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State of The Art of Green Building Standards and Certification System Development in Thailand

Aree Lohmeng[a], Krichkanok Sudasna[b*], and Tusanee Tondee[b]

[a]*Rattanakosin College for Sustainable Energy and Environment, RMUTR, Thailand*
[b]*Faculty of Architecture and Design, RMUTR, Thailand*

Abstract

Energy saving and the sustainable environment are becoming one of the most important aspects to Thailand, especially in the building and construction industry. Green Building Index for energy and environment concern has been developed by Thai government since 1992 that aim to solve the environment resource crisis, depended upon regulations and evaluation guidelines of local climate. Nowadays, the number of green buildings is rapidly increased according to the concerns of energy consumption and environmental impact. LEED (Leadership in Energy and Environmental Design), Green Mark, and TREES (Thai's Rating of Energy and Environmental Sustainability) are the most widely used systems for green building certification in Thailand. There are 113 buildings from 201 assessed projects were certified by LEED and three buildings were certified by Green Mark. TREES which developed by Thai Green Building Institute has certified only 12 buildings from the total of 74 registered projects. This paper was focused on the situation and the development of green building standards and certification systems in Thailand, including LEED, Green Mark, and TREES. The comparisons of assessment methods and components among these 3 systems were discussed. Additionally, the recommendation on the practice of green building development in Thailand was also provided. This paper found that the number of green building was increasing especially commercial building. Moreover, those are influenced by economic expanding.

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Keywords: Green Building, LEED, Green Mark, TREES

* Corresponding author. Tel.: +662-441-6000, +662-8894585.
E-mail address:krichkanok.s@rmutr.ac.th

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1. Introduction

Nowadays, in several sectors of Thailand become aware of energy and environment, especially in building and construction industry for preventing the environment problems and sustainability energy efficiency. Analyzing the national existing green building evaluation systems found that Thai government and private sectors awareness about green buildings is not enough for environment resources. They think that green buildings rating requires business image and production cost. Hence, it is very necessary to study the situation and the development of green building standards and certification in Thailand from the green building was certified, such as LEED, Green Mark and TREES etc. Green Building Rating in Thailand was developed by the government since 1992-2009 and publish the Energy Saving Building Manual manage by Ministry of Energy. Generally, Green Building in Thailand was certified in LEED, Green Mark, and TREES. There are 113 projects from 201 assessed projects were certified by LEED and 3 projects were certified by Green Mark. TREES which developed by Thai Green Building Institute has certified by 12 projects from 74 registered projects [1].

2. Background of Green Building Rating

At present, many global organizations of green building were cooperating on green building issues. The major of green building global network is World Green Building Council (WGBC). The World GBC was founded in November 1999 in California, USA, and after that was formally established in 2002 by the National Assembly. At the first period, the members of WGBC were Australia, Canada, Japan, Spain, Russia, United Arab Emirates, United Kingdom, and the United States. Today there are about 100 countries in the world and 18 countries in Asia Pacific. WGBC is cooperating with many countries that are different in the construction industry for supporting the sustainable development of Green Building. At present, the building was registered in WGBC are over 100,000 buildings or 1,000,000,000 square meters.

Today, the members of WGBC were prescribed their own green building rating that has the criteria for evaluating: 1) LEED of USGBC USA, 2) BREEAM of UK GBC, 3) HQE of France GBC, 4) DGNB of German Sustainable Building Council, Germany, 5) IGBC Rating System of IGBC and GRIHA of Green Rating for Integrated Habitat Assessment India 6) Green Mark of SGBC Singapore, 7) Green Star of GBC Australia, 8) BEAM of HKGBC Hong Kong and 9) CASBEE of JSBC Country Japanese [2].

Asia-Pacific members of WGBC that are 15 countries: 1) Australia, 2) Indonesia 3) Sri Lanka, 4) Hong Kong Special Administrative Region, 5) India, 6) Japan, 7) Kazakhstan, 8) Korea, 9) 10) New Zealand, 11) Pakistan, 12) Philippines, 13) Singapore, 14) Taiwan and 15) Vietnam.

The five members of WGBC that are represented from ten countries of AEC member: 1) Indonesia, 2) Malaysia, 3) Philippines, 4) Singapore and 5) Vietnam. The five countries of AEC members are not members of the WGBC are Brunei, Darussalam, Cambodia, Laos, Myanmar and Thailand [2].

The most of WGBC member countries were advised by the green building rating consultants that are used LEED, Green Mark, Green Star, etc. Thailand was awareness in green building rating and has been active in energy conservation by the National Environmental Quality Promotion Act since 1992. Nowadays, Green Building Institute of Thailand was established by The Association of Siamese Architects under the Royal Patronage of His Majesty the King and Engineering Institute of Thailand.

3. Green Building Rating

The World Green Building Council (WGBC) encourages the member countries set their own green building evaluation criteria. The aim of green building evaluation is to increase building efficiency and reduce environment problem [4]. Green buildings of Thailand evaluation criteria are:

- LEED (Leadership in Energy & Environment Design), which can be assessed different scores to building evaluation that depend upon the building appropriate. LEED label in Thailand were got the different level that depending on the environment and constructions detail.
- DGNB (The German Sustainable Building Council) was established in 2007 with the objective of promoting sustainable and cost-effective of the construction and the future real estate sectors. In 2008, DNGB was responded to register about 121 organizations. Today DGNB has member more 1,100 members that achieve to sustainable construction and habitable residential. The DGNB label was certified one project in Thailand since 2013
- Green Mark was launched in January 2005 by BCA (Building and Construction Authority) in Singapore. The purpose is to promote a good environment in real estate sectors. The creation of the great standardized model to create sustainable environment that integrating between design and construction with green building technology.

- TREES (Thai's Rating of Energy and Environmental Sustainability) was developed by Thai Green Building Institute in 2008. TREES getting cooperation from The Association of Siamese Architects under the Royal Patronage of His Majesty the King and Engineering Institute of Thailand were jointly established Thai Green Building Institute (TGBI) in 2009. TREES's objective is to raise awareness among Thai people and society about the design and construction of sustainable green buildings.

4. Green Building Development in Thailand

Thailand adopts the solution to legislate the act of energy conservation promotion from the foreign country in 1992 and give force the acts in April 3rd, 1992 [1]. The act of energy conservation promotion in 1992 aim to support with efficient production and consumption, support equipment and materials for energy saving and to establish the fund to promote energy conservation that uses as a mechanism to provide financial aid subsidies for energy conservation. In later years, the acts involve to energy conservation were given force in many acts such as Energy Conservation Promotion Act (No. 2), the ministerial regulations prescribe glass for energy conservation and efficient air conditioners.

At the beginning, Thailand's energy saving project was assigned by The Department of Alternative Energy Development and Efficiency (DEAC). It was provided to industry sector in the energy analysis and suggestions services for industrial plants, for training about energy conservation technology. After that, the government published Sixth National Economic and Social Development Plan (1987-1991) aim to increase the number of residential and commercial energy conservation buildings [5].

In 1995, the first energy conservation building was The Energy Conservation Building Honor to commemorate His Majesty the King on the occasion of the 50th anniversary. The grand ceremony of the building since December 12th, 1995 at Tambon Klong 5, Klong Luang Pathum Thani Province. The act of energy conservation provides to this building and uses energy conservation technology that is passive design building [6].

In 2008, the ministry of industry who was conducting Green Building Project, prescribed the criteria of existing and new construction building and create the mock-up of conceptual design for the green building. Furthermore, the Ministry designed guideline of green buildings as the pollution control building at Bangkok Yai District Office Building in 2009. After that, Pollution Control Department published the environmental management guidelines for existing and new construction office green buildings and furthermore, they were advice in two building: 16th Environment Office Building at Nonthaburi province and Policy and Natural Resources Plan Office Building at Bangkok.

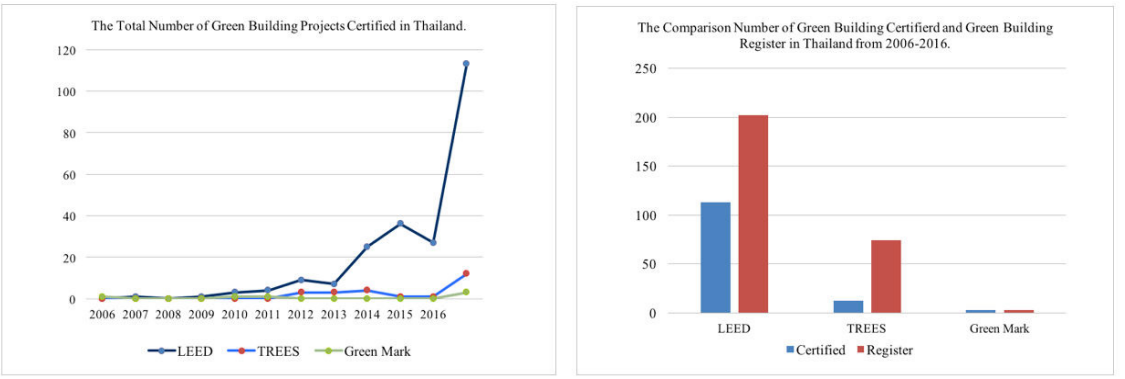


Fig 1. (Left)The Total Number of Green Building Projects Certified in Thailand ; (Right) The Comparison Number of Green Building Certified and Green Building Register in Thailand from 2006-2016.

All of Thailand evaluation criteria of green building are BCA Green Mark, TEEAM, LEED, TREES, DGNB. The important evaluation criteria in Thailand are LEED, Green Mark, and TREE. All of them are expanded the number of Green Building Project in the future.

4.1 LEED in Thailand

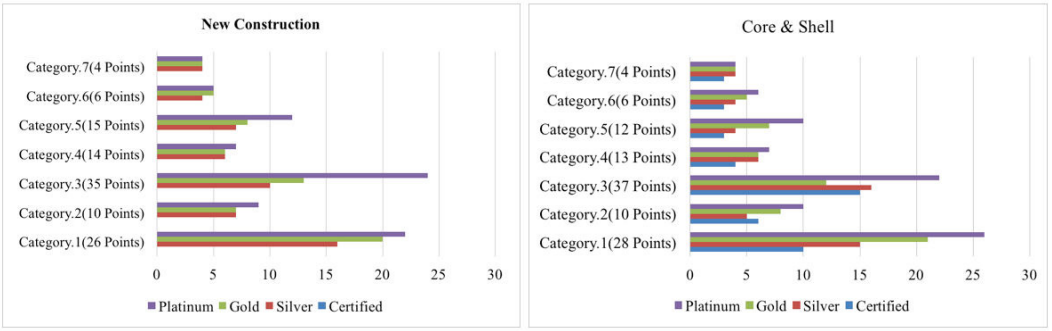
LEED was first active in Thailand in 2007. LEED is the evaluation criteria of building strategy that can evaluate with actual local building in Thailand and flexible in several building types. There is different evaluate in green building that starting with Certified 40-49 points, Silver 50-59 points, Gold 60-79 points and Platinum more than 80 points. Types of evaluation are 1) Building design and construction 2) Interior design and Construction 3) Building Operations and Maintenance 4) Neighborhood Development and 5) Homes. At present, area there are 113 buildings from 201 registered projects in Thailand [7] as seen in Table 1.

Most of building types certified by LEED is Retail Commercial Interior 52 buildings from 54 applicants. Most of them are Starbucks. Twenty-seven buildings from 72 applicants of New Construction were certified. Twelve buildings from 18 applicants of Commercial Interior are certified that the most of them were an office building, Core and Shell, Retail New Construction, Existing Buildings, Healthcare, School New Construction, and Home.

Table 1. The number of LEED labeled in Thailand since 2007-2016.

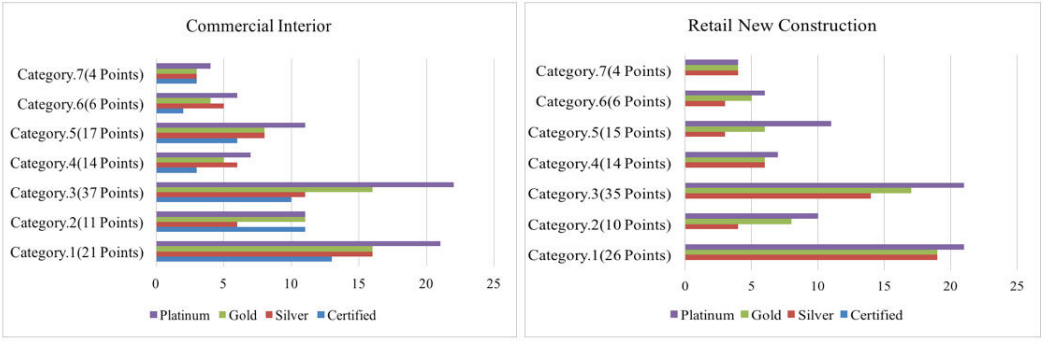
Type	Certified Level				Certified Total	Certification in Progress	Total
	Certified	Silver	Gold	Platinum			
Retail Commercial Interior	43	3	5	1	52	2	54
New Construction	1	7	12	7	27	45	72
Commercial Interior	2	3	5	2	12	6	18
Core and Shell	1	2	5	3	11	15	26
Retail New Construction	-	1	6	-	7	1	8
Existing Buildings	-	-	-	2	2	14	16
Healthcare	1	-	-	-	1	3	4
School New Construction	-	-	1	-	1	1	2
Home	-	-	-	-	-	1	1
Total	48	16	34	15	113	88	201

Nowadays, LEED was publicizing information about the score and the project that was certified to promote Green Building. From Figure 2 and 3 represented by the score of LEED certified in Thailand in each category that a total score of 110 points. In Figure 2 (a), the New Construction of LEED obtained 54 points (Silver), 63 points (Gold), and 83 points(Platinum). Figure 2 (b) is Core and Shell obtained 44 points(Certified), 54 points(Silver), 63 points(Gold) and 85 points(Platinum) that have a bit more than a minimum point. Figure 3 (c) is Commercial Interior obtained 48 points(Certified), 55 points(Silver), 63 points(Gold) and 82 points(Platinum). Figure 3 (d) is Retail New Construction obtained 53 points (Silver), 65 points(Gold), and 80 points(Platinum). All of them were certified Silver, Gold and Platinum level. The most of their score has a bit more than a minimum point in each category.



(a) (b)

Fig 2. The Ratio of LEED Score Average of New Construction and Core & Shell



(c) (d)

Fig 3. The Ratio of LEED Score Average of Commercial Interior and Retail New Construction

For the four evaluation types are the small amount of certified building as follows: Retail Commercial Interior, Health Care, Existing Building and School New Constructing that has a total score of 110 points. Retail Commercial Interior that has a total score of 110 points obtained 44 and 67 points which were Certified and Gold level. Health Care that has a total score of 110 points obtained 46 points that were Certified level. Existing Building that has a total score of 110 points obtained 84 points that were Platinum level. School New Construction that has a total score of 75 points obtained 45 points that were Gold level. For the number of certified building that represented to increasing of LEED that are difference weighting indicator in each category and trend toward to expanding the number of green building were certified.

4.2 Green Mark in Thailand

Green Mark was launched in 2006 that aimed to supporting green building construction and to creating a good environment. For the Green Mark criteria are considered following: 1) energy efficiency, water efficiency, 2) environment protection, 3) indoor environment quality and 4) other green and innovative features that contribute to better building performance.

In Thailand, there are 3 projects- Exchange Tower, Millennium Residence, and IKEA Bang Na - or area average about 292,950 square meters that were certified by Green Mark. All of them are commercial building that concern about energy saving and the good image of the project [8]. Green Mark has a benchmark to assess a project's environmental design and construction, and green building technologies base on specifically Singapore.

4.3 TREES in Thailand

The aim of TREES is to develop knowledge of green building for local green rating that reduces disadvantage in economic and raises awareness of Thai society on design, construction, and development of the sustainable green building. TREES held the conference on March 11th, 2009 that started to establish Thai Green Building Institute (TGBI). The criteria are based on the following: 1) Building Management, 2) Site and Landscape, 3) Water Conservation, 4) Energy and Atmosphere, 5) Materials and Resources, 6) Indoor Environmental Quality, 7) Environmental Protection and 8) Green Innovation. The buildings that can evaluate in two categories is new construction building (TREES-NC) and existing building (TREES-EB).

TREES developed evaluation separately for 2 types that are prerequisite score and optional score. The prerequisite score is a type of evaluation which was certified first. The optional score adjusted accordingly by priority of building type. The level of TREES score is divided into 4 levels that are Platinum (more than 61 points), Gold (46-60 points), Silver (38-45 points), and Certified (30-37 points). At present, 12 buildings from 74 registered projects (11,001sq.m.) were certified. Two projects are in Platinum level, 6 projects in Gold level, 2 projects are in Silver level and 2 projects are in Certified level [9]. However, TGBI now announces only the lists of certified projects but does not show the score and detail of TREES Label.

5. Comparison of Green Building Rating: LEED, Green Mark and TREES

Green building ratings are various criteria depending on existing climate. The different environment is an important factor that affected to the evaluation process. Each country usually considers criteria on its own.

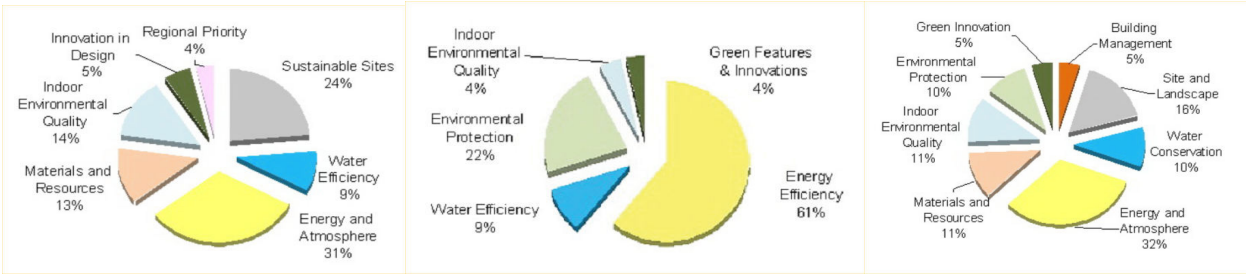


Fig. 4. (Left) The Ratio of LEED Rating.; (center)The Ratio of Green Mark Rating.; (right)The Ratio of TREES Rating [1].

From figure 4 represented to the most number of criteria categories is TREES that has 8 categories. LEED has 7 categories and the Green Mark has 5 categories. The three of green building rating focus on energy in difference way. Green Mark focused on Energy Efficiency that gives the score about 61 percentages and Environment Protection 22 percentages. LEED have many topics are Energy and Atmosphere 31 percentages, Sustainable Sites 24 percentages. The topic of TREES focuses on Energy and Atmosphere 32 percentages, Site and Landscape 16 percentages.

There will be a different score that bases on the purpose of assessment in each criterion. As demonstrated in figure 4, show the essential concept of all green building rating is aim to create energy efficiency and healthy atmosphere with the least energy and resources. The categories of rating have a difference detail such a Green Mark emphasized in water efficiency while LEED concerned about the material and sustainable site. TREES separated more detail of green building rating than another that is an addition to building management. Finally, based on the green rating calculation results were determined by context and destination of rating method. The key categories reflected building's characteristics and keep their performance in balance.

6. Conclusion

This study was an attempt to show the differences of green building rating in Thailand. In order to achieve this, three rating systems including LEED, Green Mark and TRESS were evaluated. Thai Green Building Institute (TGBI) is the key mechanism to support the evaluating process of green building in Thailand since 2009. Green Building Rating was applied to several projects that concern about energy efficiency and environment crisis. There is a need to verify and improve the energy efficiency and atmosphere. Standardization and rationalization have taken place in each country especially green building rating in Thailand that depends on local climate and objective of each project. On basis of these, this article takes LEED, Green Mark, and TRESS as a case study, and comparative about categories of building type. The analysis of green building rating in Thailand draws the following important conclusions: 1) number of green building was increasing especially commercial building, 2) number of register was increasing that on result of expanding economic the projects and 3) the score of certified project is a bit more limited that present to the quality of green building. However, TGBI attaches importance to every sector that they also hope to promote energy saving and reduce the electricity consumption.

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