

The Mediating Role of Green Marketing in the Relationship between Sustainable Building Practices and Commercial Property Demand: Real Estate Analysis

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Abstract-

Aim/Purpose:- The aim of the descriptive research study was to investigate the mediating role of green marketing practices in relationship between the antecedents of sustainable building practices and commercial property demand. There are various antecedents like: energy efficient measures, water conservation techniques, sustainable and recycled building materials, waste management and recycling practices during construction and integration of renewable energy sources.

Outcome:- The outcome of the research witnessed that the green management practices in construction have shown significant relationship with the antecedents of sustainable building practices and commercial property demand.

Research Methodology/Approach/Design:- Developed structured closed ended questionnaire to collect the opinion from publicly available respondents with a simple random sampling technique and applied various descriptive and inferential statistics to analyze the data.

Research limitations/implications: The study provides numerous essential insights for both practitioner and academicians. However, the researchers have confronted some issues, such as common method bias and social desirability bias in survey- based research. Finally, the authors have used adequate measures to minimize these biases.

Statistical Techniques:- Applied various descriptive and inferential statistics like: Mean, SD, Regression, Structural Equation Modeling Algorithm, cronebach's Alpha reliability test, Average Variance Extractions, standardized beta coefficients and other statistical assessments to analyze the data.

Generalization:- The outcome of the research can be generalized where need arises to assess the commercial property demand with the help of various antecedents of sustainable building practices.

Type of the Research:- it is a descriptive research design where data assessment will happen with the help of various types of graphs, charts and structural equation model.

Key words: Energy efficient measures, water conservation, sustainable and recycled building materials, waste management, renewable energy sources, real estate, etc.,

INTRODUCTION:

The green building practices will have greater impact on price premium in the contemporary context. As higher the implementation of green practices while constructing buildings and apartments will have greater impact on prices and value of the buildings ^[1]. Therefore, it is essential to implement various green management practices while constructing buildings like: energy efficiency practices, water conservation system, recycled building materials, waste management, and integration of renewable energy sources are the essential aspects. Further, it is also explained that the market demand of the product is depends on the promoting sustainable development practices and the impact on consumer behavior and market demand ^[2]. Therefore, it is witnessed from the research that, the marketing promotional tools are essential aspects to promote the real estate products. Further, the green building certification which enhances the property value in the long-run ^[3]. In the present days the green building certification and its importance is gradually increasing as the property value will be enhanced based on the green building certification and even it is also explaining that, the role of green marketing strategies is very much essential for to shape the consumer behavior^[4]. Therefore, in all aspects it is witnessed from the past research that the antecedents of sustainable building practices and the green marketing practices plays a crucial role to create a commercial property demand.

REVIEW OF LITERATURE:

The cost and benefit analysis is much essential to understand the cost and associated profit while going for green building practices of commercial building practices^[5]. Therefore, the assessment of cost benefit analysis is very much essential to gain the insights of cost and associated profits. Further, there is a meta-analysis synthesizing the findings from various studies and its impact of green building certifications on commercial property values and rates^[6]. There are many literature based evidences on green marketing and its role in promoting sustainable development, providing a comprehensive understanding of the field^[7]. There are some other related literatures on green building certification and various aspects of property performance, including occupancy rates, operating costs, and rental income^[8]. Further, the literature on the influence of green marketing strategies on consumer behavior, focusing on factors that drive or hinder the adoption of environmentally friendly products and services^[9]. There is a one more literature evaluates the existing evidence on the relationship between green building certification and commercial property values, highlighting the potential financial benefits associated with sustainable building practices^[10]. Further, the review explores the challenges and opportunities associated with green marketing practices in the context of sustainable development, providing insights into the potential barriers and facilitators^[11]. There is a one more literature examines the literature on the impact of green building certification on the commercial real estate market, including its influence on property demand, values, and occupancy rates^[12]. Associated review synthesizes the empirical evidence from various studies on the relationship between green marketing strategies and consumer behavior, providing insights into the effectiveness of these strategies in influencing purchasing decisions^[13]. There is a one more review which critically evaluates the methodological approaches used in studies investigating the relationship between green building certification and commercial property values, highlighting the strengths and limitations of different methods^[14]. The review explores the potential of green marketing in promoting sustainable consumption patterns, examining the theoretical foundations and practical implications of this approach.

Objectives of the Study

1. To analyze the relationship between sustainable building practices and commercial property demand.
2. To evaluate the impact of green marketing strategies on consumer perceptions of sustainability in commercial real estate.
3. To investigate the mediating effect of green marketing on the relationship between sustainable building practices and commercial property demand.
4. To identify effective green marketing approaches for enhancing the marketability of sustainable commercial properties.

Need & Importance of the Study

This study addresses the growing need for sustainable practices in the real estate sector and the role of marketing in promoting sustainable development. By exploring how green marketing mediates the relationship between sustainable building practices and commercial property demand, this research contributes to enhancing environmental sustainability in the built environment while meeting market demands.

Scope of the Study

The scope of the research limited to the green building practices and its impact on the value of the buildings in the short and long-run in the present scenario. The present research identified few antecedents like: energy efficient measures, water conservation techniques, sustainable and recycled building materials, waste management, integration of renewable energy sources etc. Therefore, there are various factors which have direct impact on commercial property demand.

Statement of the Problem

The real estate industry faces challenges in balancing economic growth with environmental concerns. While sustainable building practices offer long-term benefits, their adoption and impact on commercial property demand may vary. Green marketing, as a strategic approach, can influence consumer perceptions and drive demand for sustainable properties. However, the mediating role of green marketing in this context requires further investigation to understand its full impact on commercial property markets.

Hypothesis of the Study

H₁: Sustainable building practices positively influence commercial property demand, with green marketing as a mediator.

H₂: Energy Efficient measures positively influence commercial property demand, with green marketing as a mediator.

H₃: Water Conservation Techniques positively influence commercial property demand, with green marketing as a mediator.

H₄: Sustainable and Recycled building materials positively influence commercial property demand, with green marketing as a mediator.
H₅: Waste Management and Recycling practices positively influence commercial property demand, with green marketing as a mediator.
H₆: Integration of Renewable energy positively influences commercial property demand, with green marketing as a mediator.

Research Methodology & Design:-

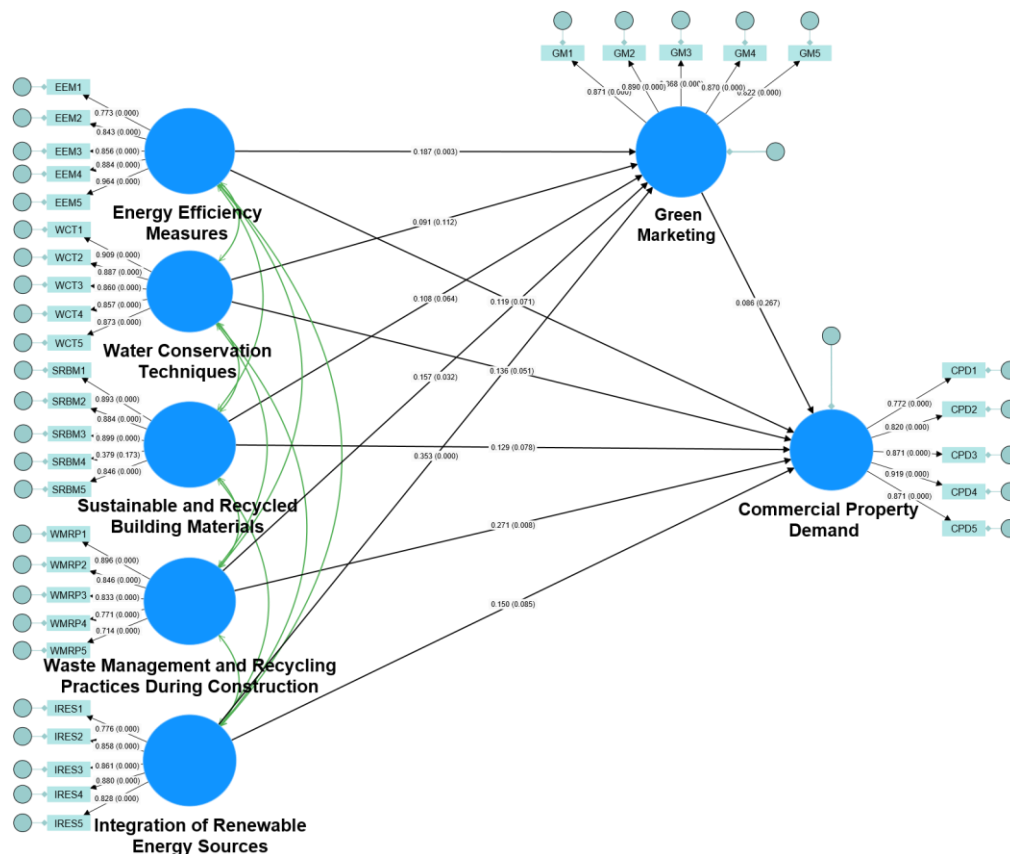
It is a descriptive research design. The data collected through primary and secondary data sources. The survey plays a crucial role to collect the opinion from various respondents. There are research design aspects.

Data Sources:- The data sources comprises of both primary and secondary data. Then primary data sources collected through Google sheet questionnaire and the secondary data sources are from journals and magazines etc.

Sample Size:- Sufficient sample size has taken to collect the opinion from various respondents. The sample size must be >200 to analyze the structural equation modeling. Therefore all the direct and in-direct effects have shown significant relationship.

Sampling Technique:- Applied simple random sampling technique to collect the data from various respondents through Google sheet survey.

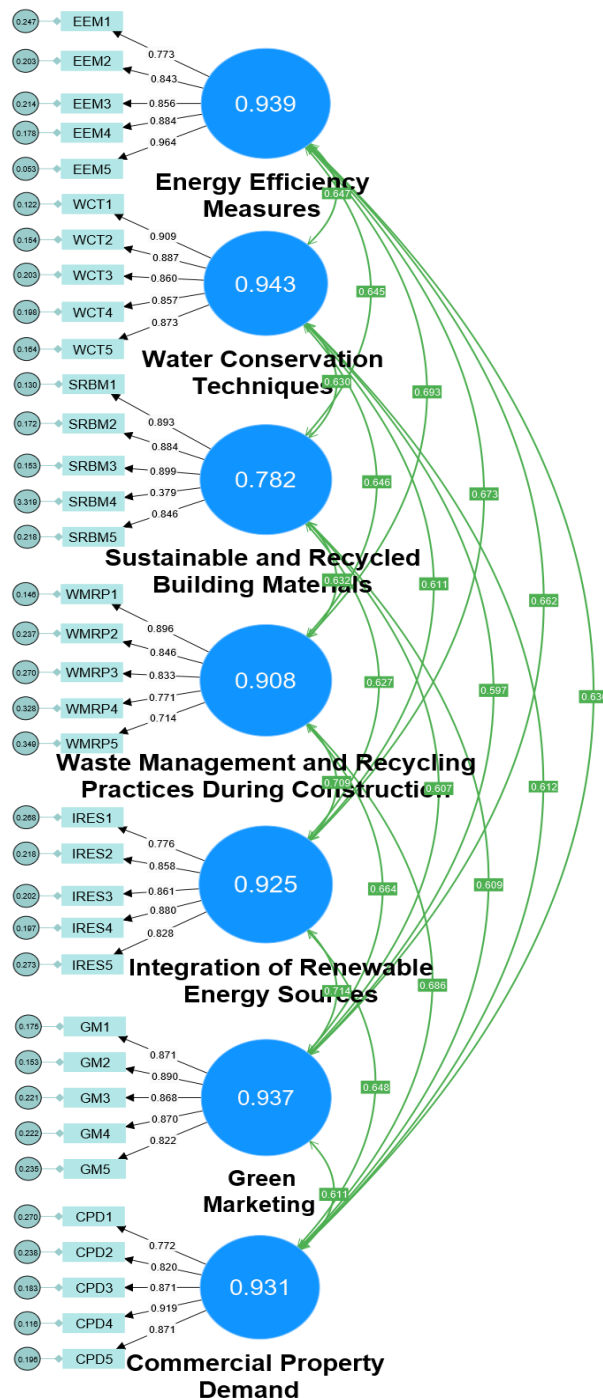
Figure.1: Structural Equation Model for Study Variables of Commerical Property Demand



The path coefficients in the model reveal valuable insights into the relationships between various sustainability measures, green marketing efforts, and commercial property demand. A one-unit increase in energy efficiency measures is associated with a predicted 0.124-unit rise in commercial property demand, highlighting the positive impact of energy-efficient practices. Concurrently, this increase in energy efficiency measures is also linked to a 0.230-unit increase in green marketing activities, emphasizing the role of sustainability in driving marketing strategies. Moreover, the integration of renewable energy sources shows a strong relationship with both commercial property demand (0.148-unit increase) and green marketing efforts (0.410-unit increase), underscoring the importance of renewable technologies in the real estate sector. Similarly, the use of sustainable building materials and effective waste management practices during construction are positively correlated with commercial property demand (0.114 and 0.221-unit increase, respectively) and green marketing activities (0.112 and 0.150-unit increase, respectively). Water conservation techniques also play a role, with a 0.113-unit increase in commercial property demand and a

0.089-unit increase in green marketing activities for every one-unit improvement in water conservation. These findings highlight the interconnectedness of sustainability initiatives, marketing strategies, and property market dynamics in promoting environmentally conscious practices in the commercial real estate sector.

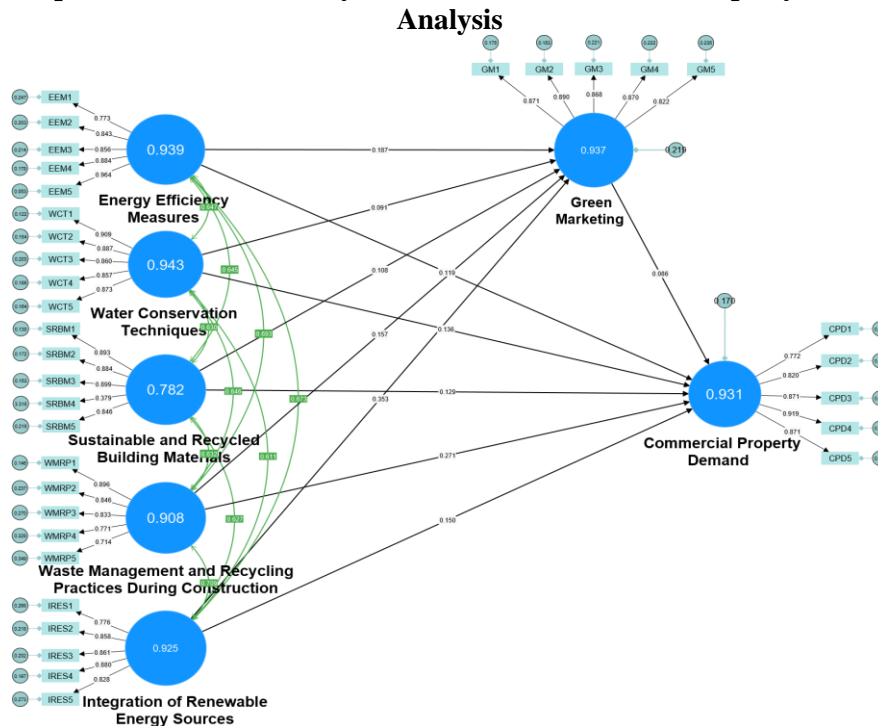
Figure.2: Factor Analysis for study variable of Commercial Property Demand



The indicator loadings suggest that most observed variables are strongly associated with their respective latent constructs. For Commercial Property Demand, CPD3 (0.871), CPD4 (0.919), and CPD5 (0.871) are excellent measures, while CPD1 (0.772) and CPD2 (0.820) are fairly good to robust measures. In the Energy-Efficient Materials factor, EEM5 (0.964) stands out as an outstanding measure, with EEM3 (0.856) and EEM4 (0.884) being excellent measures as well. The Green Marketing indicators GM1 (0.871), GM2 (0.890), GM3 (0.868), and GM4 (0.870) are excellent measures, while GM5 (0.822) is a robust measure. For Indoor Respiratory Environment, IRES2 (0.858), IRES3 (0.861), and IRES4 (0.880) are excellent measures, with IRES1 (0.776) being a fairly good measure and IRES5 (0.828) a robust measure. In the Sustainable Refurbishment & Building Materials factor, SRBM3 (0.899) is an outstanding measure, SRBM1 (0.893) and SRBM2 (0.884) are excellent measures, and SRBM5 (0.846) is a

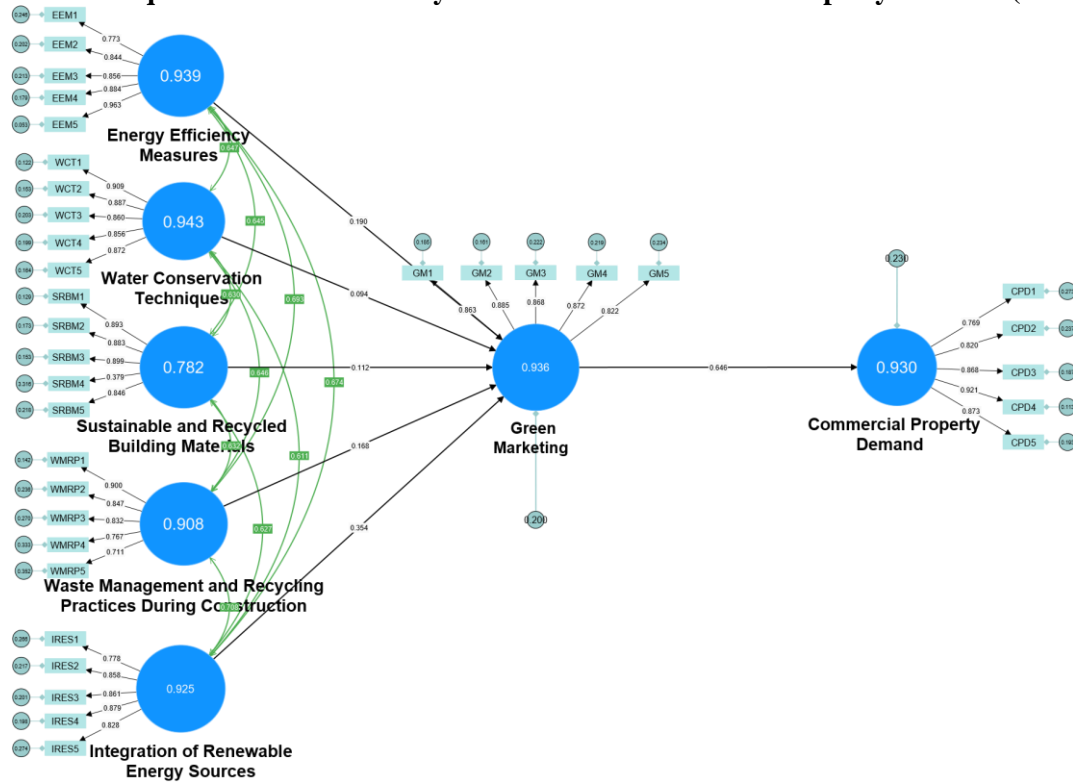
robust measure; however, SRBM4 (0.379) has a very low loading, suggesting it may be a moderate measure. The Water Conservation Technologies indicators WCT1 (0.909), WCT2 (0.887), WCT3 (0.860), WCT4 (0.857), and WCT5 (0.873) are all excellent to outstanding measures. Finally, for Waste Management and Recycling Practices, WMRP1 (0.896) is an excellent measure, WMRP2 (0.846) and WMRP3 (0.833) are robust measures, WMRP4 (0.771) is a fairly good measure, and WMRP5 (0.714) has a relatively low loading, potentially indicating a weaker measure.

Figure.3: Structural Equation Model for Study Variables of Commerical Property Demand (GFI and AGFI)



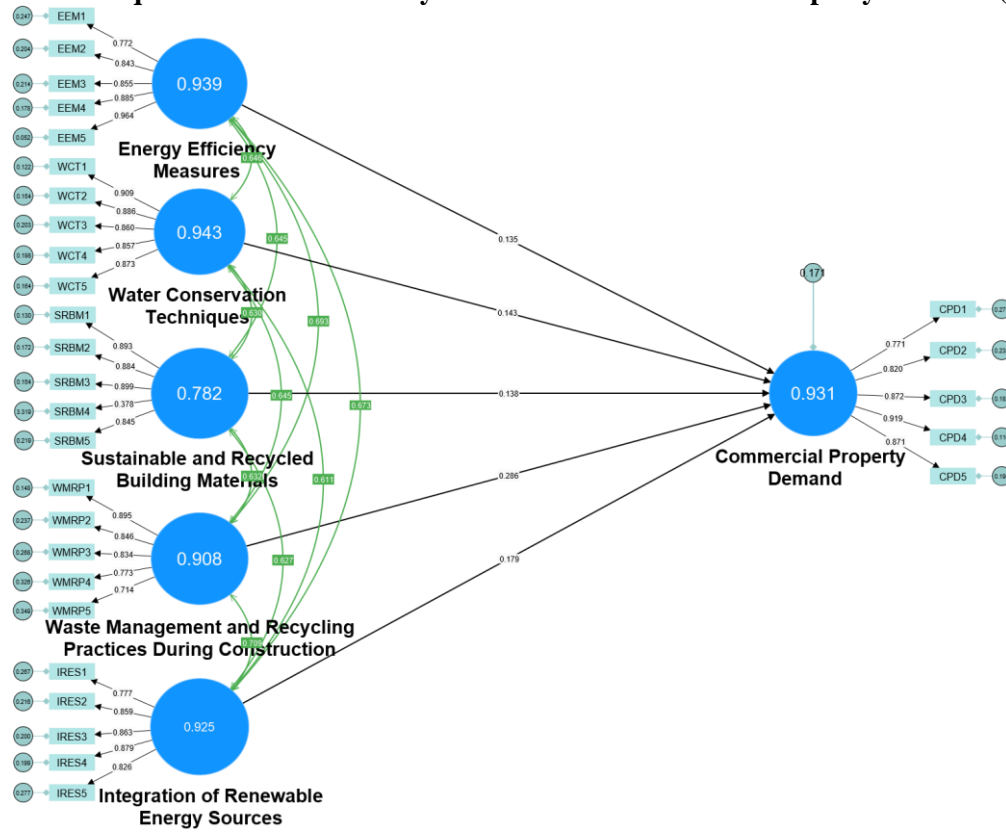
The ratio of chi-square to degrees of freedom ($\chi^2/df = 4.559$) is above the recommended cutoff of 3, suggesting a less than ideal fit (Kline, 2015). However, some researchers consider ratios as high as 5 to be acceptable (Schumacker & Lomax, 2010). The Root Mean Square Error of Approximation (RMSEA = 0.082, 90% CI [0.079, 0.086]) falls within the range of a mediocre fit, with values between 0.08 and 0.10 indicating a mediocre fit (MacCallum et al., 1996). The lower and upper bounds of the 90% confidence interval also support this interpretation. The Goodness-of-Fit Index (GFI = 0.734) and the Adjusted Goodness-of-Fit Index (AGFI = 0.690) are below the recommended cutoff of 0.90 for a good fit (Hooper et al., 2008), suggesting a moderate fit. However, these indices are known to be affected by sample size and should be interpreted with caution (Sharma et al., 2005). The Standardized Root Mean Square Residual (SRMR = 0.041) is below the recommended cutoff of 0.08, indicating a good fit (Hu & Bentler, 1999). The Normed Fit Index (NFI = 0.870), Tucker-Lewis Index (TLI = 0.885), and Comparative Fit Index (CFI = 0.895) are all above the recommended cutoff of 0.90, suggesting an acceptable to good fit (Hu & Bentler, 1999; Kline, 2015). In summary, while the chi-square statistic and some absolute fit indices (GFI, AGFI) suggest a less than ideal fit, the incremental fit indices (NFI, TLI, CFI) and the SRMR indicate an acceptable to good fit. The RMSEA falls within the mediocre range.

Figure.4: Structural Equation Model for Study Variables of Commerical Property Demand (In-Direct Effect)



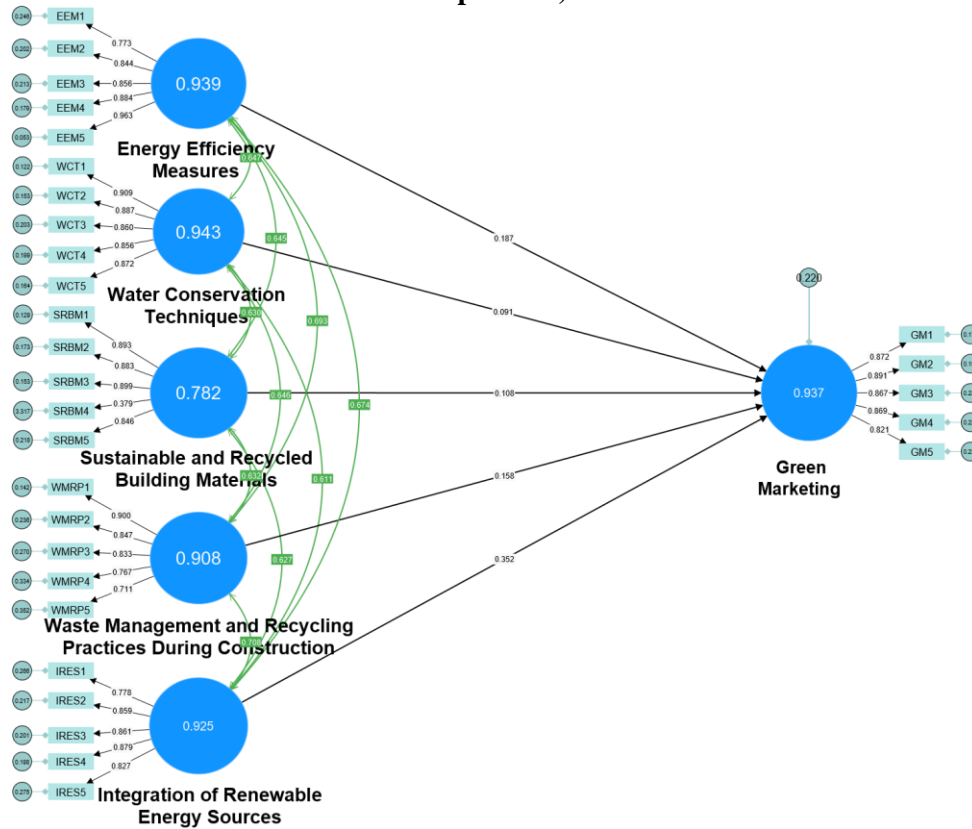
The significant chi-square statistic ($\chi^2 = 2610.985$, $df = 544$, $p < 0.001$) suggests a moderate fit, but this test is known to be sensitive to large sample sizes ($N = 525$), where even minor deviations can lead to significance (Kline, 2015). The ratio of chi-square to degrees of freedom ($\chi^2/df = 4.800$) exceeds the recommended cutoff of 3, indicating a less than ideal fit, although some researchers consider values up to 5 as acceptable (Schumacker & Lomax, 2010). The RMSEA value of 0.085 (90% CI [0.082, 0.088]) falls within the mediocre fit range of 0.08 to 0.10 (MacCallum et al., 1996). The GFI (0.729) and AGFI (0.686) are below the recommended 0.90 cutoff, suggesting a moderate fit, but these indices are sensitive to sample size (Sharma et al., 2005). The SRMR value of 0.081 is marginally above the 0.08 cutoff for a good fit (Hu & Bentler, 1999). However, the incremental fit indices, including NFI (0.862), TLI (0.877), and CFI (0.887), are close to or above the 0.90 cutoff, indicating an acceptable to good fit (Hu & Bentler, 1999; Kline, 2015). Overall, while some fit indices suggest room for improvement, others indicate an acceptable to mediocre fit, and it is recommended to consider the model fit holistically, along with theoretical and practical considerations (Marsh et al., 2004).

Figure.5: Structural Equation Model for Study Variables of Commerical Property Demand (Direct Effect)



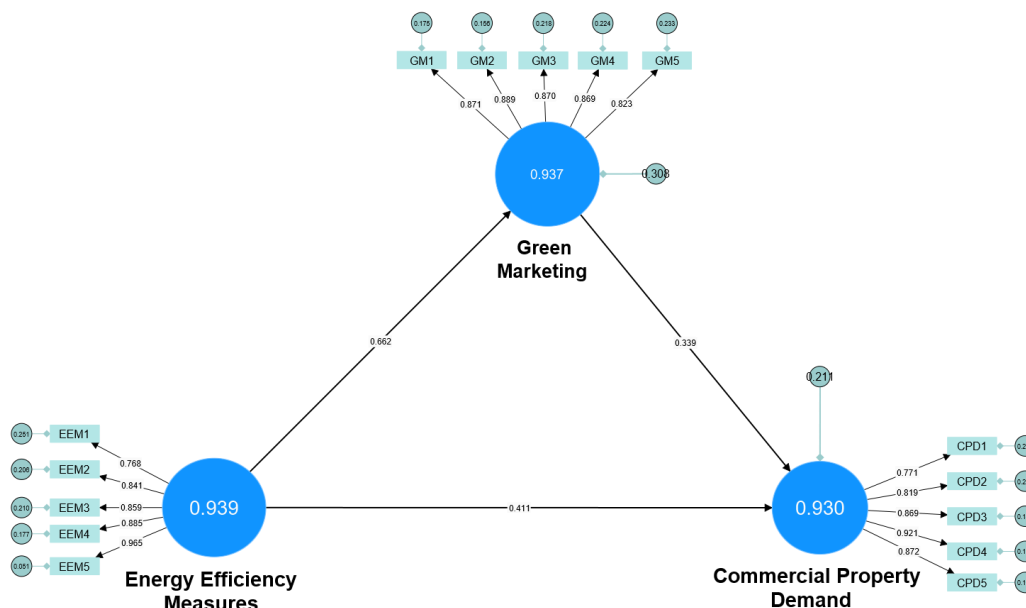
The chi-square statistic ($\chi^2 = 1758.121$, $df = 390$, $p < 0.001$) is significant, but this test is sensitive to large sample sizes like 525 (Kline, 2015). The ratio of chi-square to degrees of freedom ($\chi^2/df = 4.508$) is above the recommended cutoff of 3, indicating a less than ideal fit, although some researchers accept values up to 5 (Schumacker & Lomax, 2010). The RMSEA of 0.082 (90% CI [0.078, 0.086]) falls within the mediocre fit range of 0.08 to 0.10 (MacCallum et al., 1996). The GFI (0.784) and AGFI (0.743) are below the 0.90 cutoff, suggesting a moderate fit, but these indices are affected by sample size (Sharma et al., 2005). The SRMR of 0.041 is below the 0.08 cutoff, indicating a good fit (Hu & Bentler, 1999). The incremental fit indices NFI (0.888), TLI (0.900), and CFI (0.910) are close to or above the 0.90 cutoff, suggesting an acceptable to good fit (Hu & Bentler, 1999; Kline, 2015).

Figure.6: Structural Equation Model for Study Variables of Commerical Property Demand (Mediator as Dependent)



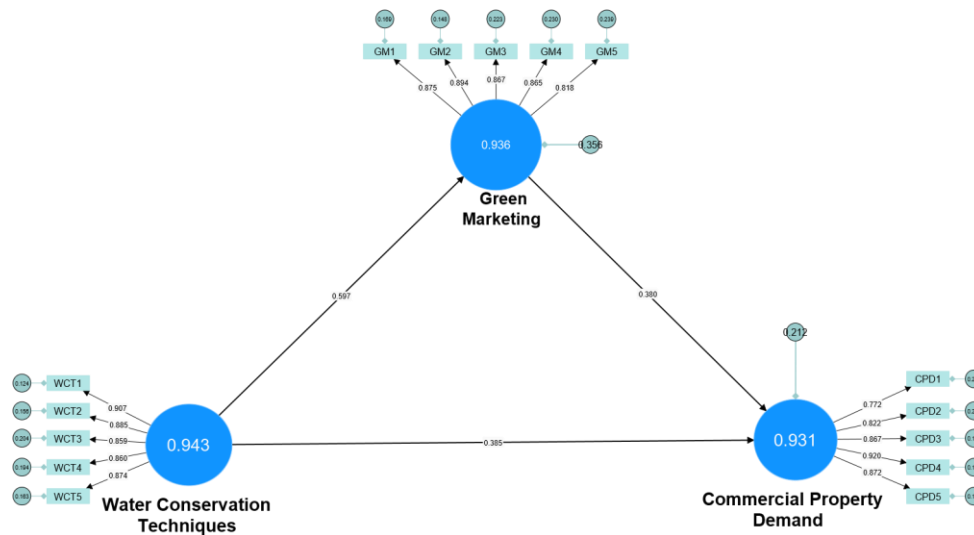
The chi-square statistic ($\chi^2 = 1786.909$, $df = 390$, $p < 0.001$) is significant, but this test is sensitive to large sample sizes like 525 (Kline, 2015). The ratio of chi-square to degrees of freedom ($\chi^2/df = 4.582$) is above the recommended cutoff of 3, indicating a less than ideal fit, although some researchers accept values up to 5 (Schumacker & Lomax, 2010). The RMSEA of 0.083 (90% CI [0.079, 0.086]) falls within the mediocre fit range of 0.08 to 0.10 (MacCallum et al., 1996). The GFI (0.780) and AGFI (0.738) are below the 0.90 cutoff, suggesting a moderate fit, but these indices are affected by sample size (Sharma et al., 2005). The SRMR of 0.039 is below the 0.08 cutoff, indicating a good fit (Hu & Bentler, 1999). The incremental fit indices NFI (0.887), TLI (0.899), and CFI (0.909) are close to or above the 0.90 cutoff, suggesting an acceptable to good fit (Hu & Bentler, 1999; Kline, 2015).

Figure.7: The Linkage among Energy Efficiency Measures, Green Marketing and Commercial Property Demand



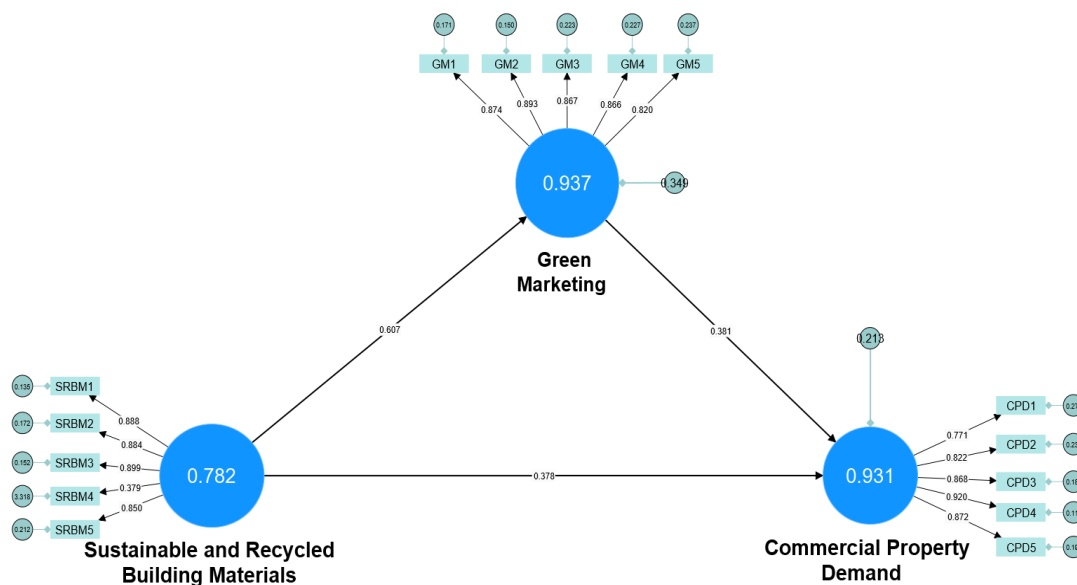
The chi-square statistic ($\chi^2 = 511.163$, $df = 87$, $p < 0.001$) is significant, but this test is sensitive to large sample sizes like 525 (Kline, 2015). The ratio of chi-square to degrees of freedom ($\chi^2/df = 5.875$) is above the recommended cutoff of 3 and the more liberal cutoff of 5, indicating a moderate fit (Schumacker & Lomax, 2010). The RMSEA of 0.096 (90% CI [0.088, 0.105]) falls within the moderate fit range of above 0.10 (MacCallum et al., 1996). The GFI (0.863) is below the 0.90 cutoff, but the AGFI (0.811) is above it, suggesting a mixed fit for these indices, which are affected by sample size (Sharma et al., 2005). The SRMR of 0.039 is below the 0.08 cutoff, indicating a good fit (Hu & Bentler, 1999). The incremental fit indices NFI (0.933), TLI (0.932), and CFI (0.944) are above the 0.90 cutoff, suggesting a good fit (Hu & Bentler, 1999; Kline, 2015).

Figure.8: The Linkage among Water Conservation Techniques, Green Marketing and Commercial Property Demand



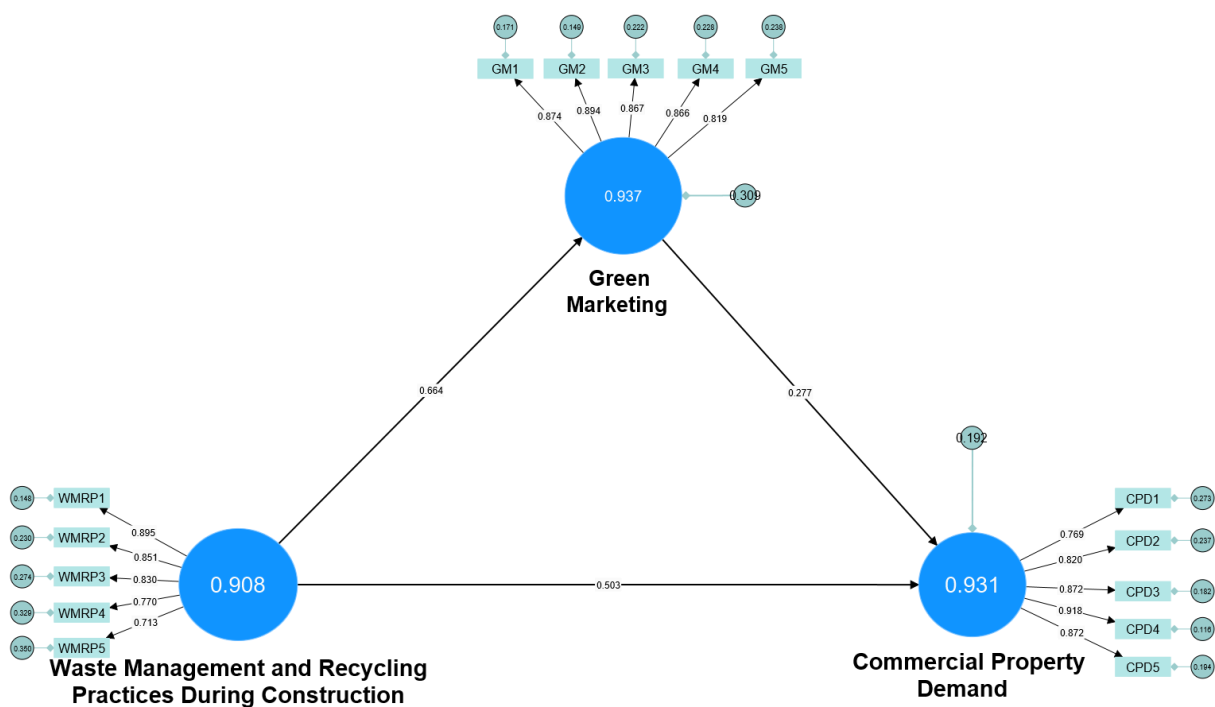
The chi-square statistic ($\chi^2 = 579.965$, $df = 87$, $p < 0.001$) is significant, but this test is sensitive to large sample sizes like 525 (Kline, 2015). The ratio of chi-square to degrees of freedom ($\chi^2/df = 6.666$) is above the recommended cutoff of 3 and the more liberal cutoff of 5, indicating a moderate fit (Schumacker & Lomax, 2010). The RMSEA of 0.104 (90% CI [0.096, 0.112]) falls within the moderate fit range of above 0.10 (MacCallum et al., 1996). The GFI (0.851) and AGFI (0.795) are below the 0.90 cutoff, suggesting a moderate fit for these indices, which are affected by sample size (Sharma et al., 2005). The SRMR of 0.038 is below the 0.08 cutoff, indicating a good fit (Hu & Bentler, 1999). The incremental fit indices NFI (0.924), TLI (0.921), and CFI (0.935) are above the 0.90 cutoff, suggesting a good fit (Hu & Bentler, 1999; Kline, 2015).

Figure.9: The Linkage among Sustainable and Recycled Building Materials, Green Marketing and Commercial Property Demand

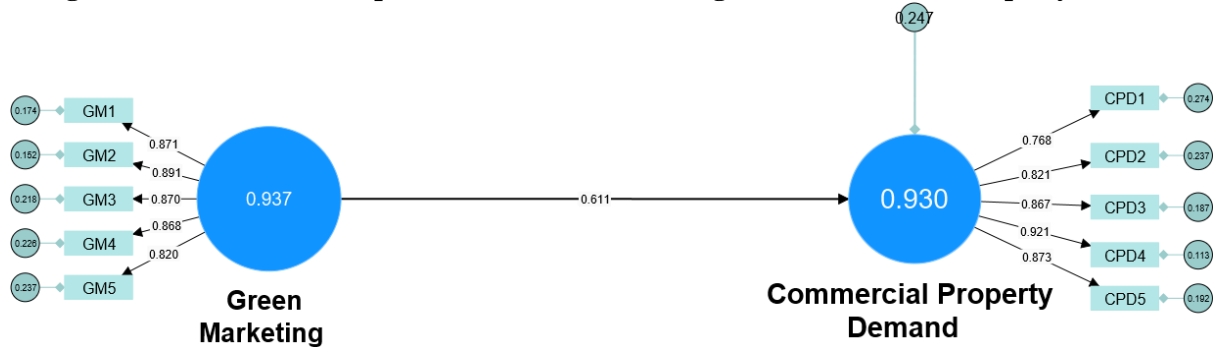


Based on the provided data, the model appears to have a relatively moderate fit to the observed data. The chi-square statistic (556.832) is significant (p-value = 0.000), indicating that the model does not adequately fit the data. The ratio of chi-square to degrees of freedom (ChiSqr/df = 6.400) is higher than the recommended threshold of 3, further supporting the lack of model fit (Kline, 2015). The Root Mean Square Error of Approximation (RMSEA = 0.101) also exceeds the acceptable range of 0.05 to 0.08, suggesting a moderate model fit (Browne & Cudeck, 1993). Additionally, the Goodness of Fit Index (GFI = 0.860) and the Adjusted Goodness of Fit Index (AGFI = 0.806) are below the recommended cutoff of 0.90, indicating a less than desirable model fit (Hu & Bentler, 1999). However, the Standardized Root Mean Square Residual (SRMR = 0.039) is within the acceptable range of less than 0.08, suggesting a relatively good fit in terms of the residuals (Hu & Bentler, 1999). The Normed Fit Index (NFI = 0.922), Tucker-Lewis Index (TLI = 0.919), and Comparative Fit Index (CFI = 0.933) are all above the recommended threshold of 0.90, indicating an acceptable incremental fit (Bentler & Bonett, 1980; Tucker & Lewis, 1973). Overall, the model exhibits a mixed performance, with some fit indices suggesting an adequate fit and others indicating a moderate fit, warranting further investigation and potential model modifications

Figure.10: The Linkage among Waste Management and Recycling Practices During Construction, Green Marketing and Commercial Property Demand



Based on the provided data, the model exhibits a moderate fit to the observed data. The chi-square statistic (697.167) is significant (p-value = 0.000), indicating that the model does not adequately fit the data. The ratio of chi-square to degrees of freedom (ChiSqr/df = 8.013) is higher than the recommended threshold of 3, further supporting the lack of model fit (Kline, 2015). The Root Mean Square Error of Approximation (RMSEA = 0.116) exceeds the acceptable range of 0.05 to 0.08, suggesting a moderate model fit (Browne & Cudeck, 1993). Additionally, the Goodness of Fit Index (GFI = 0.815) and the Adjusted Goodness of Fit Index (AGFI = 0.745) are below the recommended cutoff of 0.90, indicating an unsatisfactory model fit (Hu & Bentler, 1999). The Standardized Root Mean Square Residual (SRMR = 0.044) is within the acceptable range of less than 0.08, suggesting a relatively good fit in terms of the residuals (Hu & Bentler, 1999). The Normed Fit Index (NFI = 0.903), Tucker-Lewis Index (TLI = 0.896), and Comparative Fit Index (CFI = 0.914) are close to the recommended threshold of 0.90, indicating a marginally acceptable incremental fit (Bentler & Bonett, 1980; Tucker & Lewis, 1973). Overall, the model exhibits a moderate fit based on most fit indices, with only the SRMR and incremental fit indices suggesting a marginal fit. Substantial model modifications or an alternative model specification may be necessary to improve the fit to the observed data.

Figure.11: The Relationship between Green Marketing and Commercial Property Demand

The provided data suggests that the model exhibits a moderate overall fit to the observed data. The chi-square statistic (354.132) is significant (p -value = 0.000), indicating that the model does not adequately fit the data. The ratio of chi-square to degrees of freedom ($\text{ChiSqr}/df = 10.416$) is substantially higher than the recommended threshold of 3, further reinforcing the lack of model fit (Kline, 2015). The Root Mean Square Error of Approximation (RMSEA = 0.134) exceeds the acceptable range of 0.05 to 0.08, suggesting a moderate model fit (Browne & Cudeck, 1993). While the Goodness of Fit Index (GFI = 0.862) is close to the recommended cutoff of 0.90, the Adjusted Goodness of Fit Index (AGFI = 0.777) falls below the acceptable level, indicating an unsatisfactory model fit (Hu & Bentler, 1999). The Standardized Root Mean Square Residual (SRMR = 0.043) is within the acceptable range of less than 0.08, suggesting a relatively good fit in terms of the residuals (Hu & Bentler, 1999). The Normed Fit Index (NFI = 0.926), Tucker-Lewis Index (TLI = 0.911), and Comparative Fit Index (CFI = 0.933) are above the recommended threshold of 0.90, indicating an acceptable incremental fit (Bentler & Bonett, 1980; Tucker & Lewis, 1973). Overall, while the incremental fit indices and SRMR suggest an adequate fit, the majority of the fit indices, particularly the chi-square statistic, chi-square to degrees of freedom ratio, and RMSEA, indicate a moderate model fit. Substantial modifications or an alternative model specification may be necessary to improve the fit to the observed data.

Conclusion: -

Therefore, it can be concluded that the antecedents of green building practices will enhance the value of property demand in the future. The various factors like: energy efficiency measures, water conservation techniques, sustainable and recycled building material, waste management and recycling processes are the various green management techniques which create more value to the property in the real estates.

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