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Factors Affecting Project Owners' Commitment to Implement Green Building Principles in the South Kalimantan Province of Indonesia

Jovan Neil Kelvin[1], Aqli Mursadin[2]

[1,2]Construction Management Master of Civil Engineering Study Program, Faculty of Engineering, Lambung Mangkurat University, South Kalimantan, Indonesia

Corresponding Author: Jovan Neil Kelvin

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ABSTRACT

The construction of green buildings faces various challenges, including high costs, extended implementation timelines, and numerous requirements that must be satisfied. This study aims to analyze the factors influencing the implementation of green buildings. The research focuses on the PUPR Office in South Kalimantan Province, as well as planning consultants, construction management personnel, and contractors involved in the construction projects of the South Kalimantan Sports Hall and the Sheikh Muhammad Arsyad Al-Banjari Mosque in South Kalimantan Province. Key factors affecting the implementation of green buildings include financial commitment, energy savings, and the utilization of environmentally friendly materials. These factors encompass several variables: additional fund allocation for green buildings, the skills and experience of designers, the integration of natural and artificial lighting, energy-saving planning, the application of prefabrication technology and flatpack design, the use of sustainable materials, the incorporation of local wisdom, and strategies for light efficiency and outsourcing that involve gain sharing.

Keywords: *Building Construction, Building Energy Performance, Energy, Green Building, Green Construction*

INTRODUCTION

Development invariably generates negative impacts, notably in the form of construction waste, which increases in proportion to the number of ongoing projects. One effective strategy to mitigate this impact is the implementation of the Green Building (GBH) concept. According to the Regulation of the Minister of Public Works and Public Housing No. 21 of 2021, a Green Building is defined as a structure that meets technical standards and is capable of conserving energy, water, and other resources through the application of sustainability principles. The adoption of this concept is crucial for maintaining a balance between development and environmental preservation.

In Indonesia, the popularity of green buildings has surged in recent years. Rapid urbanization and economic growth have heightened awareness of environmental issues. Agyekum et al. (2020) noted that both the public and private sectors are increasingly encouraged to embrace sustainable building practices to minimize construction waste. Sujatmiko et al. (2020) further emphasized that green buildings represent a significant contribution from the construction sector toward environmental protection. This shift is supported by government policies that delineate two categories of green buildings: mandatory and recommended.

The construction of green buildings faces various challenges, including high costs, extended implementation timelines, and numerous regulatory requirements. Nevertheless, these challenges are not insurmountable. The initial high costs can be offset by long-term savings derived from enhanced energy efficiency, reduced waste, and other environmental benefits. Additionally, low public awareness regarding the significance of green buildings poses a substantial barrier to their adoption. Therefore, educational initiatives highlighting the advantages of green buildings are essential to promote broader acceptance and implementation.

The Indonesian government is actively supporting the implementation of green buildings through the establishment of policies, incentives, and development of standards. Incentives such as tax breaks and low-interest loans are strategic measures designed to attract developers and investors toward sustainable development. As more green building projects are initiated, the long-term benefits—including improved occupant health, reduced energy costs, and diminished greenhouse gas emissions—are becoming increasingly evident.

In South Kalimantan, several initiatives have been undertaken to apply the Green Building concept, including the submission of Greenship certification for the Banjarmasin Customs Office building. However, similar plans for the Sheikh Muhammad Arsyad Al-Banjari Mosque and the South Kalimantan Sports Hall were canceled due to cost constraints, extended timelines, and stringent requirements. Despite this, the province is beginning to demonstrate a growing interest in green building practices.

The challenges associated with implementing green buildings can be addressed through appropriate solutions, including heightened awareness of the environmental and economic advantages of this approach. The purpose of this study is to analyze the factors influencing the successful implementation of green buildings.

MATERIALS & METHODS

The research includes the PUPR Service in South Kalimantan Province, planning consultants, construction management and contractors related to the construction project of the South Kalimantan GOR and the Sheikh Muhammad Arsyad Al-Banjari Mosque in South Kalimantan Province.

Data Analysis

Data processing is to identify the most significant influences and factors in the implementation of green buildings on owner decisions in South Kalimantan Province.

RESULT

Respondents' perceptions regarding the influence of green building implementation factors on the commitment of job owners in South Kalimantan Province as a whole. The following are the mean and standard deviation (SD) values processed by researchers based on data from respondents.

Table 1. Mean, median and standard deviation values of data

QA	Description	MEAN	MEDIAN	STDEV
Q1	Scheduling of each stage of construction activities	4.21	4	0.94
Q2	Periodic monitoring and evaluation of performance	2.57	2	0.86
Q3	Storage warehouse for materials	2.83	3	0.79
Q4	Permit for the proper functioning of heavy equipment	2.86	3	0.84
Q5	Recycling of construction waste materials	3.71	4	0.81
Q6	Utilization of rainwater	2.68	3	0.75
Q7	Heavy equipment operator certificates	2.66	2	0.90
Q8	3R principle approach	3.34	3	1.16
Q9	Provision of PPE	1.66	1	0.81

Q10	Provision of first aid equipment	3.31	3	1.03
Q11	Health insurance	3.62	3	1.00
Q12	Implementation of environmentally friendly behavior (conservation of water, energy, other resources) for workers	3.52	3	0.96
Q13	Use of energy-saving equipment	2.99	3	0.88
Q14	Environmentally friendly materials	3.25	3	1.10
Q15	Local material suppliers	3.02	3	1.00
Q16	Location for obtaining heavy equipment/materials	2.3	2	0.59
Q17	Scheduling of each stage of construction activities	2.91	3	0.83
Q18	Periodic monitoring and evaluation of performance	3.8	4	0.88
Q19	Storage warehouse for materials	3.07	3	0.99

Validity Test

The distribution of questionnaires, complemented by interviews, was conducted with relevant stakeholder elements, including contractors, consultants, green building (BGH) experts, and representatives from the PUPR Office of South Kalimantan Province. Validity testing is a crucial aspect of research, ensuring that the instruments used accurately measure the intended constructs. In the context of this study, it is essential to assess the validity of the instrument designed to identify the factors influencing green building implementation on the commitment of project owners in South Kalimantan Province. Validity testing will confirm that each question and indicator within the survey instrument effectively represents the concept being studied, thereby ensuring the reliability of the data collected for further analysis.

This study involved a total of 100 respondents, comprising various stakeholders in the construction industry, including consultants, contractors, experts, and representatives from the PUPR Office of South Kalimantan Province. The diversity of these respondents not only provides a comprehensive perspective but also aids in evaluating the external validity of the research instrument. By involving multiple parties with different roles in the implementation of green buildings, it is anticipated that rich and in-depth data can be gathered regarding project owners' commitment to the principles of green building.

With established validity, the results of this study are expected to provide an accurate and comprehensive understanding of the relationship between green building implementation and project owner commitment in South Kalimantan Province. Furthermore, the findings can serve as a valuable reference for future studies seeking to explore the implementation of green buildings and their impacts in various contexts.

According to Noor (2020), the validity level of each questionnaire item is determined by the p-value, where a p-value < 0.05 indicates that the data is considered valid, while a p-value > 0.05 suggests that the data is invalid. The results of the validity test are presented in Table 2.

Table 2. Validity Test Output

Indicator	Critical value	Description
Q1	0.001	VALID
Q4	0.029	VALID
Q7	0.021	VALID
Q8	0.000	VALID
Q9	0.000	VALID
Q10	0.011	VALID
Q11	0.000	VALID
Q12	0.000	VALID
Q13	0.001	VALID
Q14	0.000	VALID

Q15	0.009	VALID
Q17	0.003	VALID
Q18	0.000	VALID
Q19	0.001	VALID

Reliability Test

Reliability is an important aspect in research to ensure the consistency and stability of the instruments used in collecting data. In this study, a reliability test was conducted to assess the extent to which the instruments used can provide consistent results when used on different groups of respondents at different times. This study aims to identify the influence of green building implementation factors on the commitment of job owners in South Kalimantan Province. In Noor (2020) it is stated that if the reliability value is <0.6 then the data is not good, but if the reliability value is ≥ 0.7 then the data is considered good. The Cronbach's alpha value can be seen in Table 3 below.

Table 3. Reliability Test Output

Variable	*Cronbach's alpha*	Limit α	Description
Q1	0.700	0.7	reliable
Q4	0.713	0.7	reliable
Q7	**0.651**	**0.7**	unreliable
Q8	**0.694**	**0.7**	unreliable
Q9	0.703	0.7	reliable
Q10	0.711	0.7	reliable
Q11	**0.694**	**0.7**	unreliable
Q12	**0.694**	**0.7**	unreliable
Q13	0.704	0.7	reliable
Q14	0.700	0.7	reliable
Q15	0.710	0.7	reliable
Q17	0.707	0.7	unreliable
Q18	0.614	0.7	Reliable
Q19	0.700	0.7	reliable

Based on the results of the reliability test, it was found that Q7, Q8, Q11 and Q12 are unreliable variables and cannot be used as data references. Coding details for the reliability test using Rstudio can be seen on the attachment page. After elimination, a new reliability table was obtained. The new table can be shown in Table 4.

Table 4. New Reliability Test Output

variable	*Cronbach's alpha*	Limit α	Description
Q1	0.730	0.7	Reliable
Q4	0.740	0.7	Reliable
Q9	0.740	0.7	Reliable
Q10	0.720	0.7	Reliable
Q13	0.720	0.7	Reliable
Q14	0.720	0.7	Reliable
Q15	0.740	0.7	Reliable
Q17	0.740	0.7	Reliable
Q19	0.720	0.7	Reliable

Total Item Association Test

Item-total association analysis is one of the important methods in research to evaluate the quality and internal consistency of measurement instruments. This method is used to determine the extent to which each item in the instrument contributes to the total score obtained. By analyzing the relationship between the score of each item and the total score, researchers can identify items that may be inappropriate or less representative in measuring the desired data. In the context of this study, item-total association analysis will help ensure that all items in the instrument used to measure the influence of green building implementation factors on the commitment of job owners in South Kalimantan Province have high validity and reliability. The results of the item-total association test can be seen in Table 5 below.

Table 5. Total Item Association Test Output

Variable	Description	p-value
Q1	Scheduling each stage of construction activities	1.79×10^{-4}
Q2	Periodic performance monitoring and evaluation	1.14×10^{-2}*
Q3	Material storage warehouse	2.19×10^{-3}*
Q4	Heavy equipment functional suitability permit	1.61×10^{-2}
Q5	Recycling of construction waste materials	7.25×10^{-3}*
Q6	Utilization of rainwater	2.73×10^{-6}*
Q7	Heavy equipment operator certificate	5.77×10^{-6}*
Q8	3R principle approach	2.90×10^{-4}*
Q9	Provision of PPE	1.12×10^{-4}
Q10	Provision of first aid equipment	1.38×10^{-4}
Q11	Health insurance	2.83×10^{-4}*
Q12	Implementation of environmentally friendly behavior (conservation of water, energy, other resources) for workers	3.89×10^{-6}*
Q13	Use of energy-saving equipment	9.75×10^{-5}
Q14	Environmentally friendly materials	1.85×10^{-1}
Q15	Local material suppliers	8.96×10^{-4}
Q16	Location of heavy equipment/material acquisition	5.70×10^{-4}*
Q17	Scheduling each stage of construction activities	4.78×10^{-3}
Q18	Periodic performance monitoring and evaluation	8.32×10^{-3}*
Q19	Material storage warehouse	1.35×10^{-2}

Based on the Total Item Association test, in accordance with the validity and reliability tests, Q2, Q3, Q5, Q6, Q7, Q8, Q11, Q12, Q16, and Q19 are variables that may not be appropriate or less representative in measuring the desired construct.

Proportional Analysis

The proportional test is a statistical method used to test a hypothesis about the proportion of a population based on a sample taken from that population. This process begins by formulating the null hypothesis (H0), which states that the proportion of the population is equal to a certain value, and the alternative hypothesis (Ha), which states that the proportion of the population is not equal to that value, can be greater or less depending on the type of test conducted (two-tailed or one-tailed). After that, the level of significance (alpha) is determined, which usually ranges from 0.01 to 0.05.

The data collected must be a random sample of the population being studied. For example, if we want to know the proportion of students who pass an exam, we take a random sample of students and record whether they pass or not. The test statistic used is the normal distribution or z distribution, where (p0) is the hypothesized population proportion, and (n) is the sample size.

The next step is to determine the critical region based on the level of significance and the type of test conducted, which involves using the z-distribution table to determine the critical value. Finally, the decision is made by comparing the value of the test statistic with the critical value. If the value of the test statistic falls into the critical region, the null hypothesis is rejected; otherwise, the null hypothesis fails to be rejected. For example, if we test whether the proportion of students who pass an exam is more than 70% with a sample of 100 students and find that 75 students pass, we will calculate the z-score and compare it to the critical value. If the z-score is less than the critical value, we do not have enough evidence to reject the null hypothesis and conclude that the proportion who pass is not more than 70%. This proportionality test provides an important tool in making data-based decisions about hypothesized population proportions. Based on the results of the validity and reliability test, it was found that Q2, Q3, Q5, Q6, and Q16 were invalid while Q8, Q12, and Q13 were not reliable. Of the 19 questions, 10 questions were declared valid and reliable and could be continued for analysis. These questions are described in Table 6 below.

Table 6. Variable Elimination Output

Variable	Description	p-value
Q1	Scheduling of each stage of construction activities	1.79×10^{-4}
Q2	Periodic monitoring and evaluation of performance	1.14×10^{-2}*
Q3	Storage warehouse for materials	2.19×10^{-3}*
Q4	Permit for the proper functioning of heavy equipment	1.61×10^{-2}
Q5	Recycling of construction waste materials	7.25×10^{-3}*
Q6	Utilization of rainwater	2.73×10^{-6}*
Q7	Heavy equipment operator certificates	5.77×10^{-6}*
Q8	3R principle approach	2.90×10^{-4}*
Q9	Provision of PPE	1.12×10^{-4}
Q10	Provision of first aid equipment	1.38×10^{-4}
Q11	Health insurance	2.83×10^{-4}*
Q12	Implementation of environmentally friendly behavior (conservation of water, energy, other resources) for workers	3.89×10^{-6}*
Q13	Use of energy-saving equipment	9.75×10^{-5}
Q14	Environmentally friendly materials	1.85×10^{-1}
Q15	Local material suppliers	8.96×10^{-4}
Q16	Location for obtaining heavy equipment/materials	5.70×10^{-4}*
Q17	Scheduling of each stage of construction activities	4.78×10^{-3}
Q18	Periodic monitoring and evaluation of performance	8.32×10^{-3}*
Q19	Storage warehouse for materials	1.35×10^{-2}

After determining the variables that are now valid and reliable, a proportion test is carried out to determine whether the following variables have significant values that are in accordance with the hypothesis. The proportion test is carried out with the help of the R Studio application. The test results can be shown in Table 7.

Table 7. Proportion Test Output

Var	Est	2.50%	97.50%	p-value
Q1	0.930	0.870	1.000	0.000
Q4	0.600	0.513	1.000	0.029
Q9	0.210	0.147	1.000	1.000
Q10	0.740	0.657	1.000	0.000
Q13	0.670	0.684	1.000	0.000
Q14	0.750	0.668	1.000	0.000
Q15	0.650	0.563	1.000	0.002
Q17	0.690	0.605	1.000	0.000
Q19	0.700	0.615	1.000	0.000

In this study, the following research hypotheses are used:
H0: Mo = 2;
H1: Mo > 2

Based on the results of the analysis presented and the research hypothesis used, we can test whether certain variables meet the standard with a value of 3 and above.

The null hypothesis (H0) states that the variable does not meet the standard, namely a value of 3 and below, while the alternative hypothesis (H1) states that the variable meets the standard with a value of 3 and above. This can be seen from the p-value Where if the p-value of the variable is above 0.05 then the variable accepts H0 but if the p-value of the variable is below 0.05 it means that the variable rejects H0. The results of the hypothesis can be seen in Table 8.

Table 8. Proportion Test Output

var	p-val	H0
Q1	0.000	Not Accepted
Q4	0.029	Not Accepted
Q9	**1.000**	**Accepted**
Q10	0.000	Not Accepted
Q13	0.000	Not Accepted
Q14	0.000	Not Accepted
Q15	0.002	Not Accepted
Q17	0.000	Not Accepted
Q19	0.000	Not Accepted

The results of the analysis show the estimated value (Est) for each variable along with the 95% confidence interval (2.5% - 97.5%) and p-value (p-val). The (*) sign indicates a variable that passes the test, namely rejecting the H0 hypothesis. The following is the interpretation of the analysis results:

Owner, User Commitment Factors

Based on the results of the proportion test, it can be concluded that there is a consensus among respondents regarding the significant influence of this factor on the decision to implement green buildings. More than half of the respondents gave a positive assessment (above a scale of 2), indicating that the factor is considered relevant and important in decision-making considerations. The proportion test analysis shows that the majority of respondents (more than 50%) gave an assessment above a scale of 2, indicating agreement that this factor, more precisely the variable Commitment to allocate additional funds for green building work, has a significant influence on the decision-making process in implementing the green building concept. The estimated value is 0.930 with a confidence interval of 0.870 to 1,000 and a p-value of 9.48 x 10-18. Because there is a sign (*), this indicates that Q1 meets the standard with a value of 3 and above. This shows that Based on the results of calculating the mean and median values of the given variable data, we can conclude whether these variables meet the set standards, namely more than 50% of the population gave a value of 3 and above. This shows that this variable consistently meets the standards. Variable Q1, namely Commitment to allocate additional funds for green building works, which is related to the commitment to allocate additional funds for green building works, has a mean value of 4.21 and a median of 4. This shows that this financial commitment is considered the most significant and consistently important by owners in their decision to build a green building.

Condition of the construction industry in South Kalimantan

Based on the results of the proportion test, it can be concluded that there is a consensus among respondents regarding the significant influence of this factor on the decision to implement green buildings. More than half of the respondents gave a positive assessment (above a scale of 2), indicating that the factor is considered relevant and important in decision-making considerations. The proportion test analysis shows that the majority of respondents (more than 50%) gave an assessment above a scale of 2, indicating agreement that this factor, more precisely the variable of the designer's ability and experience in designing green buildings, has a significant influence on the decision-making process in implementing the green building concept. Q4: The estimated value is 0.600 with a confidence interval of 0.513 to 1,000 and a p-value of 2.872 x 10-2 or 0.02. There is a sign (*) indicating that Q4 rejects H0. The Q4 variable shows that although the median meets the standard, the mean slightly below 3 indicates that some of the respondents' values for the Q4 variable may be below the standard and indicate that the designer's experience is important but not as strong as other factors.

Energy and water efficiency and conservation conditions in buildings

The proportion test analysis consistently shows that respondents gave a significant positive assessment to the planning and implementation of energy saving factors in the context of green building decision making. More than half of the respondents agreed, indicating that this factor is considered crucial in the consideration. In contrast, the integration of natural and artificial lighting factor did not reach the same level of significance, indicating that this factor may be less of a major concern.

Q9: The estimated value is 0.210 with a confidence interval of 0.147 to 1,000 and a p value of 1,000. There is no sign (*) indicating that Q9 meets the Ho hypothesis. The Q9 variable, with a mean of 1.66 and a median of 1, indicates that the integration of natural and artificial lighting does not have a significant impact on the determining factors for implementing green buildings and indicates that this factor is considered the least important by owners in their decisions to build green buildings.

Q10: The estimated value is 0.740 with a confidence interval of 0.657 to 1,000 and a p value of 1.301x10-6. There is a sign (*) indicating that Q10 meets the standard with a value of 3 and above. The Q10 variable with a mean of 3.31 and a median of 3 shows that based on the calculation of the mean and median values of the given variable data, we can conclude whether the variables meet the established standards, namely more than 50% of the population gave a value of 3 and above.

Condition of material technology in buildings

Based on the results of the proportion test, it can be concluded that there is a consensus among respondents regarding the significant influence of this factor on the decision to implement green buildings. More than half of the respondents gave a positive assessment (above a scale of 2), indicating that the factor is considered relevant and important in decision-making considerations. The proportion test analysis shows that the majority of respondents (more than 50%) gave an assessment above a scale of 2, indicating agreement that this factor, more precisely the variables Application of prefabrication technology and flatpack design in building structure planning, Use of environmentally friendly materials; and Utilization of local wisdom of materials and their locations have a significant influence on the decision-making process in implementing the green building concept. Q13: The estimated value is 0.670 with a confidence interval of 0.584 to 1,000 and a p-value of 4.834x10-04. There is a sign (*) indicating that Q13 meets the standard with a value of 3 and above. The Q13 variable, with a mean of 2.99 and a median of 3, almost meets the standard. Variable Q13, related to the application of prefabrication technology and flatpack design in building structure planning, shows that this factor almost meets the important standard but is less consistent.

Q14: The estimated value is 0.750 with a confidence interval of 0.668 to 1,000 and a p value of 4.792x10-7. There is a sign (*) indicating that Q14 meets the standard with a value of 3 and above. variable Q10 with a mean of 3.31 and a median of 3, and variable Q14 with a mean of 3.25 and a median of 3, indicate that both consistently meet the established standards.

Q15: The estimated value is 0.650 with a confidence interval of 0.563 to 1,000 and a p value of 1.866 x 10-3. There is a sign (*) indicating that Q15 meets the standard with a value of 3 and above. Variable Q15 with a mean of 3.02 and a median of 3 meets the standard. Variable Q15, related to the use of local wisdom of materials and their collection locations, has a mean of 3.02 and a median of 3, indicating that this factor is considered but is not dominant.

Condition of material technology in buildings

Based on the results of the proportion test, it can be concluded that there is a consensus among respondents regarding the significant influence of various factors on the decision to implement green buildings. More than half of the respondents provided positive assessments (above a scale of 2), indicating that these factors are considered relevant and important in decision-making processes. The proportion test analysis reveals that the majority of respondents (over 50%) rated the significance of factors such as the efficiency and effectiveness of light, and outsourcing with gain sharing, as having a substantial influence on the decision-making process involved in the implementation of the green building concept.

Q17: The estimated value is 0.690, with a confidence interval of 0.605 to 1.000 and a p-value of 1.078×10^{-4}. A sign (*) indicates that Q17 meets the standard with a value of 3 and above. The variable Q17, related to the efficiency and effectiveness of light, has a mean of 2.91 and a median of 3, suggesting that this factor approaches the importance threshold but is lower in priority.

Q19: The estimated value is 0.700, with a confidence interval of 0.615 to 1.000 and a p-value of 4.810×10^{-5}. A sign (*) indicates that Q19 meets the standard with a value of 3 and above. The variable Q19, concerning outsourcing and gain sharing, has a mean of 3.07 and a median of 3, indicating that while important, this factor is not as critical as the previously mentioned variables.

From this analysis, it is evident that financial commitment, energy savings, and the use of environmentally friendly materials are the primary factors influencing project owners' decisions in developing green buildings.

The analysis results demonstrate that project owners exhibit a high commitment to allocating additional funds for the construction of buildings with green characteristics. This commitment is aligned with the favorable conditions present in the construction industry in South Kalimantan. Moreover, the project owners' understanding of the factors influencing the development of green buildings is notably high. The strong commitment to green building initiatives is directly proportional to a deep understanding of the significance of sustainable and environmentally friendly development.

With such a high level of commitment and understanding from project owners, it is anticipated that the implementation of green building development in South Kalimantan will progress smoothly and yield positive impacts on both the environment and the surrounding community.

The implementation of the green building concept in projects, such as mosques and sports facilities (GOR), in South Kalimantan Province encounters various obstacles, one of which is the relatively high administrative costs associated with the certification process. According to Mr. Ryan Tirta Nugraha, Head of the Cipta Karya Division of the PUPR Department of South Kalimantan Province, the primary challenge lies in the substantial administrative costs required for submitting green building certification through the Green Building Council Indonesia (GBCI). These costs encompass various administrative aspects necessary to obtain certification, which is internationally recognized and adds value to the building project.

As an alternative, an assessment system based on the Circular (SE) regarding Green Building Construction is available, which does not require a certification application fee. However, this system does not confer an internationally recognized license, potentially limiting global recognition that could enhance the image and credibility of the building project on the international stage. Although free of charge, the lack of an international license may be a drawback for projects seeking to emphasize their commitment to sustainable development practices globally.

Consequently, making decisions regarding the type of certification to utilize necessitates careful consideration of the costs incurred against the benefits received. Opting for GBCI certification, albeit expensive, can yield significant international recognition, whereas employing a rating system based on SE related to Green Building Construction may offer a more economical solution but with limited recognition. This cost constraint is a key determining factor in the strategy for implementing green building initiatives in these projects.

To address the challenges encountered, the first step is to ensure a commitment to allocate additional funds specifically for building projects that prioritize green characteristics. To reinforce this commitment, it is essential to cultivate strong awareness of the strategic benefits associated with this investment. This can be achieved by providing comprehensive information about the long-term advantages of green buildings, including energy savings, lower operating costs, and enhanced company reputation concerning sustainability.

Additionally, it is crucial to provide relevant case studies and concrete evidence of performance from previous projects that have successfully implemented green building principles. Such data will help persuade management that the allocation of additional funds is not merely an added cost but an investment with significant long-term returns.

Regular and open communication with management is also necessary, incorporating industry trends and regulations that increasingly support green building practices. Furthermore, involving leaders in the decision-making process from the outset can facilitate a deeper understanding of the importance of this commitment to the success of the project and the overall corporate image. With this approach, it is hoped that leaders will fully support the allocation of additional funds for green building projects.

Finally, it is important to enhance the designer's skills and experience in creating environmentally friendly buildings through additional training and collaboration with experts in the field. Improvements in the integration of natural and artificial lighting, along with meticulous planning to implement energy-saving technologies, are also vital. The adoption of prefabrication technology and flatpack design in structural planning can enhance construction efficiency. Moreover, the selection of environmentally friendly materials and the incorporation of local wisdom are highly recommended. Lastly, employing the right outsourcing strategies and the principle of gain sharing can help ensure cost efficiency and optimize outcomes in sustainable building projects.

CONCLUSION

Factors that influence the implementation of green buildings include financial commitment, energy savings, and the use of environmentally friendly materials. The variables contained in these factors include:

a. Commitment to allocate additional funds for green building work
b. The ability and experience of designers in designing green buildings
c. Integration of natural and artificial lighting
d. Planning and implementation of energy savings
e. Application of prefabrication technology and flatpack design in building structure planning
f. Use of environmentally friendly materials
g. Utilization of local wisdom of materials and their locations
h. Efficiency and effectiveness of light
i. Outsourcing and gain sharing

Declaration by Authors

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