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Green building certification: impact on employee engagement.

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Abstract:
This paper examines the effect of Green Building Certification on employee satisfaction, with particular focus on the link between sustainability practices and organisational engagement. The first research questions are to determine how informed the employees are regarding green building practices and secondly, how the perceived benefits affect the level of participation. The data for this study was gathered from one hundred employees of organizations with green building certifications by use of structured questionnaires, and analyzed by Exploratory Factor Analysis (EFA) and regression analysis by use of SPSS and AMOS. The study shows that awareness of green building initiatives is relatively high among employees, although this awareness is not necessarily associated with greater levels of engagement. A negative correlation was established between the perceived benefits of green buildings and employee engagement, meaning that if employees are unaware of the benefits of such practices, they may be less engaged. Therefore, to ensure that green building certifications are valued and supported, organisations have to clearly explain how organisations and their workers stand to gains, for instance, through enhanced health and productivity. Based on the findings of the study, it is recommended that greater focus should be placed on the engagement of employees in sustainability programmes and improvement of communication channels as ways of achieving higher effectiveness in sustainability. Subsequent studies should also take into account such factors as organizational culture and personal values to enhance knowledge of this relationship. Finally, this research underscores the need for organizations to integrate green building practices with the engagement frameworks to enhance the workforce engagement and organizational results.

Keywords: Green Building Certification, Employee Engagement, Sustainability Initiatives, Workplace Satisfaction, and Awareness

1.1 Introduction

Over the last decade, green building certification has become a vital strategy for addressing environmental issues in our world Wei et al. (2015) . This certification indicates a set level of approach towards the sustainable nature of the construction and the design of buildings with aim of reducing resource use, optimizing energy utilization and decreasing the impact on the environment Uğur and Leblebici (2018). Some of the most recognized certification programs include the LEED- ESD (Leadership in Energy and Environmental Design) and BREEAM (Building Research Establishment

Environmental Assessment Method) that contain elaborate principles for evaluating and rating of excellent performing buildings. Since the adoption of these sustainable practices becomes more and more a common strategy for organizations, the understanding of the effects on the employees becomes Rasheed (2025) necessary.

In other words, employee engagement is a critical success factor in organizations, which refers to the psychological attachment that employees have to their tasks and organizations Assetta (2019). Employees who are engaged perform better on their tasks, have higher levels of job satisfaction and lower turnover intention Razali et al., (2024). The nature of workplace has a strong correlation with the level of engagement and green buildings have some specific features which can improve the engagement Palupiningtyas (2024). Several studies show that workers occupying green certified buildings are more satisfied, motivated, and healthy than workers in non-green buildings Singh (2024) . Facilities such as better ventilation systems, daylight, and natural spaces lead to a healthier and engaging working environment resulting in better staff health and productivity Au-Yong et al. (2022) . People productivity and satisfaction and green building certification: a review of existing literature & empirical evidence, Darko et al. (2013) . First of all, the understanding and recognition of the green activities by the employees are the key factors influencing their perception of the organizational environment Kain (2015). Whenever employees are let in on what their organization is doing for the environment, they are sure to have a sense of pride and commitment which will go a long way in enhancing their engagement levels. This awareness does not only strengthen their link with the organization's objectives but also make the staff, employees, or workers of the organization embrace organizational values Labartino (2018).

Secondly, the perceived benefits of green buildings are closely linked with job satisfaction. The study has found that those employees who are aware of the benefits of such working conditions, including energy conservation and improved inside conditions, also tend to show higher levels of workplace satisfaction. This satisfaction can lead to enhanced motivation and productivity; people are willing to expend effort at work since they enjoy the ambiance created to complement the working environment Parida et al. (2021).

Furthermore, green buildings may also create a healthy and productive corporate culture that supports teamwork and creativity Ujma et al. (2024) . Sustainability commitment strengthens the interaction of team members as well as promotes the spirit of togetherness among the employees Qiu et al. (2016) Grzegorzewska and Kirschke (2021). Talking and working on sustainability and green projects improve interpersonal relationships and increase individual attachment to the organization.

It is noteworthy that awareness of the impact of green building certification on employees is becoming critical to organizations seeking to create the best environment to cultivate top talent. When there are many employers in the job market, clients look for those organizations that embrace sustainability and care for their employees' welfare Ober (2024) . Through such a policy of engagement, organizations promote the sustainability of the environment and also improve their performance and image Islam et al. (2023).

1.2 Background of the Study

Due to the rising pressure towards environmental conservation, the construction of buildings has been affected greatly by change in design, construction and use. Green building certification has become one of the significant approaches that can be used to enhance the efficiency of resource utilisation in built environment projects; with the goals of reducing energy consumption, and waste and improving resource use efficiency Ade and Rehm (2020). Holders of the LEED (Leadership in Energy and Environmental Design) and BREEAM (Building Research Establishment Environmental Assessment Method) certification programs establish strict guidelines for determining the environmental efficiency of buildings. Besides promoting the use of sustainable practices, these programs also help to identify and reward organizations that are environmental friendly Ebert et al. (2011).

The significance of green building practice is not only determined by the environmental aspects, but it also touches on people aspects such as the employees' health and productivity Kaya (2021) . While organizations have attempted to improve employees' wellbeing through healthy workplace, there is evidence that green building leads to better indoor air quality, more daylight, and thermal comfort Yudelson (2010). Many of these factors have been associated with increased levels of employee satisfaction, productivity and general health. Therefore, organizations that embrace green building certification can be rewarded through employee engagement since workplace environment is positive

and staff committed Boarin et al. 2014.

The significance of employee engagement as a determinant of organizational performance has gradually emerged as a key determinant of organizational performance. Employees with high level of engagement are productive, creative and committed hence reducing the turnover and increasing job satisfaction among the employees Espinoza et al. (2012) . The physical environment of the workplace is critical to the concept of engagement and the shift to green building offers organizations a chance to improve this factor Yudelson (2016). In the process of designing healthy buildings, business organizations can strengthen their mission to reflect the employees' values, thus eliciting pride.

This research recognizes the increase in literature about green building practices but found a research gap in determining the direct correlation between green building certification and employee engagement. This study aims at filling that gap by examining the following research questions: Awareness of green initiatives and perceived benefits of green buildings; Employee engagement, job satisfaction and workplace culture Korkmaz et al. In this way, the research will seek to establish the above factors in order to help organisations to understand how they can make use of green building certification in order to improve the levels of employee engagement and organisational performance Licina et al. (2021). Knowledge of such dynamics will become crucial as companies strive to develop sustainable environments for their employees and stakeholders Cidell (2009).

1.3 Objectives of the study

1. To investigate the correlation between green building certification and employee engagement in organisations' work place, in terms of participants' perception of the physical environment and its sustainability attributes.
2. To evaluate the relationship between awareness of green building initiatives and perceived benefits of sustainable practices on job satisfaction and total organizational commitment in green certified organizations.

1.4 Literature review

Leskinen et al. (2020) surveyed empirical studies on the effects of green certificates on property cash flows and values from the view of professional property investors. Employing the discounted cash flows (DCF) approach, they synthesized over 70 quantitative peer-reviewed papers. According to the results of the study, green certificates improved rental yields and decreased operating costs, rates of vacancies, and related risks, which in turn means higher property values. The literature expanded in the 2010s, with studies moving from the asset-level to the portfolio-level. Although the advantages of certification have been well documented, they are not universal and have been most frequently studied with regards to the commercial real estate markets in the United States and LEED and ENERGY STAR certifications. The researchers pointed out limitations of extending these results to other markets and stressed the importance of property value reporting to promote sustainable investment.

Newsham et al. (2018) examined the relationship between office accommodation and organizational productivity using quantitative data obtained from 14,569 employees of a large Canadian financial organization.The study contrasted the results obtained from employees of green certified offices (sample size = 10) with those of similar non-green offices (sample size = 10).ofessional property investors. Using discounted cash flows (DCF) as a methodological framework, they analyzed over 70 peer-reviewed studies. The findings indicated that green certificates increased rental income while reducing operating expenses, vacancy rates, and associated risks, which collectively contributed to higher property values. The number of studies grew rapidly in the 2010s, shifting from asset-level to portfolio-level analyses. While the benefits of certification were evident, they varied widely, with many studies focusing on U.S. commercial real estate markets and LEED and ENERGY STAR certificates. The researchers noted challenges in applying these findings to other markets and emphasized the need for property values to reflect environmental performance to encourage sustainable investment practices.

Newsham et al. (2018) investigated the impact of office accommodation on organizational productivity by analyzing data from 14,569 employees of a large Canadian financial organization. The study compared outcomes between those working in green-certified office buildings (n = 10) and those in similar conventional buildings (n = 10). The results revealed that employees in green-certified buildings are more satisfied with their jobs, more valuable to clients and stakeholders, had better evaluation of their management, and increased corporate participation. Also, there was a trend indicating that managers gave a higher rating on job performance in green certified building. Nevertheless, not all

green certified buildings were found to perform better than conventional buildings and enhanced performance was not recorded in all the indicators used. One of the key learnings of the study was that such metrics are regularly gathered by organisations, but integrating them to the building characteristics has not often been done before. These achievements represent new possibilities for further analysis of existing datasets in the sphere of building performance.

Athamneh (2024) studied the relationship between Green Workplace Design (GWD) and employees' satisfaction and performance in the Jordanian public organizations. In the study, self-administered questionnaires were conducted on 360 participants working in the identified GWD structures that embraced workplace design; Employee Productivity Scale, Employee Engagement Scale and Green Workplace Design Scale were used. The study established a favourable relationship between GWD and engagement, which improved by 35.2%, and productivity, which enhanced by a remarkable 45.5%. What is more, the results revealed that increased levels of employee engagement at the onset were linked to a 19.7% dip in productivity. However, GWD served as the intermediary that constructed a targeted and a multipurpose environment that fostered participation. This underlines the need for creating organizational environments that would support employee's health, foster effective communication, learning, and creativity. Given that light supply is scarce in areas such as Jordan and that many public sector buildings are poorly designed, the adoption of GWD could change organizations' performance dramatically and enhance staff relations and interactions.

Herazo and Lizarralde (2015) have reviewed how Green Building Certifications (GBCs) have impacted buildings processes particularly focusing on cooperation and creativity in architectural endeavours. Sustainable development (SD) has influenced architecture on a global scale, however, the research found a knowledge gap in understanding of the effects of GBCs on the process of building construction rather than the end result. The research involved a total of 19 interviews with built environment professionals and explored three architecture projects in Canada that have attained a commonly known GBC and were informed by SD principles throughout the design and construction phases. The findings revealed that the processes within these projects were affected by four key tensions: Strategic-tactical, cooperation-competition, fulfilling-effective, individual-group. Such tensions can be positively or negatively productive in terms of fostering the project collaboration and innovation. The study hence underlined the need to look at GBCs as a process rather than an end product, and the need to manage these tensions to enhance both product and process performance.

Brazdauskas and Žirnelė (2020) also made a conceptual input into the ongoing debates regarding the enhancement of furthering the green office development and encouraging employees 'buy-in'. They operationalised the concept of "green office" or "sustainable office" as the practices that sought to minimise the adverse environmental effects of office processes and operations as well as promote sustainable development. The paper was built around the concept of employee-led processes of engagement and motivation and the generation of ideas and solutions; therefore; discussions of green building design features or infrastructural strategies were not addressed in the paper. The main goal was to offer recommendations on how the people at workplace can take an initiative and get engaged in development of environmentally friendly working environment and promote green ideas in solving sustainability issues at the workplace, as well as encouraging their "green entrepreneurship". The authors emphasized three fundamental trajectories of action: environmental enablers for green offices, encouraging sustainable office consumption and management, and enhancing waste management for a healthy green environment.

1.5 Methodology

Research Design: The research method of this study is quantitative in nature in order to assess the effect of green building certification on engagement. Thus, relying on the systematic approach, the research expects to collect quantitative data that will enable the application of statistical analysis to explain the interconnections between the constructs being studies. The emphasis is made on the evaluation of the level of engagement of employees and correlation between the latter and the level of green building activities more important in the context of the modern world with its tendencies of environmental responsibility of companies and organizations.

Study Area: The research will be carried out in different green certified buildings in Bhopal, India where many organizations have embraced sustainability. There is a steady rise in the uptake of green building practices in this region, owing to environmental and people's' health issues. The chosen facilities belong to various industries; some of them are office buildings, educational facilities, and

healthcare centers, so the results of the application of green certifications can be compared in various contexts and with regard to the level of employees' engagement.

Population and Sample: The target population of this research comprises the employees in the working green certified buildings within the study area. Probability sampling will be used here whereby each participant stand an equal probability of being sampled as the other employee. These help to increase the density of the sample and exclude various kinds of bias in the process. A sample size of 100 employees will be targeted in order to have a range of opinions on the effectiveness of green building certification for enhancing employees' engagement.

Data Collection Methods: Information will be obtained from an employee self-completion survey, which will comprise of items that have been developed based on the selected theoretical constructs such as employee engagement, green building awareness, perceived benefits of sustainability, and job satisfaction. The questionnaire will include statements, which will be self-administered using a 5- Likert scale with options that will include Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree. The survey will be conducted in a manner that the participants can complete the survey through the internet, and this is due to the fact that it would be easier to administer and complete.

Data Analysis: The collected data will be analyzed and hence conclusions will be made from the data collected using various statistical methods. To begin with, Explororatory Factor Analysis (EFA) will be conducted on the returned questionnaires using SPSS in order to examine the first dimensionality of the set items and or factors that account for the observed variation in responses. Before this, Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy will be computed to ensure that the data is appropriate for factor analysis, KMO value greater than 0.6 is acceptable.

After EFA, CFA will be conducted using AMOS to confirm the factor structure that has been determined in the current study. This step is very important so as to increase the reliability and validity of the proposed model against the collected data. Also, frequency and percentage distribution will be used to present the demographic profile of the sample while tests of correlation and regression analysis will be used to test the relationship between the identified factors and the level of employee engagement.

1.6 Data analysis

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.662
Bartlett's Test of Sphericity	Approx. Chi-Square	2721.618
	df	300
	Sig.	.000

The analysis started with the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity, which are crucial to check the factor analysis suitability. The KMO value derived was 0.662, which can be interpreted as moderate sampling adequacy. However, using Kaiser's recommendation, values ranging between 0.60 and 0.70 are considered acceptable for EFA, and therefore the sample size is adequate to detect the underlying structures among the variables. Bartlett's Test of Sphericity came up with an approximate Chi-Square value of 2721.618 with the Sig. of 0.000. This result shows that the correlation matrix is not an identity matrix which is an affirmation that there are sufficient correlations among the variables to allow factor analysis. The fact that the significance level of 0.05 is less than 0.05 also substantiate the conclusion on the suitability of the data for the EFA since it indicates that the variables are related and therefore can form factors. In conclusion, the KMO measure and Bartlett's Test confirm the suitability of the presented research model for further analysis and investigation of the correlation between green building certification and employee engagement.

Table1. Regression Weights: (Group number 1 - Default model)

			Estimate	**S.E.**	**C.R.**	**P**	**Label**
EE	<---	AGBC	6.136	3.791	1.619	.105	
EE	<---	WCE	.003	.032	.100	.920	
EE	<---	JS	.011	.023	.486	.627	
EE	<---	PBGB	-.341	.066	-5.205	***	

			Estimate	S.E.	C.R.	P	Label
AGBC5	<---	AGBC	1.000				
AGBC4	<---	AGBC	.652	.745	.875	.381	
AGBC3	<---	AGBC	7.744	4.742	1.633	.102	
AGBC2	<---	AGBC	6.460	3.979	1.623	.104	
AGBC1	<---	AGBC	7.092	4.346	1.632	.103	
PBGB5	<---	PBGB	1.000				
PBGB4	<---	PBGB	1.144	.135	8.485	***	
PBGB3	<---	PBGB	1.325	.135	9.784	***	
PBGB2	<---	PBGB	.961	.134	7.182	***	
PBGB1	<---	PBGB	-.015	.097	-.150	.881	
JS5	<---	JS	1.000				
JS4	<---	JS	.234	.388	.603	.547	
JS3	<---	JS	-.011	.025	-.436	.663	
JS2	<---	JS	.041	.084	.493	.622	
JS1	<---	JS	-.001	.011	-.099	.921	
WCE5	<---	WCE	1.000				
WCE4	<---	WCE	.920	.068	13.617	***	
WCE3	<---	WCE	.820	.053	15.506	***	
WCE2	<---	WCE	-.304	.092	-3.304	***	
WCE1	<---	WCE	.256	.091	2.809	.005	
EE1	<---	EE	1.000				
EE2	<---	EE	1.167	.148	7.862	***	
EE3	<---	EE	1.560	.177	8.809	***	
EE4	<---	EE	1.053	.153	6.864	***	
EE5	<---	EE	1.349	.159	8.499	***	

Regression analysis of the model that measures the relationship between different independent variables and EE highlighted some important findings. The results in the form of regression weights show the magnitudes and signs of the real-life relationships between the constructs in question. In the analysis, the direct impact of Awareness of Green Building Certification (AGBC) on engagement is emphasized. The estimated regression weight of 6.136 imply that there is a positive relationship between AGBC and EE. However, the calculated critical ratio (C.R.) of 1.619 with a significance level of 0.105 suggest that this relationship is not statistically significant at the conventional levels ($p < 0.05$). This implies that although there is a significant relationship established there is not a strong enough relationship to state that AGBC has a direct influence on employee engagement definitively. On the other hand, the regression weights of the Perceived Benefits of Green Buildings (PBGB) are negative at -0.341 with C.R. of -5.205 and P-value of ***. This means that perceived benefits have a negative and direct relationship with the level of engagement of the employees in green buildings, where perceived benefits are lower among employees. This result is particularly interesting as it might suggest that organisations should increase awareness of the potential benefits achieved through the implementation of green initiatives to improve the employee engagement.

The other independent variables that were used in the model for example; Job Satisfaction (JS) and Workplace Comfort Environment (WCE) were not correlated with employee engagement. In particular, JS had regression weight of 0.011 and C.R. of 0.486 which gives p-value of 0.627, not showing strong impact to the level of engagement of the employees. Likewise, WCE had a regression weight of 0.003 with C.R. of 0.100, and p-value of 0.920 indicating that these constructs may not significantly affect engagement in this study.

The regression weights for the various indicators within each construct also give important information. In the context of AGBC, the coefficients for the indicators AGBC5 to AGBC1 suggest that these have differential importance. Thus, even though the indicator AGBC4 yielded a regression weight of 0.652,

the significance of this was not statistically supported (p = 0.381). However, other factors such as AGBC3 and AGBC1 were almost significant, and therefore, could be explored in more detail. In the case of the analysis of the Perceived Benefits of Green Buildings (PBGB), the indicators proved to have significant reliability. For example PBGB4 with regression weight of 1.144 and PBGB3 with 1.325 were significant at $p < 0.001$ level; this suggests that these aspects are positively correlated with the overall perception of benefits of green buildings.

The regression weights of the various indicators for job satisfaction (JS) were insignificant, as seen from the estimates of about 0.041, and high p-values (greater than 0.5) for each JS indicator. This absence of relationship indicates a possibility of the nature of the job satisfaction to be further examined for other components that may have stronger relationship with the level of engagement of the employees. Likewise, the Workplace Comfort Environment (WCE) indicators also showed high level of significance in some cases, particularly for WCE4 and WCE3 with regression weights of 0.920 and 0.820 respectively. These results imply that particular aspects of comfort at the workplace may be important in affecting engagement, and therefore, the contents of comfort should be explored in order to determine what aspects are most significant.

Table 2. CMIN MODEL

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	53	1241.654	272	.000	4.565
Saturated model	325	.000	0		
Independence model	25	2339.986	300	.000	7.800

The results of the model fit statistics of the analysis provide important information about the structural equation modeling that was done in this study to measure the effect of green building certification on employee engagement. The closest indicator of goodness of fit is the Chi-Square statistic (CMIN) that quantifies the difference between the observed and the expected covariance matrices. For the default model, the number of parameters is 53; thus, the CMIN equals 1241.654, and the degrees of freedom is 272. This gives the p-value of 0.000 which means that there is a statistically significant difference between the observed and estimated models. The CMIN/DF ratio is equal to 4.565 meaning that the model of structural equation was also acceptable, because commonly acceptable threshold for this index varies between 2 and 5.

In contrast, the saturated model that offers an ideal fit with the different parameters set equal to the number of observed variances and covariances yielded a CMIN of 0.000 with 0 degrees of freedom. This means that the saturated model provides the best account of the data since the observed and expected frequencies are one and the same. It is used in evaluating how well other models fit the model. On the other hand, the independence model, which is a model with no hypothesized relations between the observed variables, has an NPAR of 25, CMIN of 2339.986 and 300 degrees of freedom. The p-value is also 0.000 which states that the variables are far from being independent and the CMIN/DF which is 7.800 is also poor fit value.

These model fit statistics indicate that although the default model does not provide a perfect fit of the data, it is a better fit than the independence model. The value of CMIN close to and less than 3, especially the ratio of CMIN/DF suggests that the areas of model improvement can be found and may be addressed by modification indices or by considering the theoretical propositions in the development of the theoretical model. In addition, these statistics indicate that model fit should be evaluated in structural equation modeling since the results give an indication of the extent to which the specified model is appropriate.

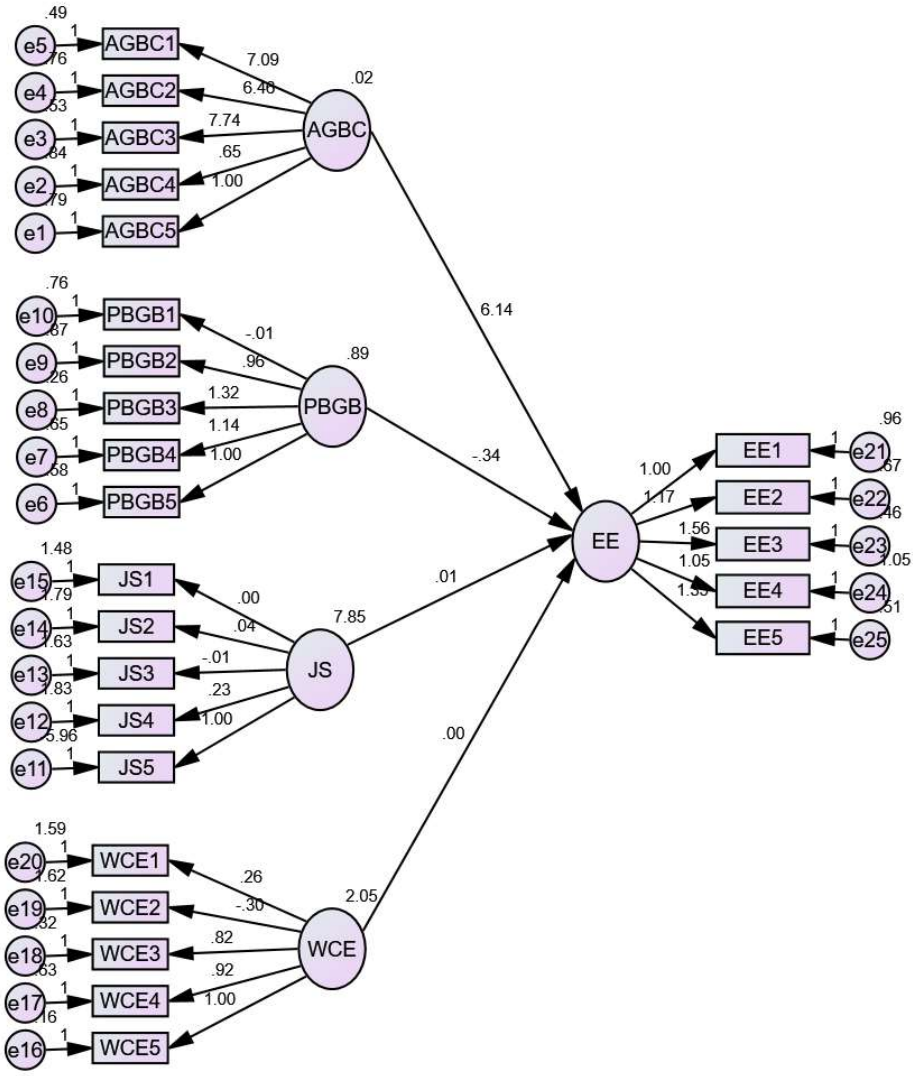

Figure 1. Exploratory factor analysis (EFA)

1.7 Discussion

The analysis of the effects of green building certification on employees shows some important findings and implications for organisations interested in engaging their workforce in sustainable work environments. The regression analysis revealed that although the Awareness of Green Building Certification (AGBC) was positively related to the employee engagement (EE), this relationship was not significant. This implies that just as awareness of green building initiatives may not be sufficient to increase engagement levels among employees. There is a need for organizations to investigate further into the factors that underpin perception and experience of employees in relation to green buildings. It seems that increased communication about the practical utility of green certifications, like better indoor environments, lower energy costs, and the general health of employees, may be the key to a closer association between green building and employee involvement. On the other hand, the negative correlation between the Perceived Benefits of Green Buildings (PBGB) and employees engagement was more astonishing. Those who expect less in terms of benefits from green initiatives may not only show less engagement, which is an important finding indicating that there may be a gap in the

organization's sustainability initiatives and employees' perceptions. That is why, it is crucial to involve employees into sustainability efforts and make them better recognize how sustainability efforts influence the workplace and their well-being. If the employees are engaged in decision making of sustainability related issues, they are likely to have the same perception of the value addition of green initiatives and this could lessen the negative effect witnessed in the study. In addition, the analysis of the model fit statistics showed that the default model provided a satisfactory fit while there is still potential for model improvements. The observed Chi-Square values and CMIN/DF ratios indicate that although the model captures some of the essential determinations, further modifications are required to enhance its goodness of fit. Future studies could include one or more other variables or dimensions for example organizational culture or individual employee values on sustainability that could mediate the effects of Green Building Certification on employee engagement.

1.8 Conclusion

Thus, the findings of this research show that green building certification is connected with the level of employee engagement in a complex way, which can be useful for organisations interested in the improvement of both sustainable practices and the level of employees' satisfaction. The results show that even though the employees have some perception about the green building initiatives, this perception does not necessarily translate into higher level of engagement. More critically, it established that the level of perceived benefits of green buildings was negatively related to the level of employees' engagement; that is, if the employees are not perceiving the benefits of green building initiatives, their engagement could be low. This indicates that for organizations to achieve optimal results from their green practices, they should not only adopt green practices, but also ensure that they disseminate the real benefits accruing from the adoption of green practices including health, productivity and costs. The results indicate that there is a need to engage the employees directly in the process of sustainability reporting. When employees are involved in decision making processes, and they can now see the outcomes of green initiatives in their workplace, then they will be willing to accept those practices. It is also important for organisations to improve communication in support of green building certifications to ensure that the employees comprehend the distinct benefits of the certifications to their wellbeing and job satisfaction. It can help to reduce the negative effects, which were mentioned in the study, and promote the more positive attitude towards sustainability activities inside the organization. Furthermore, the model fit statistics show that the current model provides a reasonable fit to the studied relationships, while also suggesting potential for improvement. Subsequent studies need to identify other variables that may affect the relationship between green building certification and employees. Other variables like organisational culture, sustainable values of the employees, direct participation in sustainability programmes could give further understanding of this relationship. By so doing, researchers would be in a better position to understand the various dimensions that can help them to advance the practices of green buildings in a bid to foster high levels of employees' engagement.

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