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Analysis of Visual Evaluation Method and Development of a Digital Inspection Model for State-Owned Building Condition Assessment

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Abstract. The condition assessment of State-Owned Buildings (BGN) by the Banjarmasin City DPUPR (Public Works and Spatial Planning Agency) currently relies on a manual, paper-based system suffering from two fundamental weaknesses. First, a methodological weakness: the assessment instrument's weighting is erroneously based on a Cost Budget Plan (RAB) rather than on the functional importance or safety of the components. Second, a process weakness: the manual system is prone to human error, time-consuming, and yields data that is difficult to manage. This applied research aims to (1) Identify and select essential building components for simple-classification BGN; (2) Determine objective importance weights for each component using the AHP method; and (3) Design a functional digital inspection prototype model that ensures data integrity, validity, and security. This study uses an exploratory sequential design (Qualitative → Quantitative → Development). The initial qualitative phase involves a literature study and document analysis to compile an initial component list. This list is then validated and reduced in the first quantitative phase using the Cut-Off Point (COP) method through an expert survey. In the second quantitative phase, the final component list is weighted using the Analytic Hierarchy Process (AHP) to obtain a priority vector. The final stage is the development of a functional digital prototype using Google Sheets as a rapid prototyping platform. This prototype is engineered with functional features to ensure data validity (Data Validation), data integrity (Protected Ranges), and accountability (Version History). The research successfully, (1) identified 33 essential sub-components for simple-classification BGN through the Cut-Off Point (COP) method . (2) The Analytic Hierarchy Process (AHP) weighting results established the Structural Component as the most critical criterion with an importance weight of 48.16%. (3) Field validation via a case study demonstrated that the developed digital prototype is 15.38% more time-efficient (saving 10 minutes in the total cycle) and more methodologically valid, yielding a damage score of 69.51% compared to 60.19% from the manual, RAB-based system, significantly changing the final recommendation from Heavy Rehabitation to Total Rehabitation. This new model is proven to provide a more objective and accurate basis for decision-making for the Banjarmasin City DPUPR.

Keywords. Building Condition Assessment, State-Owned Buildings, Digital Inspection, Analytic Hierarchy Process (AHP), Cut-Off Point (COP), Asset Management.

1. Introduction

State-Owned Buildings (BGN) are vital assets that support public service functions. The sustainability of their function and user safety depends heavily on effective asset management. In Banjarmasin City, the Department of Public Works and Spatial Planning (DPUPR) is responsible for this management. A key pillar of this is regular condition assessment. However, the current method used by DPUPR relies on a conventional, paper-based system with two fundamental weaknesses .

The first is a methodological weakness. The assessment form's weighting system is erroneously based on a Cost Budget Plan (RAB) rather than the functional, structural, or safety importance of the components. This flawed, cost-based approach means critical but inexpensive components (like structural elements) may be overlooked, while expensive aesthetic components are over-valued. The second is a process weakness. The reliance on paper forms makes inspection, recapitulation, and archiving a manual process. This is not only time-consuming and prone to human error (e.g., calculation or data entry mistakes) but also results in historical data that is difficult to manage and analyze for long-term strategic planning. This research proposes an integrated solution to solve both problems. To address the methodological weakness, a new assessment framework is developed using scientifically validated component selection (Cut-Off Point) and objective weighting (Analytic Hierarchy Process - AHP). To address the process weakness, this new framework is implemented in a functional digital inspection prototype designed to be efficient, accurate, and secure. While previous studies have used AHP `[1, 2]` or Cut-Off Point (COP) methods separately `[3, 4]`, the novelty of this research lies in the integrated development of a comprehensive model. This study (1) uses COP to scientifically reduce a list of components, (2) uses AHP to build a valid weighting model from those components, and (3) develops a functional digital prototype with guaranteed data integrity, which is then (4) validated in a head-to-head comparison against the old manual system.

2. Methods

This applied research utilized an exploratory sequential design (Qualitative → Quantitative → Development). This sequential flow ensures that each phase is built upon the valid findings of the previous one.

2.1. Component Identification and Selection

The initial qualitative phase aimed to compile an exhaustive list of potential building components. This was achieved through a systematic literature review (reviewing government regulations [5, 6], academic journals, and textbooks) and a content analysis of the existing internal forms used by DPUPR Banjarmasin. This synthesis resulted in a comprehensive initial list of 61 sub-components.

In the first quantitative phase, this list of 61 items was validated and reduced using the Cut-Off Point (COP) method. A questionnaire was distributed to 15 experts (from government, consultants, and contractors) who rated the importance of each component for a 'Simple Classification BGN' on a 5-point Likert scale. A cut-off threshold was calculated (3.1355). Any component with a mean score below this threshold was deemed non-essential and eliminated. This process reduced the list from 61 to 33 essential sub-components.

2.2. Component Weighting (AHP)

The 33 essential components were then structured into a 3-level hierarchy for the Analytic Hierarchy Process (AHP). The hierarchy consisted of the main goal, 5 main criteria (Structural, Architectural, Mechanical, Electrical, Outdoor Space), and 33 sub-criteria (the components), as shown in Figure 1.

Pairwise comparison questionnaires were administered to the same 15 experts to judge the relative importance of components at each level. The responses were aggregated using the Geometric Mean to form a composite matrix. For each matrix, the local priority vector (weights), maximum eigenvalue (λ_{max}), Consistency Index (CI), and Consistency Ratio (CR) were calculated `[7, 8]`. All matrices were confirmed to be consistent, with CR values well below the 0.1 threshold.

Finally, a global priority synthesis was performed. The final 'Global Weight' for each of the 37 sub-components was calculated by multiplying its local weight by the weight of its parent criterion. These 37 global weights became the core logic for the new assessment model.

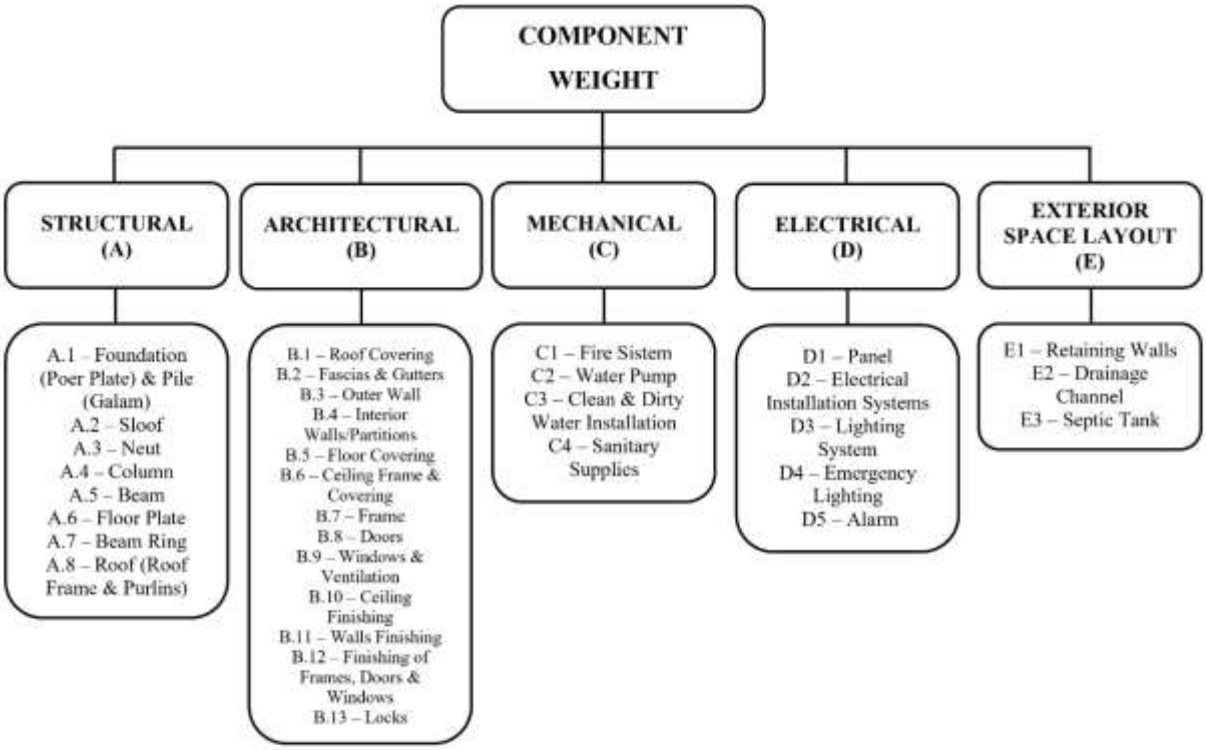


Figure 1 Hierarchical Structure of Simple Building Component Weighting

2.3. Prototype Development and Validation

The final phase was the development of a functional digital prototype [9] using Google Sheets as a rapid prototyping platform. The 33 components and their AHP global weights were embedded into the system. The prototype was specifically engineered to guarantee data quality, (1) Data Validity was ensured using 'Data Validation' to create dropdown menus for condition input (e.g., "Minor Damage", "Moderate Damage", "Heavy Damage"), preventing typos and non-standard entries. (2) Data Integrity was ensured using 'Protected Ranges' to lock all cells containing AHP weights and formulas, making them unchangeable by surveyors. (3) Accountability was ensured using the built-in 'Version History', which acts as an automatic, un-editable audit trail for all changes.

The prototype first underwent internal Black-Box Testing `[10]` using a Test Case Scenario to confirm that all validation (e.g., rejecting invalid text), integrity (e.g., formulas cannot be edited by 'Editor' role), and security (e.g., 'Viewer' role is read-only) features functioned perfectly.

Field validation was then conducted using a comparative case study on a single object, SDN Alalak Utara 1. A technical surveyor from DPUPR performed two inspections on the same building: Scenario A (using the old, manual RAB-based system) and Scenario B (using the new, digital AHP-based prototype). Time efficiency and assessment scores were recorded for both scenarios, followed by a qualitative post-test interview with the surveyor to assess usability `[11]`.

3. Results and Discussion

The research successfully validated the new model, demonstrating significant advantages in both process efficiency and methodological validity.

3.1. AHP Weighting Result

The AHP analysis established a clear and consistent hierarchy of importance. The Structural Component was determined to be the most critical criterion, with a final importance weight of 48.16%. This was followed by Architectural (26.51%), Mechanical (10.01%), Electrical (10.34%), and Outdoor Spatial Planning at 4.98%. These weights, detailed in Table 1, formed the objective calculation engine for the prototype.

Table 1 Final Global Weights of Building Components from AHP Synthesis

Code	Main Components/ Subcomponents	Criteria Weight (%)	Local Weight (%)	Global Weight (%)
A	**Structural**	**48,16**		
A.1	Foundation (Poer Plate) & Pile (Galam)		28,86	13,90
A.2	Sloof		13,11	6,32
A.3	Neut		12,52	6,03
A.4	Column		13,35	6,43
A.5	Beam		11,61	5,59
A.6	Floor Plate		8,93	4,30
A.7	Beam Ring		6,08	2,93
A.8	Roof (Roof Frame & Purlins)		5,54	2,67
B	**Architectural**	**26,51**		
B.1	Roof Covering		12,28	3,25
B.2	Fascias & Gutters		2,71	0,72
B.3	Outer Wall		16,65	4,41
B.4	Interior Walls/Partitions		9,87	2,62
B.5	Floor Covering		11,32	3,00
B.6	Ceiling Frame & Covering		12,17	3,23
B.7	Frame		3,32	0,88
B.8	Doors		7,21	1,91
B.9	Windows & Ventilation		6,51	1,73
B.10	Ceiling Finishing		5,81	1,54
B.11	Walls Finishing		6,90	1,83
B.12	Finishing of Frames, Doors & Windows		2,78	0,74
B.13	Locks		2,48	0,66
C	**Mechanical**	**10,01**		
C.1	Fire Sistem		34,56	3,46
C.2	Water Pump		11,70	1,17
C.3	Clean & Dirty Water Installation		30,24	3,03
C.4	Sanitary Supplies		23,49	2,35
D	**Electrical**	**10,34**		
D.1	Panel		28,13	2,91
D.2	Electrical Installation Systems		29,17	3,02
D.3	Lighting System		17,68	1,83
D.4	Emergency Lighting		11,14	1,15
D.5	Alarm		13,88	1,44
E	**Outdoor Spatial Planning**	**4,98**		
E.1	Retaining Walls		37,69	1,88
E.2	Drainage Channel		36,61	1,82
E.3	Septic Tank		25,70	1,28
			Σ	**100,00**

3.2. Prototype Functional Features

The prototype was successfully engineered to guarantee the three pillars of data quality as a direct solution to the identified problems.

First, “Data Validity” was guaranteed by implementing 'Data Validation' on the condition input cells (Figure 2 & 3). This feature forces surveyors to select from a standardized dropdown list and rejects invalid free-text entries, directly eliminating a source of human error.

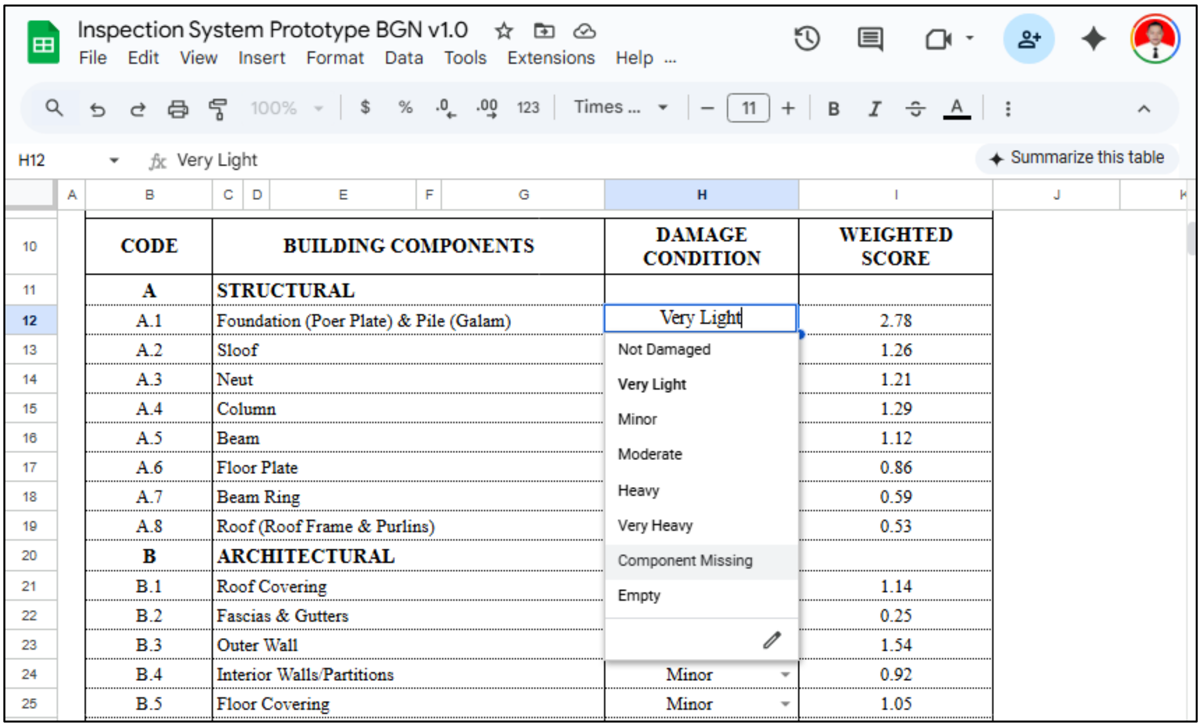


Figure 2 Data Validation (Dropdown) Feature

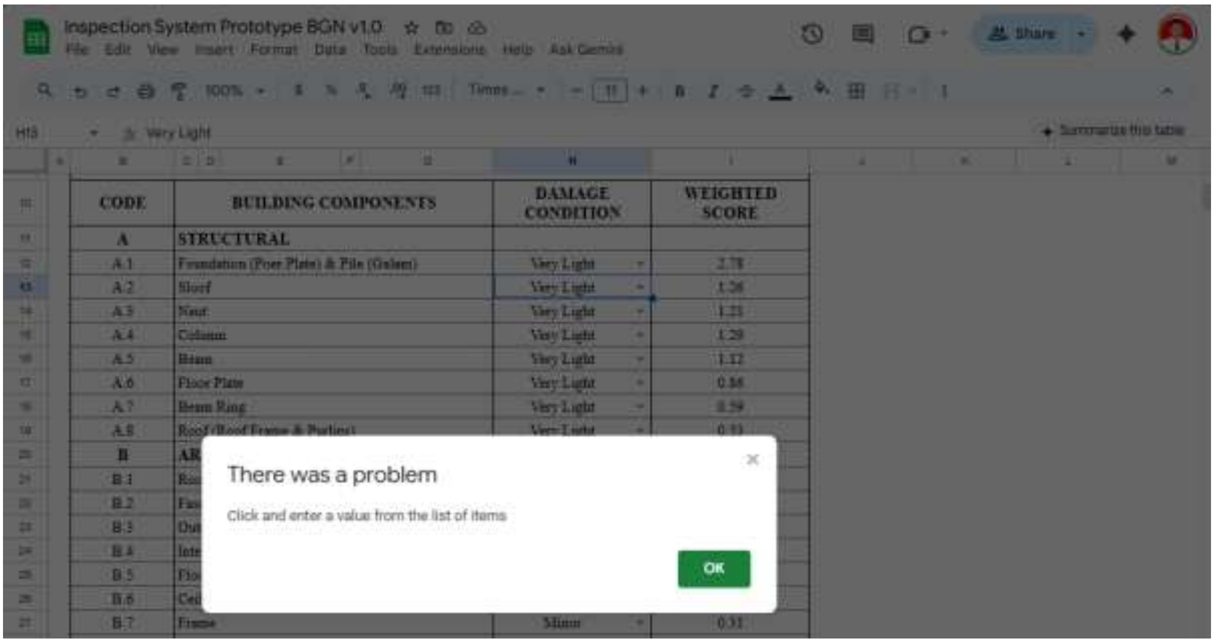
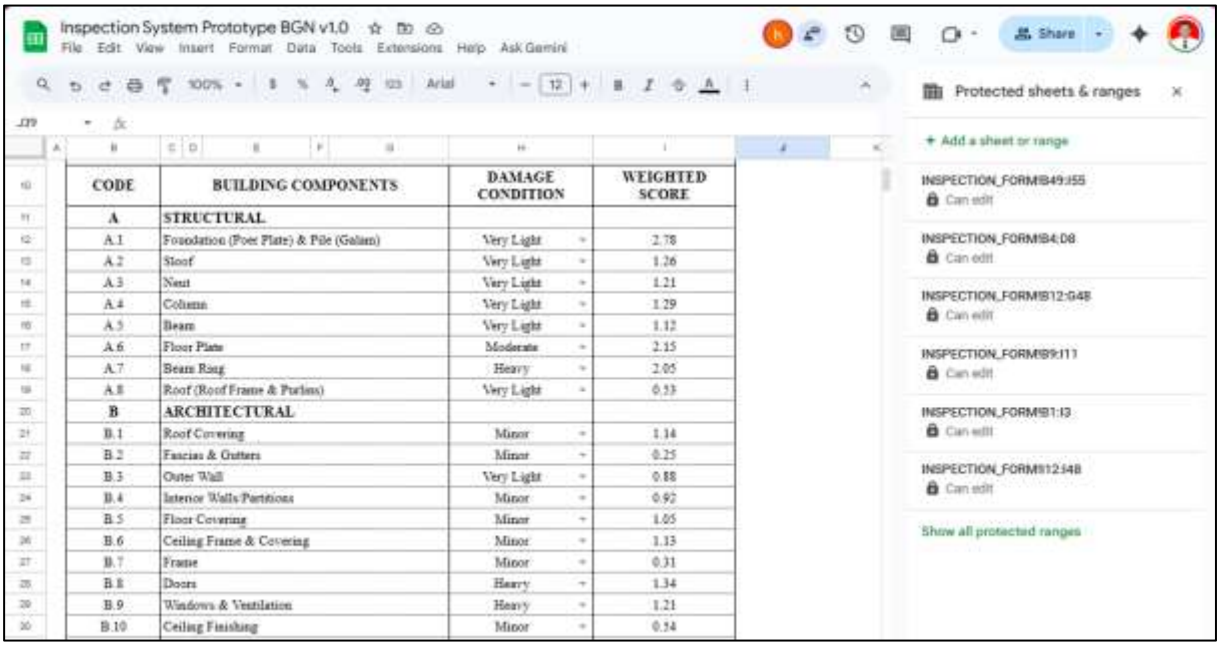


Figure 3 System Warning When Data Input is Invalid

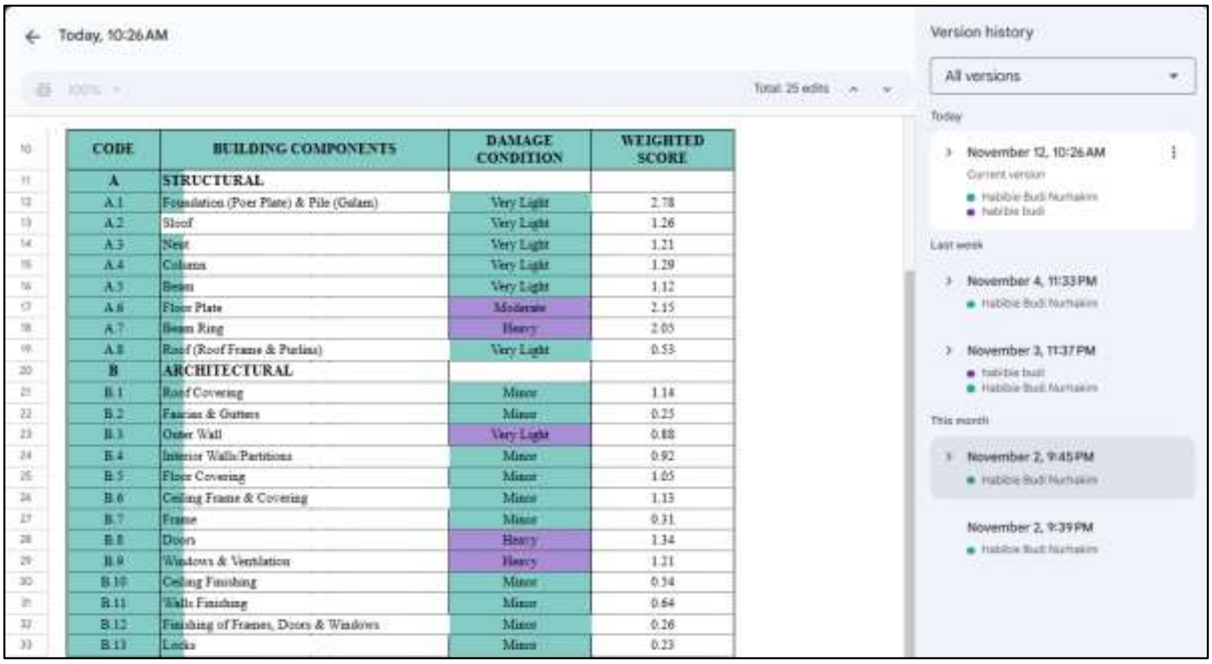
Second, “Data Integrity” was guaranteed by using 'Protected Ranges & Sheets' (Figure 4). This key feature locks all cells containing the validated AHP weight formulas, making them un-editable by surveyors. This ensures the calculation logic is secure and cannot be accidentally or intentionally altered, a crucial improvement over unsecured spreadsheets.



CODE	BUILDING COMPONENTS	DAMAGE CONDITION	WEIGHTED SCORE
A	STRUCTURAL		
A.1	Foundation (Poer Plate) & Pile (Galam)	Very Light	2.78
A.2	Sloof	Very Light	1.26
A.3	Neut	Very Light	1.21
A.4	Column	Very Light	1.29
A.5	Beam	Very Light	1.12
A.6	Floor Plate	Moderate	2.15
A.7	Beam Ring	Heavy	2.05
A.8	Roof (Roof Frame & Purlins)	Very Light	0.53
B	ARCHITECTURAL		
B.1	Roof Covering	Minor	1.14
B.2	Fascias & Gutters	Minor	0.25
B.3	Outer Wall	Very Light	0.88
B.4	Interior Walls/Partitions	Minor	0.92
B.5	Floor Covering	Minor	1.05
B.6	Ceiling Frame & Covering	Minor	1.13
B.7	Frame	Minor	0.31
B.8	Doors	Heavy	1.34
B.9	Windows & Ventilation	Heavy	1.21
B.10	Ceiling Finishing	Minor	0.54

Figure 4 Data Integrity (Protected Ranges) Feature

Third, “Accountability” was guaranteed by leveraging the platform's built-in 'Version History' (Figure 5). This feature automatically creates an un-editable audit trail, logging every change made, the user who made it, and the timestamp. This provides a level of traceability and accountability impossible with the old paper-based filing system.



CODE	BUILDING COMPONENTS	DAMAGE CONDITION	WEIGHTED SCORE
A	STRUCTURAL		
A.1	Foundation (Poer Plate) & Pile (Galam)	Very Light	2.78
A.2	Sloof	Very Light	1.26
A.3	Neut	Very Light	1.21
A.4	Column	Very Light	1.29
A.5	Beam	Very Light	1.12
A.6	Floor Plate	Moderate	2.15
A.7	Beam Ring	Heavy	2.05
A.8	Roof (Roof Frame & Purlins)	Very Light	0.53
B	ARCHITECTURAL		
B.1	Roof Covering	Minor	1.14
B.2	Fascias & Gutters	Minor	0.25
B.3	Outer Wall	Very Light	0.88
B.4	Interior Walls/Partitions	Minor	0.92
B.5	Floor Covering	Minor	1.05
B.6	Ceiling Frame & Covering	Minor	1.13
B.7	Frame	Minor	0.31
B.8	Doors	Heavy	1.34
B.9	Windows & Ventilation	Heavy	1.21
B.10	Ceiling Finishing	Minor	0.54
B.11	Walls Finishing	Minor	0.64
B.12	Finishing of Frames, Doors & Windows	Minor	0.26
B.13	Locks	Minor	0.23

Figure 5 Accountability (Version History) Feature

3.3. Field Validation: Efficiency

The comparative case study provided clear quantitative data on process efficiency. The total cycle time for Scenario A (Old System) was 65 minutes, while Scenario B (New System) took 55 minutes, as shown in Table 2.

Table 2 Case Study Time Efficiency Comparison

Stages	Scenario A (Old System)	Scenario B (New System)
Stage 1: Field Inspection (Data Collection and Input)	50 Minutes	55 Minutes
Stage 2: Recapitulation & Calculation (Data Entry, Score Calculation, and Report Finalization)	15 Minutes	0 Minutes (Automatic)
Total Duration	65 Minutes	55 Minutes

This represents a total time saving of 10 minutes, or a “15.38% increase in overall efficiency”. The prototype completely eliminated the 15-minute "Recapitulation & Calculation" bottleneck, a step which the surveyor confirmed in interviews was not only time-consuming but also the primary source of human error. The 5-minute increase in on-site inspection time (55 min vs 50 min) for Scenario B was attributed to surveyor adaptation to the new digital interface and the use of standardized dropdowns instead of free-writing, a point confirmed by the surveyor.

3.4. Field Validation: Methodological Validity

The most significant finding was the difference in the assessment *output*, which confirms the methodological flaw of the old system. The old RAB-based system (Scenario A) calculated a final damage score of 60.19%, while the new AHP-based prototype (Scenario B) calculated a score of 67.05%. This difference is summarized in Table 3.

Table 3 Final Assessment Score Comparison (Manual vs. Prototype)

METRIC	Scenario A (Old System)	Scenario B (New System)
Object	North Alalak 1 Elementary School	North Alalak 1 Elementary School
Weighting Methodology	Cost Budget Plan (RAB)	*Analytical Hierarchy Process* (AHP)
Damage Score	60.19%	69.51%
Qualification	Heavy Damage	Total Damage
Recommendation	Heavy Rehabilitation	Total Rehabilitation

The new prototype (Scenario B) gives a higher damage score (69.51%) than the old system (60.19%). This 9.32% difference is significant enough to change the treatment recommendation from "Heavy Rehabilitation" to "New Development". A closer analysis of the data in Figures 6, and 7 reveals two main causes for this disparity in results:

1. Fundamental Differences in Weighting Methodology (RAB vs. AHP) The old system (Figure 6) clearly shows the ambiguity of the cost-based methodology (RAB). The "Floor Beams and Slabs" component is given a very high weighting, namely 26.75% of the total building score. In contrast, the new AHP-based system (Table 1) divides the weighting based on expert validation and functional importance, where the weight of the structural components is distributed more evenly (e.g., "Foundation" 13.90%, "Floor Slabs" 4.30%).

No.	Building Components	Weight	Damage Level		Information
			Percentage	Score	
a	*b*	*c*	*d*	*e*	*f*
1	**FONDATION WORK**				
	Galam Piling, Poer Foundation, Sloof and Neut	15,91%	65,00%	10,34%	Heavy Damage
2	**FLOOR**				
	Floor Beams and Slabs	26,75%	65,00%	17,39%	Heavy Damage
	Floor Covering	5,68%	70,00%	3,98%	Total Damage
3	**WALL**				
	Column	7,77%	65,00%	5,05%	Heavy Damage
	Beam Ring	2,07%	65,00%	1,35%	Heavy Damage
	Wall	9,26%	70,00%	6,48%	Total Damage
	Walls Finishing	1,07%	30,00%	0,32%	Moderate Damage
4	**DOOR & WINDOW**				
	Frame	3,83%	35,00%	1,34%	Moderate Damage
	Doors	1,73%	35,00%	0,61%	Moderate Damage
	Windows	2,82%	70,00%	1,98%	Total Damage
	Ventilation	1,03%	70,00%	0,72%	Total Damage
	Locks	0,87%	35,00%	0,30%	Moderate Damage
	Finishing of Frames, Doors & Windows	0,19%	35,00%	0,07%	Moderate Damage
5	**CEILING**				
	Ceiling Frame	2,04%	35,00%	0,71%	Moderate Damage
	Ceiling Covering	2,21%	35,00%	0,77%	Moderate Damage
	Ceiling List	0,59%	50,00%	0,30%	Heavy Damage
	Ceiling Finishing	0,63%	80,00%	0,50%	Total Damage
6	**ROOFING**				
	Ceiling List	6,98%	50,00%	3,49%	Heavy Damage
	Roof Covering	3,12%	35,00%	1,09%	Moderate Damage
	Fascias & Gutters	1,01%	50,00%	0,51%	Heavy Damage
	Fascias Finishing	0,11%	80,00%	0,09%	Total Damage
7	**UTILITY**				
	Instalasi Listrik	1,48%	65,00%	0,96%	Heavy Damage
	Sanitary Installation	2,85%	65,00%	1,85%	Heavy Damage
	Percentage of Damage Level	100,00%		**60,19%**	

Results of Field Observation Analysis

a) Damage Type : **Heavy Damage**
b) Type of Treatment : **Heavy Rehabilitation**
c) Damage Level (%) : 60,19%

Figure 6 Damage Analysis Results for Scenario A (Old System)

CODE	BUILDING COMPONENTS	DAMAGE CONDITION	WEIGHTED SCORE
A	**STRUCTURAL**		
A.1	Foundation (Poer Plate) & Pile (Galam)	Heavy	9,73
A.2	Sloof	Heavy	4,42
A.3	Neut	Heavy	4,22
A.4	Column	Heavy	4,50
A.5	Beam	Heavy	3,91
A.6	Floor Plate	Very Heavy	3,66
A.7	Beam Ring	Heavy	2,05
A.8	Roof (Roof Frame & Purlins)	Heavy	1,87
B	**ARCHITECTURAL**		
B.1	Roof Covering	Moderate	1,63
B.2	Fascias & Gutters	Heavy	0,50
B.3	Outer Wall	Moderate	2,21
B.4	Interior Walls/Partitions	Very Heavy	2,22
B.5	Floor Covering	Very Heavy	2,55
B.6	Ceiling Frame & Covering	Moderate	1,61
B.7	Frame	Moderate	0,44
B.8	Doors	Moderate	0,96
B.9	Windows & Ventilation	Very Heavy	1,47
B.10	Ceiling Finishing	Heavy	1,08
B.11	Walls Finishing	Moderate	0,91
B.12	Finishing of Frames, Doors & Windows	Moderate	0,37
B.13	Locks	Moderate	0,33
C	**MECHANICAL**		
C.1	Fire Sistem	Component Missing	3,46
C.2	Water Pump	Heavy	0,82
C.3	Clean & Dirty Water Installation	Heavy	2,12
C.4	Sanitary Supplies	Heavy	1,65
D	**ELECTRICAL**		
D.1	Panel	Moderate	1,45
D.2	Electrical Installation System	Heavy	2,11
D.3	Lighting System	Heavy	1,28
D.4	Emergency Lighting	Component Missing	1,15
D.5	Alarm	Component Missing	1,44
E	**OUTDOOR SPATIAL PLANNING**		
E.1	Retaining Walls	Moderate	0,94
E.2	Drainegae Channel	Component Missing	1,82
E.3	Septic Tank	Moderate	0,64

Results of Field Observation Analysis

a) Damage Level (%) : **69,51**
b) Damage Type : **Total Damage**
c) Type of Treatment : **Total Rehabilitation**

Figure 7 Damage Analysis Results for Scenario B (New System)

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2. Identification of Missing Essential Components This is the most crucial finding. The manual system based on the RAB (Figure 6) failed to identify the absence of vital safety and functional components, because they were not listed on the cost-based form. In contrast, the prototype (Figure 7) designed from the validated components list, correctly recorded 100% defects with a status of "Component Missing" for the following essential items:
   a. C.1 Fire Systems (Contribution Weight: 3.46%)
   b. D.4 Emergency Lighting (Contribution Weight: 1.15%)
   c. D.5 Alarm (Contribution Weight: 1.44%)
   d. E.2 Drainegae Channel (Contribution Weight: 1.82%)

The total damage contribution of these missing vital components, totaling 7.87%, is the main reason why the AHP prototype's damage score is significantly higher. The new system proves methodologically more valid because it is able to assess buildings not only for visible physical damage but also for functional and safety deficiencies that the old system overlooked.

3.5. Post-Validation Prototype Refinement

Based on feedback from the results seminar and expert evaluation, a need was identified to incorporate supporting features to enhance safety aspects and information completeness. This development aims to mitigate the risk of sudden structural collapse and provide qualitative context for decision-makers. Two key features were added to the final prototype:

1. Pre-Assessment Safety Check Mechanism. This feature is designed as a logic gate at the beginning of the inspection process to prioritize occupant safety over mathematical damage scores. This mechanism works by detecting failure indications in main structural components before the detailed assessment is conducted. The applied system logic is as follows:
   a. Condition A (Critical): If the surveyor identifies "Damage to the main building structure indicating danger to space/building utilization" (e.g., extreme tilt, foundation failure, or wide structural cracks), the system automatically bypasses the AHP calculation and sets the building status directly to "Heavy Damage". This is implemented because such conditions require immediate action and detailed destructive or laboratory testing, without waiting for calculations of other components.
   b. Condition B (Non-Critical): If "Damage is identified but does not indicate immediate danger to utilization" the system permits the surveyor to proceed with the comprehensive damage assessment of all building components using the compiled AHP-based instrument.

   This addition ensures that the prototype is not only mathematically accurate but also responsive to emergency conditions in the field. The interface design for this safety identification feature is presented in Figure 8.

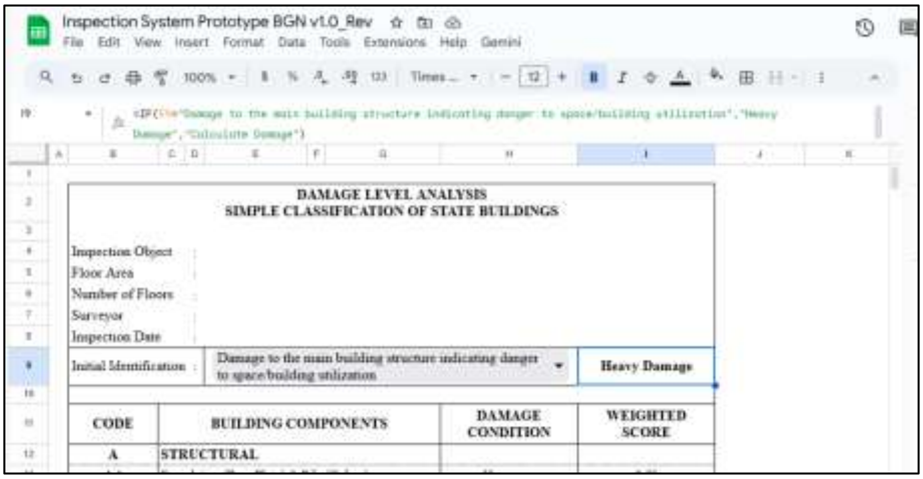

Figure 8 The user interface of the Pre-Assessment Safety Identification mechanism.

2. Surveyor Notes and Technical Recommendations Feature. While quantitative assessment using AHP provides objective scores, building condition assessment often requires qualitative context that cannot be fully captured by standardized dropdown menus. Therefore, a "Handling Recommendation Notes" feature was added at the end of the digital form. This feature serves as a platform for the surveyor's expert judgment to provide:
   a. Specific descriptions of damage anomalies found (e.g., damage caused by external factors such as standing water or tree roots).
   b. Initial technical recommendations regarding the type of repair needed (e.g., "Concrete injection required" or "Total roof replacement").

   The integration of quantitative data (AHP Score) and qualitative data (Surveyor Notes) produces a more holistic inspection report. This provides the Banjarmasin City DPUPR with a stronger foundation for drafting the Budget Plan (RAB) for subsequent repairs. The visualization of this additional recommendation column can be seen in Figure 9.

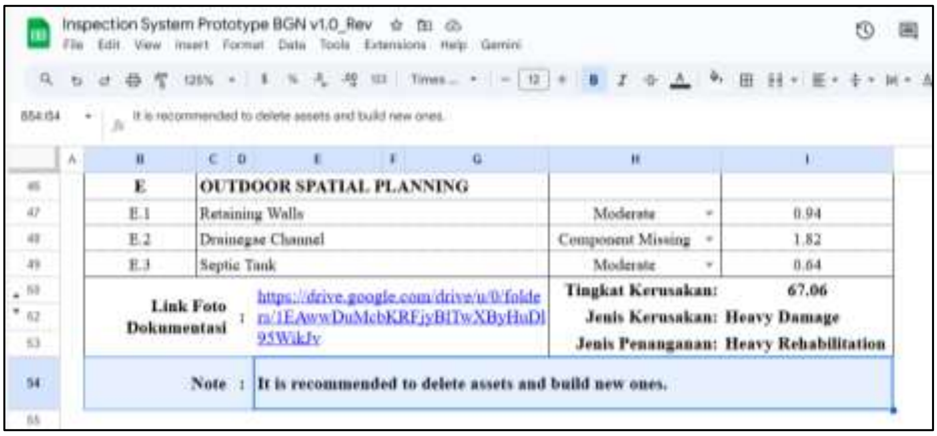

Figure 9 Integration of qualitative input fields for technical recommendations.

3.6. Final Digital Inspection Model

Based on the sequential stages of development, functional testing, field validation, and post-validation refinements, a comprehensive final model of the digital inspection system was produced. This final model represents a synthesis of the validated assessment instrument (based on 33 essential sub-components) and a digital architecture specifically designed to overcome the weaknesses of conventional systems.

The visualization of the main interface (dashboard) of the final model is presented in Figure 10. This interface integrates all standardized input features, data validation mechanisms, and safety logic gates into a single, ergonomic display for the user. Structurally, the final model possesses the following characteristics:

1. Logical Integrity: All AHP score and weight calculations operate in a locked background (backend), ensuring that assessment results are free from manual intervention or calculation errors.
2. Safety Responsiveness: The initial safety identification feature ensures that buildings with an immediate risk of structural failure are detected as high-priority cases.
3. Information Completeness: The dedicated surveyor notes column supplements quantitative data with qualitative field context.

The final output of this system is a Building Condition Report that is generated automatically and in real-time. An example of the final report layout, which is ready for printing or archiving, is shown in Figure 11. With this final configuration, the digital inspection system prototype is declared ready for implementation as a standard instrument for the routine maintenance of State-Owned Buildings within the Banjarmasin City DPUPR environment.

DAMAGE LEVEL ANALYSIS SIMPLE CLASSIFICATION OF STATE BUILDINGS			
Inspection Object :			
Floor Area :			
Number of Floors :			
Surveyor :			
Inspection Date :			
Initial Identification :	Empty		**Calculate Damage**
CODE	**BUILDING COMPONENTS**	**DAMAGE CONDITION**	**WEIGHTED SCORE**
A	**STRUCTURAL**		
A.1	Foundation (Poer Plate) & Pile (Galam)	Empty	0,00
A.2	Sloof	Empty	0,00
A.3	Neut	Empty	0,00
A.4	Column	Empty	0,00
A.5	Beam	Empty	0,00
A.6	Floor Plate	Empty	0,00
A.7	Beam Ring	Empty	0,00
A.8	Roof (Roof Frame & Purlins)	Empty	0,00
B	**ARCHITECTURAL**		
B.1	Roof Covering	Empty	0,00
B.2	Fascias & Gutters	Empty	0,00
B.3	Outer Wall	Empty	0,00
B.4	Interior Walls/Partitions	Empty	0,00
B.5	Floor Covering	Empty	0,00
B.6	Ceiling Frame & Covering	Empty	0,00
B.7	Frame	Empty	0,00
B.8	Doors	Empty	0,00
B.9	Windows & Ventilation	Empty	0,00
B.10	Ceiling Finishing	Empty	0,00
B.11	Walls Finishing	Empty	0,00
B.12	Finishing of Frames, Doors & Windows	Empty	0,00
B.13	Locks	Empty	0,00
C	**MECHANICAL**		
C.1	Fire Sistem	Empty	0,00
C.2	Water Pump	Empty	0,00
C.3	Clean & Dirty Water Installation	Empty	0,00
C.4	Sanitary Supplies	Empty	0,00
D	**ELECTRICAL**		
D.1	Panel	Empty	0,00
D.2	Electrical Installation System	Empty	0,00
D.3	Lighting System	Empty	0,00
D.4	Emergency Lighting	Empty	0,00
D.5	Alarm	Empty	0,00
E	**OUTDOOR SPATIAL PLANNING**		
E.1	Retaining Walls	Empty	0,00
E.2	Drainegae Channel	Empty	0,00
E.3	Septic Tank	Empty	0,00
Documentation Photo Link :	https://drive.google.com/drive/u/0/folders/1EAwwDuMcbKRFjyBlTwXByHuDl95WikJv	**Damage Level (%) :** **Damage Type :** **Type of Treatment :**	**0,00** **Minor Damage** **Light Rehabilitation**
Note :			

Figure 10 The main dashboard interface of the final digital inspection model.

DAMAGE LEVEL ANALYSIS SIMPLE CLASSIFICATION OF STATE BUILDINGS			
Inspection Object	: North Alalak 1 Elementary School		
Floor Area	: 270 m2		
Number of Floors	: 1 Floor		
Surveyor	: Ahmad Hardian M.		
Inspection Date	: 05 November 2025		
Initial Identification	: Damage is identified but does not indicate immediate danger to utilization		**Calculate Damage**
CODE	**BUILDING COMPONENTS**	**DAMAGE CONDITION**	**WEIGHTED SCORE**
A	**STRUCTURAL**		
A.1	Foundation (Poer Plate) & Pile (Galam)	Heavy	9,73
A.2	Sloof	Heavy	4,42
A.3	Neut	Heavy	4,22
A.4	Column	Heavy	4,50
A.5	Beam	Heavy	3,91
A.6	Floor Plate	Very Heavy	3,66
A.7	Beam Ring	Heavy	2,05
A.8	Roof (Roof Frame & Purlins)	Heavy	1,87
B	**ARCHITECTURAL**		
B.1	Roof Covering	Moderate	1,63
B.2	Fascias & Gutters	Heavy	0,50
B.3	Outer Wall	Moderate	2,21
B.4	Interior Walls/Partitions	Very Heavy	2,22
B.5	Floor Covering	Very Heavy	2,55
B.6	Ceiling Frame & Covering	Moderate	1,61
B.7	Frame	Moderate	0,44
B.8	Doors	Moderate	0,96
B.9	Windows & Ventilation	Very Heavy	1,47
B.10	Ceiling Finishing	Heavy	1,08
B.11	Walls Finishing	Moderate	0,91
B.12	Finishing of Frames, Doors & Windows	Moderate	0,37
B.13	Locks	Moderate	0,33
C	**MECHANICAL**		
C.1	Fire Sistem	Component Missing	3,46
C.2	Water Pump	Heavy	0,82
C.3	Clean & Dirty Water Installation	Heavy	2,12
C.4	Sanitary Supplies	Heavy	1,65
D	**ELECTRICAL**		
D.1	Panel	Moderate	1,45
D.2	Electrical Installation System	Heavy	2,11
D.3	Lighting System	Heavy	1,28
D.4	Emergency Lighting	Component Missing	1,15
D.5	Alarm	Component Missing	1,44
E	**OUTDOOR SPATIAL PLANNING**		
E.1	Retaining Walls	Moderate	0,94
E.2	Drainegae Channel	Component Missing	1,82
E.3	Septic Tank	Moderate	0,64
Documentation Photo Link	: https://drive.google.com/drive/u/0/folders/1EAwwDuMcbKRFjyBlTwXByHuDl95WikJv	**Damage Level (%) :** **Damage Type :** **Type of Treatment :**	**69,51** **Total Damage** **Total Rehabilitation**
Note	**: it is better to do asset write-off and new construction**		

Figure 11 The user interface of the Pre-Assessment Safety Identification mechanism.

4. Conclusions

This research successfully addresses its core objectives through a systematic development and validation process. First, it identified 5 main components and 33 essential sub-components significant for assessing simple-classification State-Owned Buildings (BGN), derived from literature synthesis and expert validation using the Cut-Off Point (COP) method, with specific adjustments for local wetland characteristics. Second, a quantitative weighting model established through the Analytic Hierarchy Process (AHP) prioritized the Structural component at 48.16%, followed by Architectural (26.51%), Electrical (10.34%), Mechanical (10.01%), and Exterior Layout (4.98%), effectively replacing the cost-biased legacy system. Finally, the field-validated digital inspection prototype proved to be 15.38% more time-efficient by eliminating manual bottlenecks and more accurate, yielding a damage score of 69.51% (Total Rehabilitation) compared to the manual system's 60.19% (Heavy Rehabilitation). Furthermore, the integration of a Pre-Assessment Safety Check and digital audit trails ensures a higher standard of structural failure detection and data integrity for the Banjarmasin City DPUPR.

This research successfully developed and validated a new digital inspection model that demonstrably overcomes the fundamental methodological and process weaknesses of the existing system at Banjarmasin City DPUPR.

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