	4.2	Moderate	Serviceability
Fungal growth	3.3	Moderate	Serviceability
Loss of Concrete Cover	3.4	High	Serviceability
Degradation/ Deterioration	3.2	Moderate	Serviceability
Pipe Failure	3.1	Moderate	Serviceability
Surface Abrasion /Wear	2.4	Moderate	Serviceability
Staining	3.5	Moderate	Aesthetic
Efflorescence	3.2	Moderate	Aesthetic
Delamination	3.4	High	Aesthetic/Serviceability

3.3.3 Building elements most affected by aging. Although failures may occur in all systems, certain elements tend to accumulate more damage over time and should be considered reference points during inspection. The results of Question 5 are shown in Table 3. Elements belonging to the enclosure system, particularly roof coverings (4.18) and façades (4.15), were perceived as the most affected by natural aging. In contrast, foundations (1.56) and communication installations (2.15) showed the lowest incidence. The lower weighting of structural elements does not imply that they are irrelevant; rather, their natural deterioration is slower and less perceptible compared to exposed or service-related elements. However, as previously noted, severe deterioration in structural elements represents the highest collapse risk. The high standard deviations reported indicate considerable dispersion in expert responses, suggesting that consensus was not achieved in this aspect.

Table 3. Incidence of damage in elements as a consequence of natural aging.

System	Elements / Components	Average Aging Weight	Standard Deviation (STD)
Enclosures	Roofing / Roof Coverings	4,18	1,47
	Facades	4,15	1,21
	Ceilings	3,82	1,47
	Walls	3,59	1,31
	Floors	3,15	1,50

Other areas	Basement areas	3,74	1,16
	Parking areas	3,38	1,23
Building Services / Utilities	Potable Water Piping (White water)	3,85	1,23
	Sewage / Wastewater Piping (Black water)	3,74	1,24
	Electric Installation	2,82	1,24
	Fire Protection Systems	2,50	1,19
	Gas Installation	2,50	0,71
	Communication systems	2,15	1,35
Structures	Slabs	3,12	1,32
	Columns	2,76	1,26
	Beams	2,74	1,19
	Stairs	2,74	1,08
	Foundations	1,56	0,93

4. CONCLUSIONS

This study determined the incidence percentage of the main factors and indicators that influence the conservation status of buildings, based on the consensus of 34 validated experts. The results show that inspection-related indicators, including damage surveys, failure mechanisms, and affected systems and elements, carry the greatest weight in the assessment of a property's condition, with an average incidence of 47%. This confirms that observable deterioration and anomaly-based diagnostics are the most reliable predictors of structural performance and collapse risk.

Property-related indicators accounted for 34%, with maintenance emerging as the most influential variable, followed by building age. These findings reinforce that chronological age alone is insufficient for estimating physical depreciation. Instead, the actual conservation status, shaped by maintenance practices, material performance, and the condition of individual components, must be incorporated into valuation models.

Environmental indicators exhibited the lowest incidence (19%), although environmental aggressiveness was recognized as a relevant factor due to its direct relationship with deterioration rates and maintenance needs. This suggests that, while environmental conditions influence degradation processes, the evaluation of conservation status is ultimately dominated by the building's current physical condition as revealed through inspection.

Overall, the results highlight the need to prioritize technical inspection over other factors when assessing the conservation status of a building and estimating physical depreciation. The expert-derived weightings obtained in this study provide a scientifically grounded basis for developing and validating a quantitative model to estimate the conservation factor (c) used in the Ross–Heideck depreciation method. Such a model would reduce evaluator subjectivity and contribute to more accurate, transparent, and technically robust real estate valuation practices.

Future research will focus on integrating these weightings into a comprehensive quantitative framework and testing its applicability across different building typologies, environmental contexts, and pathological scenarios.

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