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Article

Evaluating the role of consultants in assessing functional feasibility and reliability of buildings: A case study in Banda Aceh

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Abstract: The assessment of building reliability is a critical aspect of the functional feasibility system, as outlined in the 1998 Technical Instructions of the Directorate General of Human Settlements. These assessments typically encompass architectural, structural, and utility criteria. This research aims to understand the role of consultants in evaluating the functional feasibility of buildings in Banda Aceh. Purposive sampling was employed with 11 respondents, considering factors such as education, legal, and technical expertise. Data analysis involved factor analysis using the KMO-MSA method and descriptive analysis using SPSS software. The results reveal that consultants play a crucial role in assessing the functional feasibility of buildings, particularly in terms of skill competency, integrity, and professionalism, with a significant emphasis on the suitability of the function and specifications of the requested buildings. Moreover, the legal factor variable emerges as pivotal in consultants' activities, ensuring compliance with statutory regulations. This study underscores the importance of consultants in ensuring building reliability and adherence to stipulated provisions.

Keywords: consultants; functional feasibility; building reliability; factor analysis; statutory regulations; building assessment

1. Introduction

The issue of post-construction building reliability has garnered significant attention worldwide, considering its paramount importance for completed structures intended for use [1]. Building reliability encompasses various essential aspects mandated by building regulations, such as the Building Law [2], which includes requirements related to physical strength, comfort, utility, and accessibility. Architects in different countries employ diverse methods to conduct reliability testing on buildings, reflecting the global concern for ensuring structural integrity and safety [3].

In Indonesia, building reliability assessments are governed by national regulations. According to the 1998 Directorate General of Human Settlements Technical Instructions [2], reliability assessments are categorized into architectural, structural, and utility criteria. Despite these technical guidelines providing a basis for categorizing buildings as reliable, less reliable, or unreliable, there is a notable gap. The guidelines do not offer a formula for concluding the overall reliability value of a building based on the results of each group's examination [4].

Administrative legal regulations concerning building reliability in Indonesia are

part of the mandate of Law [2]. This law requires the fulfillment of several components: a Building Construction Permit (IMB), a Functional Feasibility Certificate (SLF), the involvement of a building expert team (TABG), and comprehensive building data collection. Building reliability testing is an integral part of these processes. Technically, such testing ensures that the building structure can handle various loads, both planned and unexpected, and withstand environmental hazards such as landslides, water intrusion, earthquakes, strong winds, and tsunamis [5].

While previous studies have explored various aspects of building reliability, there is a significant research gap in understanding the specific role of consultants in this process. This study aims to fill that gap by focusing on the indicators of consultants' roles in functional feasibility testing activities and evaluating their contributions in the context of Banda Aceh. The research addresses two main questions: What are the indicators of the consultant's role in testing the functional feasibility of buildings in Banda Aceh? What is the role of consultants in these testing activities?

The study reviewed buildings that have been functioning for at least one year and involved consultants engaged in development projects in Banda Aceh. The assessment focused on identifying indicators of the consultant's role in functional feasibility testing activities. Purposive sampling was used to select respondents, and the questionnaire was distributed exclusively to consultants. Factors considered in this research include educational, legal, and technical aspects.

This research aims to determine the indicators of the consultant's role in testing the functional feasibility of buildings in Banda Aceh and to evaluate their role in these testing activities. By addressing this research gap, the study seeks to provide a clearer understanding of how consultants contribute to ensuring the reliability and functional appropriateness of buildings, thereby enhancing the overall quality and safety of building infrastructure in Banda Aceh.

2. Literature review

Building construction is a building that is used as a public facility, for example, institutional buildings, education, light industry such as warehouses, commercial buildings, social and recreational areas [6]. The types of buildings in this construction include office buildings, shopping centers, apartments/flats, and schools. Building construction is usually planned by architects and civil engineers, while the materials required are more emphasized on architectural aspects [7].

A consultant is a person or legal entity appointed by a service user who has expertise and experience in building construction projects [8]. Consultants provide advisory services (consultancy services) in certain areas of expertise. So, in providing services, consultants will provide analysis or studies, opinions, or opinions according to their expertise to be decided by the project owner [9].

Project management consultants are a work team that has expertise in managing project management and is tasked with monitoring, controlling, and being involved in the project process [8]. It is hoped that it will be able to overcome and anticipate problems in a development project.

Building feasibility is the condition of a building that must meet predetermined requirements, in this case determined by the government [9]. Building feasibility is a measure of whether the building can be used safely and comfortably or not [10]. Building feasibility is necessary for building maintenance [11].

The legal basis for the functional fitness of a building can vary depending on the legal jurisdiction of a particular country or region [12]. Below are several general legal bases that are often used to determine the functional suitability of buildings.

a) Legal basis for building reliability inspection
   - Law no. 28 of 2002, concerning Buildings [2].
   - Minister of Public Works Regulation no. 29/PRT/M/2006 concerning Guidelines for Technical Building Requirements [13].
   - Government Regulation no. 36 of 2005, concerning Implementing Regulations of Law no. 28/2002 [14].

b) Legal basis for accessibility for persons with disabilities
   - Government Regulation no. 30/PRT/M/2006 concerning Technical Guidelines for Facilities and Accessibility in Buildings and the Environment [15].

c) Legal basis for fire safety
   - Decree of the Minister of Public Works No. 10/KPTS/2000 concerning Technical Provisions for Safeguarding against Fire Hazards in Buildings and the Environment [16].
   - Decree of the Minister of Public Works No. 11/KPTS/2000 concerning Technical Provisions for Fire Management in the City [17].
   - Decree of the Director General of Housing and Settlements regarding Technical Instructions for Fire Emergency Action Plans in Buildings.
   - Minister of Public Works Regulation no. 26/PRT/M/2008 concerning Technical Requirements for Fire Protection Systems in Buildings and the Environment [18].

d) Legal basis regarding licensing and certification requirements
   - Minister of Public Works Regulation no. 25/PRT/M/2007 concerning Guidelines for Certification of Building Functionality [19].
   - Minister of Public Works Regulation no. 24/PRT/M/2007 concerning Technical Guidelines for Building Construction Permits [20].
   - Minister of Public Works Regulation no. 26/PRT/M/2007 concerning Guidelines for Building Expert Teams [21].
   - Minister of Public Works Regulation no. 24/PRT/M/2008 concerning Building Maintenance and Maintenance Guidelines [22].
   - Minister of Public Works Regulation no. 29/PRT/M/2006 concerning Guidelines for Technical Building Requirements [13].
   - Minister of Public Works Regulation no. 16/PRT/M/2010 concerning Technical Guidelines for Periodic Building Inspections [23].

Harisun [10] conducted a study on the certification system for building functionality in Ternate City, North Maluku Province. The research explores the correlation between understanding building functionality certification and the perceived impact of mandatory building functionality certification. Through analysis using the SPSS program, a positive and significant correlation was found. Increased

understanding of Ministerial Regulation No. 25/PRT/M/2007 regarding building functionality certification guidelines leads to greater compliance among the community and construction service providers. The influence of understanding building functionality certification is calculated at 17.98%, with the remaining 82.02% influenced by other unexamined factors.

Furthermore, Rasyid [24] conducted an analysis of building functionality in vertical residential buildings: A case study of the Rusunawa Building in Sleman Regency, Yogyakarta, in 2015. The research findings indicate a significant correlation between the level of building functionality and the satisfaction level of vertical residential building occupants.

Lutfi and Syaifullah [11] analyzed the feasibility of building market buildings in Suka Sari, Bogor, through a building approach in 2020. The Sukasari Market Building was constructed in 1987 and completed in 1990 by the Bogor City Government. The Sukasari Market Building stands on a land area of 1936 m^2 with a building area of 2560 m^2, accommodating 225 merchant stalls. This building serves as one of the infrastructure landmarks in Bogor City, utilized as a trading hub for various services and necessities for the local community.

3. Methodology

Research methods are steps that are owned and carried out by researchers in order to collect information or data and carry out investigations on the data that has been obtained [25]. The research methodology employed in this study aims to provide a clear understanding of the research design, data collection procedures, and data analysis techniques utilized. A questionnaire served as the primary data collection tool, employing a survey method to gather respondents' opinions. The collected questionnaire data were meticulously entered into SPSS version 25 software, assigning predetermined codes to facilitate the subsequent data analysis process.

The study acknowledges the limitation of the small sample size, with only 11 respondents, which may impact the generalizability and realism of the results. Despite this limitation, the findings offer valuable preliminary insights into the role of consultants in assessing the functional feasibility of buildings in Banda Aceh. Future research with a larger sample size is recommended to validate and expand upon these findings.

The data processing phase involved statistical analysis, including factor analysis and descriptive analysis. Factor analysis began with formulating the research problem and identifying the original variables slated for analysis. Subsequently, a correlation matrix was established to examine the relationships among variables. Then selected a factor analysis method and determined the number of factors to be extracted from the numerous variables. Following factor analysis, descriptive analysis was conducted to provide further insights into the data.

Overall, the research methodology encompassed the systematic tabulation and recapitulation of questionnaire responses, followed by rigorous statistical analysis through factor analysis and descriptive analysis techniques. This comprehensive approach ensured a robust investigation into the role of consultants in assessing the

functional feasibility of buildings in Banda Aceh.

4. Results and discussions

The characteristics of the respondents in this research were consultants involved in building construction in Banda Aceh, with a total of 11 respondents. The characteristics of these respondents can be grouped based on gender, age, highest level of education and length of work. The distribution of characteristic percentages will be shown in **Figure 1**.

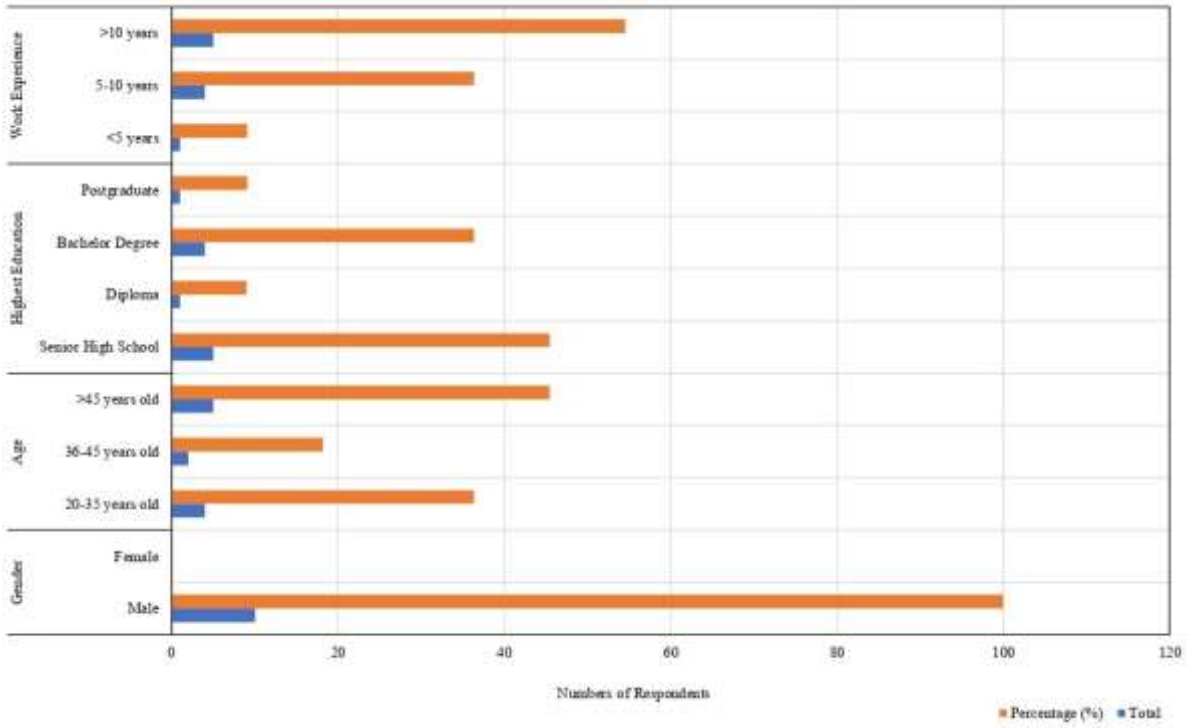

Figure 1. Respondent characteristics.

In factor analysis there are several variables that will be analyzed, so that the suitability of each variable is known, whether it can be processed further using this analysis or not. **Table 1** follows for educational (*X*1), legal (*X*2), and technical (*X*3) variables.

Table 1. KMO and Bartletts's test variable *X*.

KMO and Barlett's test		**Variable**		
		***X*1**	***X*2**	***X*3**
Kaiser-Meyer-Olkin measure of sampling adequacy		0.464	0.635	0.399
Barlett's test of sphericity	Approx. chi-square	20.007	41.911	31.880
	df	15	15	15
	Sig.	0.172	0.000	0.007

Based on the output above for the variable (*X*1) education, it is known that the KMO MSA value is 0.464 < 0.50 with the condition (KMO MSA > 0.50) and the Bartlett's test of Sphericity (Sig.) value is 0.172 > 0.050 with the condition (Sig. <

0.05), then the factor analysis in this study was declared invalid and unreliable.

Then for the legal variable (*X*2) it is known that the KMO MSA value is 0.635 > 0.50 with the condition (KMO MSA > 0.50) and the Bartlett's Test of Sphericity (Sig.) value is 0.000 < 0.050 with the condition (Sig. < 0.05), then the factor analysis in this research was declared valid and reliable.

Furthermore, for the technical variable (*X*3) it is known that the KMO MSA value is 0.399 < 0.50 with the condition (KMO MSA > 0.50) and the Bartlett's Test of Sphericity (Sig.) value is 0.007 > 0.050 with the condition (Sig. < 0.05), then the factor analysis in this research was declared invalid and unreliable.

Descriptive analysis is used to determine the frequency of measuring answers to questionnaires in explaining problem solving, based on data from respondents' results. Descriptive analysis is used to present certain characteristics of data from a particular sample. With the help of the SPSS program, the mean value is obtained, which means the average. The results of the descriptive analysis can be seen in the **Table 2**.

Table 2. Descriptive analysis.

Variable	Indicator	Mean
*X*1.1	Technical review experts must have a minimum of a Bachelor's Degree in Architecture, Structure and Mechanical, Electrical and Plumbing	2.45
*X*1.2	Has a certificate from the Association of Experts from the Construction Services Development Institute (LPJK)	1.82
*X*1.3	Have a Building Engineering Implementation Permit issued by the local government	2.55
*X*1.4	Have a Business Entity Certificate that is suitable for carrying out functional feasibility studies	2.09
*X*1.5	Has attended various seminars and workshops on building reliability issues	1.64
*X*1.6	Have experience as a construction planner/management for more than 3 years	2.09
*X*2.1	Validate suitability of planning with ABD (As Built Drawing)	2.45
*X*2.2	Validate conformity of ABD with existing	2.55
*X*2.3	Validation of laboratory test results	1.91
*X*2.4	Validation of test inspection results	2.27
*X*2.5	Validation of official memoranda and inspection minutes to stakeholders	2.45
*X*2.6	Validation of the recommendation for the application for the publication of functional eligibility	2.82
*X*3.1	Verify the building area, green, height and borders	1.82
*X*3.2	Field tests related to strength (structure) and soundness	2.27
*X*3.3	Verify the volume requirements required by the agency	2.00
*X*3.4	Observing the suitability of the function and specifications of the requested building	2.91
*X*3.5	Verify the specifications of the materials used in the building	2.36
*X*3.6	Verify Department recommendations for mechanical/electrical elements	2.55

Based on the overall mean value obtained in **Table 2**, the lowest is indicator *X*1.5 (Has attended various seminars and workshops on building reliability issues), namely with a mean value of 1.64. This shows that the majority of respondents stated that the *X*1.5 indicator had a low frequency regarding the role of consultants in testing activities for the functional feasibility of buildings in Banda Aceh. Meanwhile, indicator *X*3.4 (Observation of suitability of function and specifications of the requested building) has a mean value of 2.91. This shows that the majority of

respondents stated that indicator *X*3.4 has a high frequency of the role of consultants in testing activities for the functional feasibility of buildings in Banda Aceh.

Consequently, based on the results of factor analysis and utilizing the Kaiser-Mayer-Olkin Measure of Sampling Adequacy (KMO MSA) method, it is evident that the factor variable for the role of consultants in testing activities for the functional feasibility of buildings primarily comprises the legal factor variable (*X*2). Moreover, the indicators of the role of consultants in testing activities for the appropriateness of building functions in Banda Aceh predominantly align with indicator *X*3.4 (Observation of suitability of the function and specifications of the requested building). In this context, the consultant's role encompasses legal aspects pertaining to skill competency, as well as behavioral aspects related to integrity and professionalism in executing their duties. Furthermore, the researchers have delineated the role of consultants in testing the functional feasibility of buildings, while a technical review team conducts inspections focusing on two fundamental aspects: the reliability of buildings through architectural, structural, and electrical mechanical examinations of existing buildings. It is imperative to note that the activity of testing the functional feasibility of a building serves as a fulfillment of obligations under statutory regulations. Consequently, consultants play a crucial role in verifying the suitability of functional test results in accordance with the provisions stipulated in regional regulations.

5. Conclusions and recommendations

One limitation of this study is the small sample size, with only 11 respondents participating. This limited questionnaire distribution may result in findings that are not entirely representative or realistic. Future research should aim to include a larger and more diverse sample to improve the reliability and generalizability of the results. By addressing the identified research gap, this study seeks to provide a clearer understanding of how consultants contribute to ensuring the reliability and functional appropriateness of buildings. The findings suggest that consultants play a critical role in verifying the conformity of functional test outcomes with prescribed legal standards, thereby enhancing the overall quality and safety of building infrastructure in Banda Aceh.

From the results of data collection and analysis, several conclusions emerge. Firstly, the descriptive analysis reveals that indicator "Observation of suitability of the function and specifications of the requested building", focusing on the observation of the suitability of the function and specifications of the requested building, exhibits the highest mean value of 2.91. This indicates a significant emphasis placed on this particular aspect. Secondly, the KMO-MSA results validate the Legal variable, affirming its reliability and validity. Consequently, it can be inferred that consultants' roles in testing the feasibility of building functions in Banda Aceh encompass legal aspects, including their proficiency and competency, as well as behaviors reflecting integrity and professionalism. Notably, testing the functional feasibility of buildings aligns with obligations stipulated in statutory regulations, underscoring consultants' responsibility to ensure compliance with regional provisions during this process. Thus, consultants play a crucial role in

verifying the conformity of functional test outcomes with prescribed legal standards, thereby contributing to the integrity and reliability of building assessments in the city.

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