Market Transformation Towards Sustainability in Saudi Arabia: A Comparison Between Mostadam And LEED Rating Systems

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Abstract. The Saudi Vision 2030 launched several visualization programs, including the housing program, to create a vibrant environment for families and society. The Ministry of Housing created Mostadam, a national green building rating system that Sustainable Building operates to achieve this aim. Previously, buildings in Saudi Arabia were primarily certified using the US Green Building Council's LEED Rating system. The study investigates the market transformation towards sustainability in Saudi Arabia by comparing Mostadam and LEED. The study's main objectives are to compare Mostadam and LEED in terms of rating systems, certification levels, and the weight of categories offered in the two rating systems. The market transformation is investigated by using comparative analysis. Results showed that the Mostadam rated building is more adapted to the Saudi construction industry, and this is because awareness about building sustainability transformed the market towards more sustainable construction.

1. Introduction
Mostadam is a Saudi green building rating system administered by Sustainable Building and designed by Saudi Arabia's Ministry of Housing [5]. The new rating system is devoted to attaining Vision 2030's development goals. The temperature and environmental circumstances in Saudi Arabia prompted the creation of this building rating system. It is beneficial to the Saudi economy and generates employment. Mostadam is a term that refers to the Saudi Building Code (SBC), which is intended to follow current legislation. Other grading systems will need to be tweaked to meet Saudi rules, but Mostadam can be utilized as-is. It recognizes geographical distinctions, enabling the identification of regional principles. It also considers regional differences, allowing for regional precedence. The impact of Mostadam on the surrounding area is projected to be significant. After all, Saudi Arabia is now constructing over 5,200 projects worth USD 819 billion, and, these projects account for almost a third of the total number of ongoing projects in the Gulf Cooperation Council (GCC).
Mostadam promotes Saudi economic development and job creation by rewarding businesses that employ local goods and services. It places a premium on local architecture and reflects on the culture of the area. In the future, Mostadam will have a significant impact. The rating system is intended to improve the efficiency of the region's building sector while also having a social and environmental impact. The LEED (Leadership in Environmental Design and Energy) rating system, on the other hand, was created by the United States Green Building Council [6], the country's leading green building organization, as a voluntary rating system to assess a building's environmental performance over nearly...
its entire life cycle (Xiaoping et al., 2009). The first LEED version (V1.0) was published in 1998, and the second (V 2.0) was published in 2000. Because of its extensive implementation, LEED is primarily recognized as one of the world’s most influential green building rating systems (Al-Surfi et al., 2021) The number of LEED-registered and LEED-certified projects more than doubled in 2008, according to USGBC statistics, from roughly 10,000 to 20,000. Between the end of 2007 and the end of January 2009, over 20,000 LEED-certified projects were completed, resulting in a 92 percent increase in LEED-certified construction square footage, 284 million square feet, up from 148 million square feet. There are five LEED rating systems.

The study seeks to investigate the market transformation towards sustainability in Saudi Arabia by comparing Mostadam and LEED to examine closely the necessity to design a Rating system that fulfills the local needs of sustainable building rating in Saudi Arabia. The study’s idea is that Mostadam can help Saudi Arabia transition to a more sustainable future. The study’s main goals were to compare Mostadam and LEED in terms of rating systems, certification levels, and the weight of categories offered in the two rating systems; to assess the benefits and drawbacks of Mostadam and LEED, and to determine the adaptability of the two rating systems to the Saudi construction industry.

2. Literature Review

When comparing the categories of different rating systems, it is discovered that the points assigned to each rating system’s categories are determined by the demands of the location in which the rating system is formed. This distinction between groups is clearly shown in Fig. 1 [3]. The following findings are obtained when comparing LEED to other rating systems (see Figure 1).

![Comparison of Assessment Tools](image)

**Figure 1:** Combined Comparison of Assessment Tools. Source [3]

Given the wide range of climatic subzones found in Saudi Arabia (Fig. 2), adjusting any of the above rating systems to fit these varying climatic conditions is not possible. The climate and topography of Saudi Arabia significantly influence the country’s architecture. Saudi Arabia is a country in western Asia with environments that range from the Mediterranean to the desert of the subtropic. The different macroclimate zones of Saudi Arabia are depicted in Figure 1.

2.1 Mostadam and LEED Rating systems

The rating system specifies technological sustainability standards that projects must adopt and integrate in order to receive a certificate that recognizes their achievements and sets them apart from traditional advances [5].
In Mostadam, there are three distinct rating systems: rating system number 1, rating system number 2, and rating system number 3, focused on residential, commercial, and community structures, respectively. Each rating system comprises two parts, and element #1 is concerned with design and construction (D + C), whereas Element #2 is concerned with operating and existing facilities (O + E). These can be outlined as seen in Figure 3:

On the other hand, LEED applies to all types of buildings and aspects of construction, comprising new construction, interior fit-outs, operations and maintenance, and core and shell. It features seven different rating systems [6]:
1. Building Design and Construction (new construction and core & shell) for new construction or major renovations
2. Interior Design and Construction, including commercial interiors, with interior design and construction.
3. Building Operations and Maintenance for existing structures undertaking renovations or with slight to no construction, such as existing buildings.
4. Neighbourhood Development for new land development or redevelopment projects that include residential, non-residential, or a combination of uses. Projects can be in any stage of development, from concept to completion, and can include both planned and completed projects.
5. Single-family dwellings, low-rise multifamily (one to three floors), or mid-rise multifamily (four to six stories) comprise single-family residences, low-rise, and multifamily midrise.
6. Cities and Communities are used to describe whole cities and sub-sections of a city. LEED for Cities projects can track and control water usage, energy usage, waste, transportation, and the people life experience in their city.
7. LEED Recertification enables you to safeguard your investment in the environment while maintaining and improving your building. Included in this category all inhabited and in-use projects that have previously obtained LEED certification, including BD+C and ID+C, regardless of the grading system or version utilized.
8. LEED Zero is accessible for every LEED project that have been certified under the BD+C or O+M rating systems, as well as those that have applied for LEED O+M certification. LEED Zero certification is for projects that aim to be carbon and resource net-zero.

2.2 Mostadam and LEED Certification Levels:
Mostadam Green (20 points), Mostadam Bronze (35 points), Mostadam Silver (50 points), Mostadam Gold (65 points), and Mostadam Diamond (80 points) are the different Mostadam rating levels for Design + Construction and Operations + Existing (except for Commercial Design + Construction).

Green building projects in a range of categories earn LEED-certified projects points. Based on the quantity of points, a project is assigned to one of four LEED rating levels: Silver, Gold, or Platinum certifications are available. [6].

3. Methodology
The techniques for calculating weights and determining rating criteria have been detailed in standards released by all building rating system organizations [1]. Due to regional differences, the weights and assessment tools vary from one location to the next. As a result, investigating the specifics of all of the rating systems’ assessment mechanisms is impractical. In this study, only five standard assessment instruments were utilized for comparisons, each significant part of each rating system. Similarly, each rating system gives the assessment instruments varying weights, and the sum of all the weights differs. As a result, this study estimated and compared the proportion of each assessment instrument for each rating system.
4. Results
On Comparing Mostadam to LEED in terms of rating systems, certification levels, and points towards categories, the following results are found:

On comparing Mostadam to the LEED rating system, Table (1) depicts the rating systems of three rating systems with two adaptions while LEED has seven.

| Mostadam Rating System | LEED Rating System |
|------------------------|-------------------|
| 3 rating systems under Design and Construction and Operational and Existing 1. Residential 2. Commercial 3. Communities | 7 rating systems: 1. Building Design and Construction 2. Interior Design and Construction 3. Building Operations and Maintenance 4. Neighborhood Development 5. Homes 6. Cities and Communities 7. LEED Recertification 8. LEED Zero |

On comparing the certification levels offered by each rating system (Table 2), Mostadam is found more levels that offer flexibility and give the building more chance to be certified.

| Rating System | Certification Level | Points |
|---------------|---------------------|--------|
| Mostadam Five levels | Mostadam Green, (≥ 20 points) | |
| | Mostadam Bronze (≥ 35 points) | |
| | Mostadam Silver (≥ 50 points) | |
| | Mostadam Gold (≥ 65 points) | |
| | Mostadam Diamond (≥ 80 points) | |
| LEED Four levels | Certified, 40-49 | |
| | Silver, 50-59 | |
| | Gold or 60-79 | |
| | Platinum, 80+ | |

The comparison carried out based on the weighing of points for Mostadam and LEED rating system categories and the points towards each category (Fig. 4) showed that points for each category are based on the importance of that category in Saudia Arabia building market. An example of this is the water category. In LEED, it has 11 points, while in Mostadam, it weighs 24 points because of the geographic nature of Saudi Arabia as it's mostly desert. Additionally, energy has 35 points in LEED, while in Mostadam, it has a lower value of 27 points as Saudi Arabia is one of the wealthiest oil countries.
Table 3: Comparison of LEED v4.1 and the Mostadam Rating systems Categories. Source: [1]

| Item No. | Category in LEED v4.1 | Total Points | Category in Mostadam Rating System, Element #1.1 (Res. Buildings D + C) | Total Points |
|---------|----------------------|--------------|---------------------------------------------------------------------|-------------|
| 1       | Integrative Process  | 1            | Transportation and Connectivity                                     | 0           |
| 2       | Location and Transportation | 9          | Site Sustainability                                                 | 7           |
| 3       | Sustainable Sites    | 9            | Water                                                               | 24          |
| 4       | Water Efficiency     | 11           | Energy                                                             | 27          |
| 5       | Energy and Atmosphere| 35           | Materials and Waste                                                 | 4           |
| 6       | Materials and Resources | 19         | Health and Comfort                                                  | 14          |
| 7       | Indoor Environmental Quality | 16      | Education and Innovation                                           | 4           |
| 8       | Innovation           | 6            | Region and Culture                                                  | 7           |
| 9       | Regional Priority    | 4            | Policies, Management & Maintenance                                  | 4           |
| 10      | Total points         | 110          |                                                                     | 100         |

5. Conclusion
The introduction of the Mostadam rating system is a significant step forward in the Saudi Arabian construction market's sustainability. The rationale for this is that it is more suited to climatic conditions, and points are allocated to different categories in the rating system instead of LEED and other rating systems. Based on the previous comparisons of rating systems, certification levels, and points tallied toward categories, it is clear that a rating system designed for a specified region is only appropriate to that region and may not be extended to any other region for which it was not designed. Even if it is applied to a different region, the building's ratings may not be valid because the factors utilized for grading differ from one region to the next.

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