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Unlocking Synergies: Exploring The Nexus Between Sustainable Building Practices, Green Polymers, and Occupant Health Through SPSS Statistical Analysis

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Abstract

This study examines the significance of utilising environmentally friendly polymers in the construction industry, specifically looking at the perspectives of individuals occupying buildings that have used green building design techniques. The focus is on the occupants' perceptions of the efficiency, comfort, and health of the materials used. Green polymers, which are essential for sustainable building, have the potential to completely transform infrastructure development. The materials mentioned include of natural fibre composites, recycled plastic composites, and bio-based composites, all of which are obtained from renewable sources. They provide long-lasting performance, optimal effectiveness, and reduced ecological footprint, thereby promoting environmentally sustainable and robust construction methods. The study utilised a descriptive survey research design, employing a questionnaire that was given to 400 persons. The data analysis comprised chi-square tests, one-sample t-tests, and regression analysis. The results indicated a statistically significant relationship between the efficiency of materials used in green building companies and how occupants perceive the quality of those materials. Moreover, notable disparities were seen between the average value of the sample and a test value of 0.05 for variables pertaining to resource efficiency, the pillars of sustainability, the viability of bamboo as a sustainable choice, the well-being of occupants in well-designed structures, and the environmental friendliness of glass. The results emphasise the capacity of green construction approaches to enhance occupants' sense of material efficiency and well-being. Utilising green polymers in building is a pioneering method for attaining sustainability. These materials aid in decreasing the carbon footprint of buildings and encourage the use of renewable resources. For example, natural fibre composites are made from leftover materials from agriculture, whereas recycled plastic composites aid in the reduction of plastic waste. Bio-based composites, derived from organic sources, provide a sustainable substitute for conventional construction materials.

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Keywords: Green polymers, composites, sustainability, green building, SPSS

INTRODUCTION

The construction industry has a significant impact on our built environment, affecting both the natural world and the well-being of those who inhabit it. Considering growing global concerns regarding climate change and resource depletion, the importance of adopting sustainable building practices has never been more crucial. Sustainable building practices have the dual objective of reducing environmental impact through efficient energy and resource utilization, while also prioritizing the creation of healthier indoor spaces for occupants (Li et al., 2020)[11]. An innovative approach in sustainable construction involves the incorporation of green polymers, which are materials derived from renewable resources or designed to be environmentally friendly. There are several advantages to using these green polymers, such as decreased dependence on fossil fuels, decreased carbon emissions, and improved indoor air quality (El Asmar & Taki, 2014[6]; Sharifi & Yamagata, 2016)[13].

Research and application in the area of sustainable building practices, green polymers, and occupant health show great promise (Waqar et al., 2024)[15]. Using statistical analysis tools like SPSS, valuable insights can be gained regarding the interaction and synergy between these elements, ultimately promoting environmental sustainability and human health. This study seeks to investigate the synergies between sustainable construction methods and green polymers, aiming to provide a thorough understanding of their contributions to the well-being of building occupants. We will conduct a thorough analysis using SPSS statistical methods to investigate the effects of green building materials and practices on various factors, including indoor air quality, energy efficiency, and occupant comfort (Abdelkader, 2020)[1]. This analysis will provide valuable insights for architects, builders, and policymakers, leading to the development of more sustainable and health-conscious construction practices in the future.

Classification of Green Polymers in Construction

Green polymers in construction are classified based on their sources and the materials they incorporate (L. Zhang et al., 2024) [17]. These classifications highlight the diversity and versatility of sustainable materials available for modern construction practices. Figure 1 shows the main categories of green polymers used in construction.

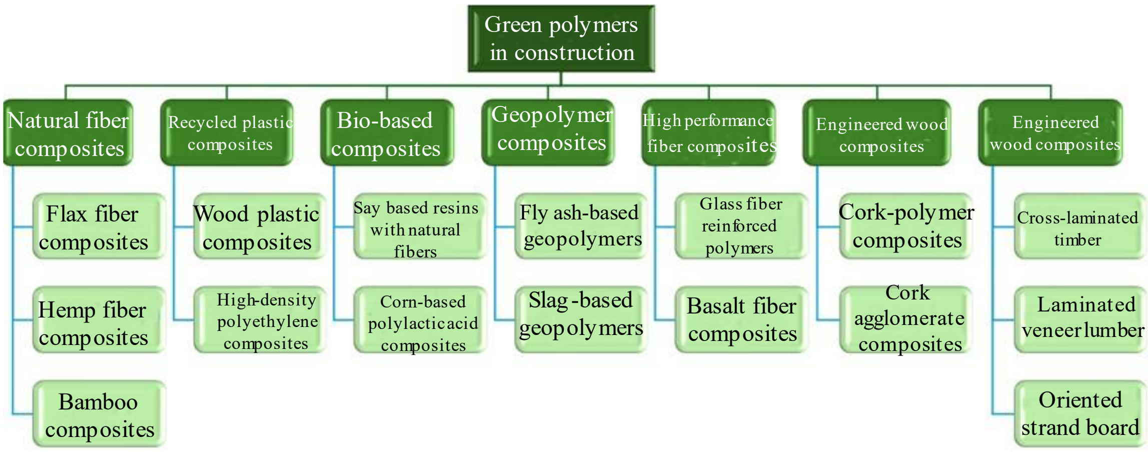

Figure 1. Main categories of green polymers used in construction.

Natural fiber composites, which utilize flax, hemp, jute, sisal, and bamboo, combined with polymer matrices that are biodegradable or recyclable, are becoming increasingly popular because of their lightweight properties, strength, and environmentally beneficial attributes. These composites are becoming more prevalent in diverse areas such as sports equipment (Atmakuri et al., 2020;[2] Zhu et al., 2024)[20]. The increasing demand for composites made from natural fibers is being observed in several industrial sectors, highlighting their commercial feasibility and sustainability (Girijappa et al., 2019;[7] Keçili et al., 2023)[9].

Recycled plastic composites, which consist of recycled plastics mixed with substances such as wood fibers, have a vital function in diminishing plastic waste and advancing a circular economy (Brouwer et al., 2018)[5]. Wood-plastic composites, which are a popular type of recycled plastic composite, are widely utilized in decking, fencing, and outdoor furniture. They provide an eco-friendly substitute for conventional plastic products (Brouwer et al., 2018)[5]. Furthermore, high-density polyethylene composites are employed in outdoor furniture, playground equipment, and landscape features, demonstrating their adaptability and environmentally friendly nature (Brouwer et al., 2018)[5]. These materials not only aid in the reduction of waste, but also actively support sustainable practices and adhere to the principles of the circular economy.

Another category of sustainable materials involves bio-based composites. These materials use natural resins derived from renewable sources such as soybean, corn, or other plant-based materials. They are combined with natural fibres or fillers (Marć et al., 2024;[12] Xu et al., 2022)[16]. Composites like these offer an alternative to conventional materials that is both biodegradable and environmentally friendly. For instance, interior panels, furniture, and flooring applications utilize soy-based resins with natural fibres, while biodegradable containers, packaging, and certain structural uses make use of corn-based polylactic acid composites (Xu et al., 2022)[6].

Geopolymer composites, which are made from inorganic polymers such as fly ash or slag, provide a sustainable and low-carbon substitute for conventional Portland cement (Bekchanov et al., 2024;[3] Z. Zhang et al., 2015)[19]. These composites have been utilized in concrete, mortar, and different building components, demonstrating their adaptability and environmentally favorable characteristics. Fly ash-based geopolymers are frequently utilized in concrete applications, whereas slag-based geopolymers are employed in both structural and non-structural building components, highlighting their environmental advantages and wide-ranging uses. Geopolymer composites are increasingly being acknowledged as a favorable and eco-friendly alternative to traditional cementitious materials, which helps promote sustainable construction methods and minimize environmental harm (Korniejenko et al., 2022)[10].

High-performance fiber composites, incorporating fibers like glass, basalt, or carbon in a sustainable matrix, are known for their exceptional strength-to-weight ratios and durability (Benmokrane et al., 2017)[4]. Glass fiber reinforced polymers are commonly used in roofing, panels, and structural reinforcement, while basalt fiber composites find applications in concrete reinforcement, structural elements, and fire-resistant panels (Benmokrane et al., 2017)[4]. These high-performance materials have gained prominence across various industries due to their versatility and eco-friendly characteristics, offering a sustainable solution for diverse applications (Benmokrane et al., 2017)[4].

Cork composites, made from cork harvested from cork oak trees, are highly regarded for their natural insulating properties and sustainable nature (Xu et al., 2022).These composites find use in flooring, wall coverings, and insulation applications, providing an environmentally friendly alternative to conventional materials. In acoustic panels and thermal insulation, cork-agglomerate composites are commonly used, highlighting the adaptability and environmentally-friendly nature of materials derived from cork (Xu et al., 2022)[16].

Wood composites that are engineered by binding wood strands, fibres, or veneers with adhesives provide improved strength and stability for a wide range of applications (Xu et al., 2022)[16]. Engineered wood composites have a variety of uses in the construction industry. Cross-laminated timber is commonly used for structural elements in buildings, while laminated veneer lumber is often applied in beams and structural components. Additionally, oriented strand board finds utility in sheathing, flooring, and roofing. These examples showcase the extensive range of applications for engineered wood composites (Xu et al., 2022) [16].

Green polymers, also denoted as eco-friendly or sustainable polymers and shows a significant advancement in materials science, particularly within the construction sector. These polymers are derived from renewable biomass sources or synthesized using environmentally friendly processes, aiming to mitigate the environmental impact associated with conventional petroleum-based polymers. Their adoption in construction holds several transformative potentials:

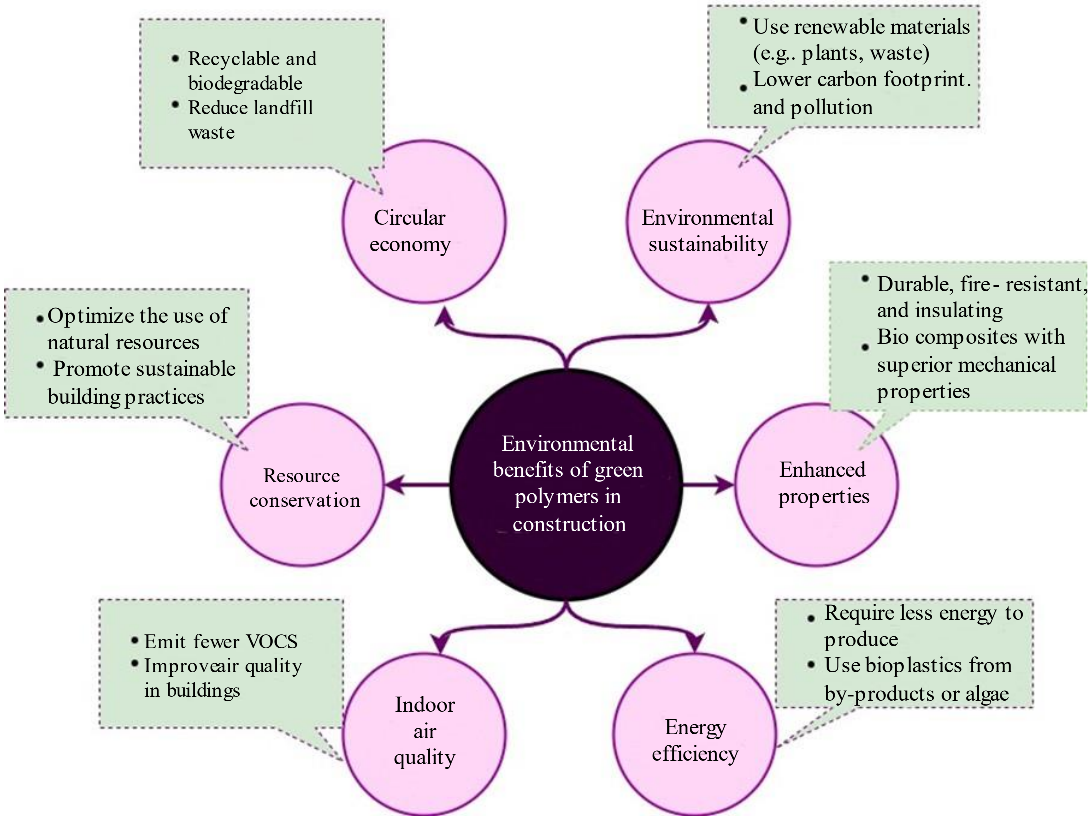

Figure 2. Environmental benefits of green polymer in construction

Green polymers offer significant environmental benefits in construction (as shown in fig. 2), including reduced reliance on finite fossil fuel resources using renewable feedstocks such as plant-based materials or waste products. This shift lowers carbon footprints and mitigates pollution associated with traditional polymer production. Certain green polymers also require less energy to manufacture, enhancing energy efficiency, as bioplastics from agricultural by-products or algae can be produced through less energy-intensive processes. Many green polymers are designed with recyclability or biodegradability in mind, aligning with circular economy principles, and facilitating material reuse and environmentally responsible disposal, thus reducing landfill waste. Furthermore, tailored formulations and processing techniques enable green polymers to exhibit enhanced material properties such as superior durability, fire resistance, and thermal insulation, with bio composites offering mechanical characteristics comparable to or surpassing conventional materials like fiberglass or PVC (Huang et al., 2021;[8] Upton & Kasko, 2015;[14] X. Zhang et al., 2017) [18].

The objective of this study is to investigate how sustainable building practices and the use of green polymers impact occupant health and well-being. Utilizing SPSS statistical tools, the study aims to provide benefits of green polymers in enhancing material efficiency, improving indoor air quality, and supporting circular economy principles. It also seeks to analyze the enhanced properties of green polymers, such as durability and thermal insulation, compared to conventional materials.

RESEARCH PROGRAM

Research Design for SPSS Statistical Tool

This study used a descriptive survey research approach. This method focuses on describing the characteristics of a population or phenomenon without manipulating any variables. The goal of researchers using this approach is to understand the current situation and report on the relationships between variables [9]. A researcher designed questionnaire was used for data collection. Questionnaire is considered the most proper tool. It allows the respondents to easily select the choice that reflect their objective opinion.

Hypothesis for Analysis

Null hypothesis (H0): No association is there between the use of sustainable materials and material efficiency in green building companies.

Hypothesis (H1): Significant difference is there in the mean feeling of material efficiency among various levels of quality outcome.

Hypothesis (H2): Poorly designed buildings might affect the health of building occupants.

Hypothesis (H3): A healthy indoor climate and an elevated level of comfort is offered by green buildings.

Population of the Study

The population of this study formed of all the occupants in the pursuit of sustainability, it is crucial to adopt practices that reduce their ecological footprint. Green buildings, which prioritize energy efficiency, use of renewable resources, and sustainable materials, can play a vital role in achieving this aim. We sought to gain the prevailing practices from the perspective of human health and environment.

Furthermore, considering the impact of these environments on human comfort. Sustainable buildings not only minimize environmental harm but also create healthier and more comfortable spaces for individuals. By incorporating elements such as natural light, proper ventilation, and ergonomic design, conducive work environments could be provided that enhance the well-being and productivity of the individuals. In summary, this study investigates the experiences of occupants about sustainability and green buildings. Through this, we can find areas for improvement and develop strategies that promote sustainability while prioritizing human comfort and well-being in India.

Sample and Sampling Technique

For sampling the data simple random selection method will be applied on the data along with chi square to get the values. The population includes both the male and female respondents [13, 14]. The analysis is to be done with the help of following questionnaire developed with the help of google forms and shared with people at various levels. In this study, the response types as shown in Figure 3 is used.

Questionnaire

Out of the 36 questions designed to survey the health and comfort of green building occupants, 25 key questions are discussed here. These questions aim to gather comprehensive insights into the participants' perceptions and experiences regarding sustainable building practices (Table.1)

The responses are being collected by sharing these questionnaires which are then to be analyses as per the drafted aims. The process of data gathering is achieved by Questionnaires developed by us. The data for this study was collected through a questionnaire distributed to various individuals. Participants were asked to provide their responses using the following link: Google Forms Questionnaire

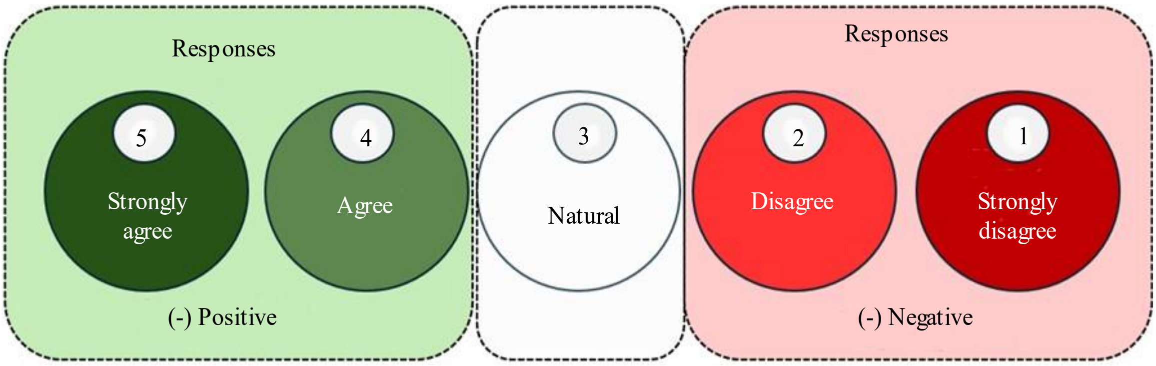

Figure 3. Response types.

Table 1. Questionnaire

Q. no.	Question rewrite
1	"Sustainable building materials focus on maximising resource efficiency during the manufacturing process."
2	"Green building firms place a high importance on material efficiency and utilise sustainable materials."
3	"Sustainable buildings consider the three pillars of sustainability: social, environmental, and economic factors."
4	"Green buildings are specifically designed to optimise the utilisation of resources like water and energy in the most efficient way possible."
5	"Green building designers aim to decrease their reliance on non-renewable energy sources, such as coal."
6	"Water efficiency is all about making smart choices with our water resources to ensure a long-lasting supply for generations to come."
7	"What is your level of understanding regarding the environmental advantages of green polymers in comparison to traditional petroleum-based polymers?"
8	"Material efficiency focuses on identifying methods and materials that reduce the amount of material used, without compromising on quality."
9	"Green buildings are essential for protecting the environment as they reduce our reliance on harmful energy sources like coal."
10	"Utilising sustainable materials allows us to foster a deeper connection with the natural world and increase our awareness of the impact we have on the environment."
11	"Bamboo is a versatile material that can be used for a variety of purposes, including furniture, blinds, tabletops, decor items, and even roofing or flooring. It is a great option that provides long-lasting performance and adaptability."
12	"Glass is widely regarded as a sustainable building material by many individuals."
13	"Green building certification systems provide useful resources and ratings to evaluate the sustainability and environmental effects of buildings or projects."
14	"Green rating systems assess the environmental and socio-economic impacts of green building designs."
15	"Green rating systems place a strong emphasis on sustainable site planning, energy efficiency, material use, construction methods, water and waste management, and indoor environmental quality."

OBSERVATION WITH SPSS SOFTWARE

The analysis of survey data was conducted using SPSS software to derive meaningful insights into sustainable building practices, green polymers, and occupant health. SPSS, a powerful statistical analysis tool, enables the examination of complex data sets, facilitating the identification of patterns, correlations, and significant variables. By utilizing SPSS, the study ensures a robust and reliable analysis of the collected data, providing a comprehensive understanding of the interactions and impacts of sustainable building practices on material efficiency and occupant well-being. The following sections present the detailed observations and results derived from the SPSS analysis.

The Figure 4 provides a detailed visual representation of survey responses from a sample size of 400 participants. The responses are categorized into several key aspects related to sustainable and green building practices, displaying frequencies and percentages across different agreement levels. For the category Perception of Sustainable Building Materials, 36.3% of the participants strongly agreed (145 responses), 43.3% agreed (173 responses), and 20.5% were neutral (82 responses). This shows a majority consensus on the importance of sustainable building materials, with most respondents agreeing or strongly agreeing.

In the Material Efficiency in Green Building Companies category, 40.5% of respondents strongly agreed (162 responses), 37.8% agreed (151 responses), and 21.8% were neutral (87 responses). This suggests a strong recognition of the efficiency of materials used in green building companies among the participants. About Construction Features for Resource Efficiency, 39.3% of participants strongly agreed (157 responses), 40.8% agreed (163 responses), and 20.0% were neutral (80 responses). The high agreement levels show that construction features designed for resource efficiency are well-regarded by the survey participants. For the aspect Reduction of Energy Dependency on Non-renewable Sources, 41.3% of the participants strongly agreed (165 responses), 36.3% agreed (145 responses), and 22.5% were neutral (90 responses). This reflects a significant approval of reducing dependency on non-renewable energy sources, with the majority showing dedicated support. In the category of Health Benefits in Green Buildings, 40.0% of respondents strongly agreed (160 responses), 39.8% agreed (159 responses), and 20.3% were neutral (81 responses). The results highlight a general agreement on the health benefits associated with green buildings, with an elevated level of positive responses.

The category Bamboo as a Sustainable Option had more varied responses: 24.3% strongly agreed (97 responses), 29.5% agreed (118 responses), 34.8% were neutral (139 responses), 9.5% disagreed (38 responses), and 2.0% strongly disagreed (8 responses). This shows a broader spectrum of opinions, with a sizeable part being neutral or disagreeing about bamboo's sustainability. Finally, for Zero Energy Homes and Energy Efficiency, 13.3% of participants strongly agreed (53 responses), 43.3% agreed (173 responses), and 43.5% were neutral (174 responses). This shows that while there is considerable agreement on the benefits of zero energy homes, a large portion of participants remains neutral, indicating a potential area for further awareness and education. Each bar in the figure is the frequency of responses for each agreement level within a specific aspect. The percentages provide a clear understanding of the distribution of opinions among the participants. This visualization highlights the varying levels of agreement and neutrality among respondents, offering valuable insights into public feeling and attitudes towards different sides of sustainable and green building practices. This information can guide policymakers, researchers, and industry professionals by finding areas of strong consensus as well as aspects requiring more awareness or improvement.

The Figure 5 shows the distribution of survey responses as percentages for various categories. For the Perception of Sustainable Building Materials, 36.3% of participants strongly agreed, 43.3% agreed, and 20.5% were neutral. About Material Efficiency in Green Building Companies, 40.5% strongly agreed, 37.8% agreed, and 21.8% were neutral. For Construction Features for Resource Efficiency, 39.3% strongly agreed, 40.8% agreed, and 20.0% were neutral. In the Reduction of Energy Dependency on Non-renewable Sources category, 41.3% strongly agreed, 36.3% agreed, and 22.5% were neutral. For Health Benefits in Green Buildings, 40.0% strongly agreed, 39.8% agreed, and 20.3% were neutral. In the Bamboo as a Sustainable Option category, 24.3% strongly agreed, 29.5% agreed, 34.8% were neutral, 9.5% disagreed, and 2.0% strongly disagreed. Finally, for Zero Energy Homes and Energy Efficiency, 13.3% strongly agreed, 43.3% agreed, and 43.5% were neutral. These percentages provide a clear understanding of the public’s views on various aspects of sustainable and green building practices.

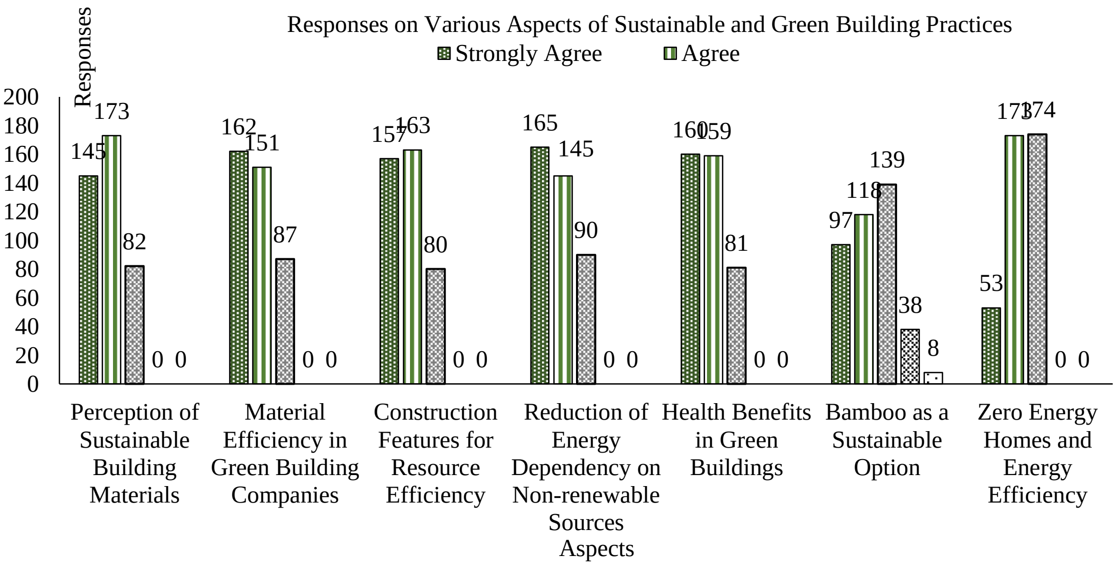

Figure 4. Responses on various aspects of sustainable and green building practices.

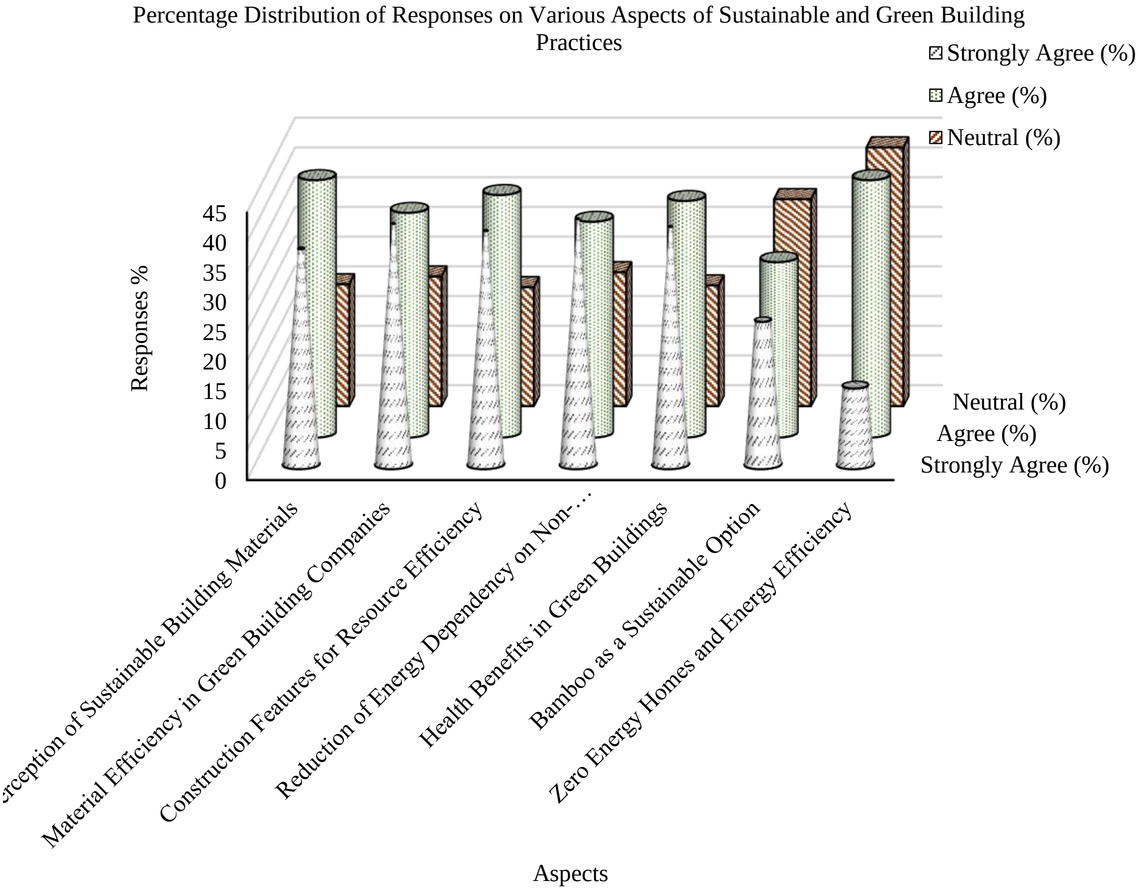

Figure 5. Unlocking synergies: exploring the nexus between sustainable building practices, green polymers, and occupant health through spss statistical analysis.

Chi-Square Test and Cross Tabulation Analysis

The study was carried out to explore the relationship between material efficiency in green building companies and the perceived quality outcomes of their construction projects. Green building practices aim to minimize waste and resource consumption while maintaining or improving building functionality and durability. The analysis employs Chi-Square tests and cross tabulation to investigate these relationships. Cross tabulation helps in identifying patterns and associations between different levels of agreement on material efficiency and corresponding quality outcomes.

Table 2. Cross Tabulation of Material Efficiency in Green Building Companies and Material Efficiency and Quality Outcome.

Material efficiency in green building companies	Neutral	Agree	Strongly agree	Total
Neutral	33	26	28	87
Agree	24	64	63	151
Strongly Agree	24	73	65	162
Total	81	163	156	400

Table 2 presents the cross-tabulation of Material Efficiency in Green Building Companies and Material Efficiency and Quality Outcome, illustrating how different levels of agreement with material efficiency correspond to various quality outcomes. The table categorizes the responses into three levels of agreement: Neutral, Agree, and Strongly Agree, both for material efficiency and for quality outcomes. For respondents who were neutral about material efficiency in green building companies, 33

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also indicated a neutral stance on quality outcome, 26 agreed on the quality outcome, and 28 strongly agreed on the quality outcome, totaling 87 responses in this category. Among those who agreed with material efficiency in green building companies, 24 respondents were neutral about the quality outcome, 64 agreed on the quality outcome, and 63 strongly agreed on the quality outcome, summing up to 151 responses. For participants who strongly agreed with material efficiency in green building companies, 24 were neutral about the quality outcome, 73 agreed on the quality outcome, and 65 strongly agreed on the quality outcome, resulting in 162 responses.

Chi-Square Test

The Chi-Square tests were adopted in this study to examine the association between material efficiency in green building companies and the perceived quality outcomes. This test is particularly suitable for categorical data, allowing us to determine whether there is a significant relationship between two variables.

Table 3. Chi-Square Tests.

Statistical Test	Score	Degrees of freedom	Two-sided significance level
Chi-Square Test by Pearson	21.943	4	0
Ratio of Likelihood Test	19.822	4	0.001
Test for Linear Association	7.77	1	0.005
Count of Valid Observations	400		

Table 3 shows the indicate statistically significant correlations, as evidenced by p-values below the 0.05 threshold. This statistical significance suggests that the observed relationships are unlikely to have occurred by chance, thereby validating the hypothesis that material efficiency in green building companies is associated with higher perceived quality outcomes. The number of valid cases is 400, and all cells meet the Chi-Square test assumptions, with no expected counts below 5.

By utilizing the Chi-Square tests, the study ensures a comprehensive analysis of the data, allowing for clear and reliable conclusions about the effectiveness of sustainable building practices.

One-Sample Test

The study aims to evaluate the effectiveness and public perception of various sustainability-related variables in green building practices. By employing statistical analyses, the research seeks to provide robust insights into how these variables perform compared to established benchmarks. The One-Sample test is a crucial part of this analysis, used to compare the sample means of different sustainability factors against a test value, offering a clear understanding of their significance and impact.

Table 4. One-Sample test.

Value (α = 0.05)	t-Statistic	Degrees of freedom	Significance (Two-tailed)	Difference in means	95% Prediction interval of the difference	
					Lower	*Upper*
Construction Features for Resource Efficiency	111.027	399	.000	4.143	4.07	4.22
Three Sustainability Pillars (i.e., People, Planet and Profit) in Sustainable Buildings	111.009	399	.000	4.175	4.10	4.25
Bamboo as a Sustainable Option	70.964	399	.000	3.595	3.50	3.69
Impact of Poorly Designed Buildings on Occupant Health	75.889	399	.000	3.733	3.64	3.83
Eco-friendliness of Glass in Buildings	110.730	399	.000	4.168	4.09	4.24

Table 4 summarizes the one-sample test results indicate statistically significant differences between the sample means and the test value, as evidenced by the p-values less than 0.001.

Coefficient and Regression Analysis

The study delves into the impact of various factors on material efficiency in green building companies by employing coefficient and regression analysis. This analysis helps in understanding the relationship between independent variables, such as the perception of sustainable building materials and green building certification systems, and the dependent variable, material efficiency. Regression analysis is a powerful statistical tool that quantifies the strength and direction of these relationships, providing valuable insights into the effectiveness of sustainability practices in the building industry.

Table 5. Coefficient Table Associated with Regression Analysis.

Model	Fixed coefficients	Estimated errors	Relative coefficients	t-Statistic	Significance level
	Coefficient (B)	Standard Error	Beta		
1	(Constant)	3.571	0.218		16.386
	Perception of Eco-Friendly Building Materials	0.148	0.052	0.143	2.873
2	(Constant)	3.266	0.292		11.181
	Perception of Eco-Friendly Building Materials	0.145	0.052	0.139	2.81
	Systems for Rating Green Buildings	0.077	0.049	0.078	1.564

Table 5 summarizes the regression analysis results. Model 1 shows the impact of the perception of sustainable building materials on material efficiency in green building companies, while Model 2 includes both the perception of sustainable building materials and green building certification systems. The results indicate that the perception of sustainable building materials has a statistically significant positive impact on material efficiency, whereas green building certification systems do not show a significant impact.

OUTCOME

Chi-Square Test Results

This analysis explores various aspects of building design and the care taken by designers during construction. The Chi-Square test results reveal a statistically significant correlation between material efficiency in green building companies and material efficiency and quality outcomes. This finding supports the null hypothesis (H0), which posits that there is no significant variation in the mean perception of material efficiency across different quality outcomes. This significant relationship is underscored by a p-value of 0.000.

ANOVA Findings

In evaluating the material efficiency in green building companies and the quantification of benefits in green building design, ANOVA results indicate a significant difference between the groups. This supports the alternative hypothesis (H1), which suggests a correlation between the use of sustainable materials and material efficiency in green building companies. The statistical significance is confirmed by p-values less than 0.05. However, no significant difference was found for the reduction of energy dependency on non-renewable sources and health benefits in green buildings, implying that these variables may not be associated with the factors tested.

Correlation Analysis

The correlation research identifies significant positive correlations between material efficiency in green building companies and the perception of sustainable building materials, among other variables. The alternative hypothesis (H2) posits that green buildings provide a healthy indoor environment and high comfort levels, supported by these correlations. However, some correlations are weak or not statistically significant, indicating that other factors may influence these relationships.

Regression Analysis

The regression analysis demonstrates that the perception of sustainable building materials has a statistically significant positive impact on material efficiency in green building companies. This finding contradicts the null hypothesis (H0), which suggests no association between the use of sustainable materials and material efficiency in green building companies. The analysis underscores the importance of fostering a positive perception of sustainable materials to enhance material efficiency.

One-Sample t-Test Results

One-sample t-test results indicate that the sample means for variables related to construction features for resource efficiency, three sustainability pillars, bamboo as a sustainable option, the impact of poorly designed buildings on occupant health, and the eco-friendliness of glass in buildings are significantly different from the test value of 0.05. This provides evidence for the alternative hypotheses (H1, H2, and H3) proposed in the study.

CONCLUSION

This study explores the synergies between sustainable building practices, green polymers, and occupant health using SPSS statistical analysis. The Chi-Square tests reveal a statistically significant correlation between material efficiency in green building companies and perceived quality outcomes, supporting the hypothesis that material efficiency impacts quality perceptions. ANOVA results confirm significant differences between groups, indicating a correlation between the use of sustainable materials and material efficiency, although no significant differences were found for energy dependency reduction and health benefits in green buildings. Correlation analysis identifies positive relationships between material efficiency and the perception of sustainable building materials, suggesting that green buildings provide a healthier and more comfortable indoor environment. Regression analysis further demonstrates that the perception of sustainable building materials significantly impacts material efficiency, emphasizing the importance of promoting sustainable materials in green building practices. One-sample t-test results show significant differences for variables related to construction features for resource efficiency, three sustainability pillars, bamboo as a sustainable option, the impact of poorly designed buildings on occupant health, and the eco-friendliness of glass in buildings. These findings underscore the critical role of sustainable building practices and materials in enhancing both material efficiency and occupant well-being, offering valuable insights for policymakers, researchers, and industry professionals in developing more sustainable and health-conscious construction practices.

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