How does the LEED rating system address environmental justice and equity considerations in building design and construction, and influence property demand and market value of sustainable buildings

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Introduction

The U.S. Green Building Council (USGBC) developed the LEED (Leadership in Energy and Environmental Design) grading system, a green building certification programme that is widely used. It offers a framework for evaluating and quantifying a building's sustainability performance, from design and construction to use and maintenance. Even though it was first developed by the USGBC, it is now the world most widely used green building rating system, LEED certification provides a framework for healthy, highly efficient, and cost-saving green buildings, which offer environmental, social and governance benefits[1].It is very common to wonder why a construction firm would want to make their project LEED certified, especially if it might increase their costs and efforts significantly. But what people often don't understand is that people are becoming increasingly environmentally conscious, and they would more readily agree to purchase a house in the building if it satisfies the criteria to be classified as a green building.

Background Information

Some of the basic standards which LEED readings evaluate buildings are :
Assessing the building's closeness to facilities, accessibility to public transit, and promotion of alternative transportation options are all part of location and transportation.

Sustainable Sites: Analysing how the project would affect the neighbourhood, taking into account site selection, stormwater management, and landscaping techniques.

Water efficiency is the promotion of water conservation through the use of water-saving plumbing equipment, efficient irrigation systems, and water-reuse techniques.

Addressing energy performance, increasing energy efficiency, and promoting the use of renewable energy sources are all aspects of energy and the environment.

Materials and Resources: By emphasising the supply of sustainable materials,

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[1] https://www.usgbc.org/leed/benefits-leed

Indoor Environmental Quality: Evaluating the quality of indoor air, lighting, thermal comfort, and acoustics to provide a healthy and productive indoor environment.

Innovation: Recognizing and rewarding innovative strategies and practices that go beyond the standard LEED requirements
.
Regional Priority: Addressing region-specific environmental priorities and concerns that vary depending on the location of the building.

There are 4 different categories, or one can classify them as levels, and each level has a certain number of points, and once you get those points, you can get the certification at that particular level.

Platinum	Gold	Silver	Certified
80+ points earned	60-79 points earned	50-59 points earned	40-49 points earned

[2]
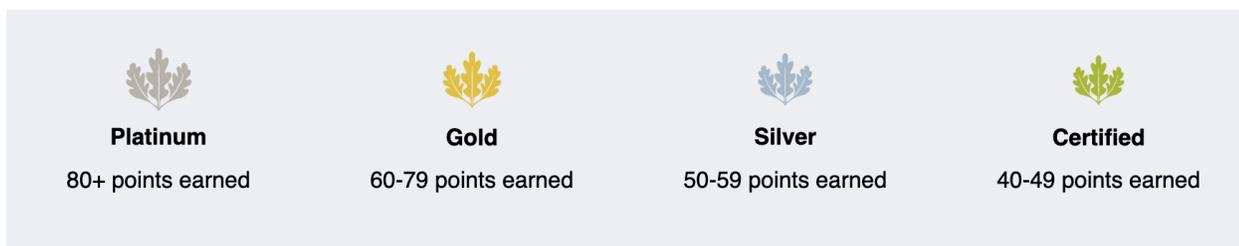
The building is assessed and based on how sustainable it is, it is given points. This is sort of an examination but for the sustainability of the building, and these are the levels. The more sustainable the building is, the more points it will earn and therefore it will have a higher level.

The LEED rating system addresses environmental justice and equity in several ways, some of which are as follows:

Social Equity Credits: LEED includes specific credits that aim to promote social equity within the building industry. For example, the "Social Equity within the Community" credit encourages projects to engage with local communities, address social issues, and promote inclusivity and diversity.

Community Engagement: LEED encourages projects to actively engage with the community throughout the design and construction process. This engagement helps ensure that the voices and concerns of marginalised communities are heard and considered. It promotes transparency, inclusivity, and collaboration in decision-making processes.

Access to Essential Services: LEED emphasises the importance of providing access to essential services for all building occupants, including marginalised populations. This includes access to public transportation, community resources, healthcare facilities, education centres, and recreational areas.

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[2]
https://www.usgbc.org/leed#:~:text=Projects%20go%20through%20a%20verification,Platinum%20(80%2B%20points).

Indoor Environmental Quality: LEED prioritises creating healthy and comfortable indoor environments for building occupants. This consideration is crucial for promoting equity, as it ensures that all occupants, regardless of their socio-economic status, have access to high-quality indoor spaces that support well-being and productivity.

Environmental Justice in Site Selection: LEED encourages project teams to consider environmental justice principles when selecting project sites. This includes avoiding sites with significant environmental hazards or locations that would disproportionately impact vulnerable communities.

Regional Priority Credits: LEED allows for the inclusion of region-specific credits that address unique environmental and social challenges faced by different regions. This approach enables the customization of the rating system to prioritise environmental justice and equity concerns specific to a particular location.

LEED for Neighborhood Development (LEED-ND): LEED-ND is a specialised rating system that focuses on sustainable and equitable development at the neighbourhood scale. It considers factors such as affordable housing, mixed-income communities, access to essential services, and community engagement.

It is worth noting that while the LEED rating system has made strides in addressing environmental justice and equity considerations, there is ongoing discussion and debate about the extent of its effectiveness and opportunities for improvement. Some critics argue that more explicit and robust measures are needed to ensure that the rating system effectively addresses the needs and concerns of marginalised communities.

Researching and analysing the specific credits, strategies, and case studies related to environmental justice and equity within the LEED rating system will provide a deeper understanding of how these considerations are currently addressed and highlight potential areas for further development and improvement.

Case study

One notable LEED-certified project in Mumbai that addresses environmental justice and equity is the Lodha Excelus building in New Cuffe Parade, Mumbai[3].The Lodha Excelus building stands as an example of how a LEED-certified project in Mumbai can address environmental justice and equity by integrating sustainable design practices, engaging with the local community, and promoting equitable access to green spaces and social amenities.This project achieved LEED Platinum certification, which is the highest level of certification awarded by the LEED rating system (80+ points). This project has been chosen since the Lodha developers are one of the leading real estate developers in India, and Mumbai being a metropolitan city, is appropriate to show how the concept of green buildings is adopted to further environmental justice and equity amongst the people.

[4]

The Lodha Excelus building incorporates several design features and initiatives that prioritise environmental justice and equity considerations:

Sustainable Site Selection: The project is located in the New Cuffe Parade neighborhood, which is a brownfield redevelopment site. By redeveloping a previously underutilized area, the project promotes urban renewal and minimizes the environmental impact associated with greenfield development.

Community Engagement: The development team actively engaged with the local community throughout the project's planning and construction phases. They conducted public consultations, listened to community concerns, and incorporated feedback into the project design. This inclusive approach ensures that the local community has a say in shaping their built environment.

Green Spaces and Landscaping: The Lodha Excelus building features extensive green spaces, including landscaped gardens, rooftop gardens, and open courtyards. These green spaces provide environmental benefits such as improved air quality, temperature regulation, and biodiversity preservation. They also enhance the quality of life for both building occupants and the surrounding community.

Energy Efficiency: The building incorporates energy-efficient design strategies to minimize energy consumption and reduce carbon emissions. It utilizes energy-efficient lighting, HVAC systems, and appliances. The project also incorporates renewable energy sources such as solar panels to generate clean energy on-site.

Water Conservation: The Lodha Excelus building includes rainwater harvesting systems and efficient plumbing fixtures to reduce water consumption. The project emphasizes the importance of water conservation, particularly in a water-stressed city like Mumbai, where equitable access to clean water is crucial for all residents.

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[3] https://www.lodhagroup.in/press-releases/lodha-goes-the-green-way-with-IGBC
[4] https://www.lodhagroup.in/projects/commercial/commercial-property-in-mumbai/excelus-mahalaxmi/about

Indoor Environmental Quality: The building prioritizes occupant health and comfort by implementing measures to enhance indoor environmental quality. It incorporates ample natural lighting, proper ventilation systems, and low-emitting materials to create a healthy and productive indoor environment for occupants.

Social Amenities: The project includes social amenities and community spaces that benefit both building occupants and the surrounding community. These amenities may include fitness centres, recreational areas, public gathering spaces, and childcare facilities. By providing these amenities, the project contributes to enhancing the quality of life and social equity within the neighborhood.

Stakeholder analysis

In the stakeholder perspective, we would also talk about its influence on property demand and market value.

Real-estate developer: Applying for , and maintaining the criterias for a green certification can increase their cost of production, however, with a green certification, the demand for their projects would increase and hence the price could increase as well, which could potentially cover up the high costs of production

Consumers: Even though they have to deal with high prices, Green certification could mean that the building they live in is environmentally friendly, implying that the consumers are actively playing a role in the betterment of the environment, lifting their state of mind and sense of purpose. A green certification would also increase the number of amenities offered and improve their quality, therefore improve the living standards of the people living in the building.

Government: The government has clear benefits to this as well. With green certification, this would mean that the environment is better off, and the government would have to spend less money, which would reduce the opportunity cost of such actions. The government could also have an increase in investments with multinational corporations who are big supporters of green energy and green buildings to improve the environment.

Overall, Green buildings pose a positive externality of production to the economy.
[5]
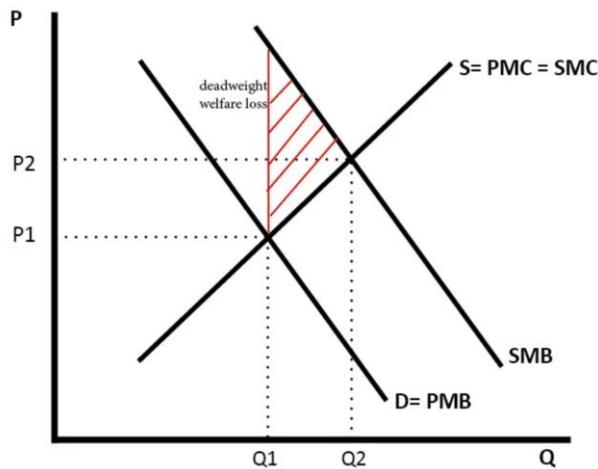
This shows that there are overall benefits to the economy, if Green buildings are built.

Influence on property demand and market value

To calculate the market demand for a property, we cannot assume that the value will increase, since the world does not function on individual assumptions, hence we must mathematically prove our assumptions. Since we analysed the stakeholder perspective, we know that each and every stakeholder benefits from this, therefore the price of the property is likely to rise, but the question that still persists, is how much will it rise by. This supposedly increase in price can be modelled by the Hedonic pricing model.

The Hedonic pricing model in simple terms is the identification of price factors according to the premise. The price is determined both by internal characteristics of the good being sold and external factors affecting it. [6]

For this calculation, we would again consider the Lodha Excelus building, thereby maintaining one building which is talked about throughout this paper. We will examine how the property demand and market value changes due to the green certification. We will use assumed values since Lodha is a private construction firm, and the cost details are not available on the internet. However, with this method we can approximate the influence this green certification would have on the property demand and market value, since even if the values which we will be inputting change, the pattern would be consistent.

The example of how we can use a hedonic pricing model to analyze the impact of green certification on property value is as follows:

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[5] https://www.economicshelp.org/micro-economic-essays/marketfailure/positive-externality/
[6] Hedonic pricing model- https://www.investopedia.com/terms/h/hedonicpricing.asp

Assumptions:

Property attributes considered in the model include size (Size), number of rooms (Rooms), and distance from key landmarks (Distance).

We assume that the coefficients for these attributes have already been estimated through regression analysis.

Hedonic Pricing Model Equation:

Property Value = $\alpha + \beta_1$Certification + β_2Size + β_3Rooms + β_4Distance + ε

On python, or any other suitable software, we can input the code:

```
# Import required libraries
import pandas as pd
import statsmodels.api as sm

# Load the dataset
data = pd.read_csv('your_dataset.csv')  # Replace 'your_dataset.csv' with the actual filename and path

# Specify the dependent variable and independent variables
y = data['Property Value']
X = data[['Certification', 'Size', 'Rooms', 'Distance']]

# Add a constant term to the independent variables
X = sm.add_constant(X)

# Fit the regression model
model = sm.OLS(y, X).fit()

# Print the regression results
print(model.summary())
```

Replace "property_data.csv" with the actual filename or path of your dataset containing the property data, including the dependent variable ("Property Value") and independent variables ("Certification", "Size", "Rooms", "Amenities", "Distance").

The X variable contains the independent variables, and y contains the dependent variable.

The add_constant function from statsmodels adds a constant term (intercept) to the independent variables.

The OLS function from statsmodels initialises the ordinary least squares (OLS) regression model.

The fit method fits the regression model to the data.

Finally, the summary method provides the summary statistics of the regression results, including the coefficients, p-values, R-squared value, and other relevant information.

For the purpose of this example, let's assume that the estimated coefficients from the regression analysis are as follows:

α (intercept) = \$300,000
β_1 (Certification) = \$50,000
β_2 (Size) = \$100 per square foot
β_3 (Rooms) = \$10,000 per room
β_4 (Distance) = -\$2,000 per mile (assuming a negative impact on value with increased distance)
ε (error term) = Random variation

Now, let's calculate the property value before and after the green certification:

Before Certification:

Assuming a property with a size of 1,000 square feet, 2 rooms, and a distance of 1 mile:
Property Value before Certification = \$300,000 + \$0 (Certification) + \$100 * 1,000 (Size) + \$10,000 * 2 (Rooms) + -\$2,000 * 1 (Distance)
Property Value before Certification = \$300,000 + \$100,000 + \$20,000 + -\$2,000
Property Value before Certification = \$418,000

After Certification:

Assuming the same property attributes as before, but now with the Certification factor:
Property Value after Certification = $300,000 + $50,000 (Certification) + $100 * 1,000 (Size) + $10,000 * 2 (Rooms) + -$2,000 * 1 (Distance)
Property Value after Certification = $300,000 + $50,000 + $100,000 + $20,000 + -$2,000
Property Value after Certification = $468,000

In this hypothetical example, we can observe that the property value before the Lodha Excelus building obtained its green certification was $418,000. However, after obtaining LEED Platinum certification, the property value increased to $468,000. The additional $50,000 (which is obtained once the regression analysis is performed through the code listed) in property value can be attributed to the perceived added value associated with the green certification, as represented by the β_1 coefficient in the hedonic pricing model.

Conclusion

All inclusive, we saw how green certification promoted environmental justice and equity, through our prime example which was the Lodha Excelus project in Mumbai, India. The second and latter part of the research question was also answered through the hedonic pricing model. We performed the hedonic pricing model and a regression analysis to confirm the increase (and by how much) the property value and market demand for the Excelus project using assumed values since the real values are not available on the internet. Therefore, this research project as a whole, was successful in answering the above Research Question.

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