

LOTUS: a Vietnamese Green Building Rating System and Implementation Issues

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Abstract: Green construction has increasingly become a popular concept and standardization in the world. This paper presents an overview of a Vietnamese green building rating tool named LOTUS. This paper also presents some major similarities and differences between LOTUS and other well-known green rating tools. The interviews with some experts and practitioners about Green buildings in Vietnam have twofold aims. One is to help better understand the causes of the differences under practitioners' viewpoints. The second aim is to uncover the opportunities and the difficulties that the project stakeholders may encounter upon the implementation of Green Building construction projects in Vietnam.

Keywords: Green Building, Sustainable, rating tool, Vietnam

I. INTRODUCTION

With the great interest of sustainable development, green building design, construction, and operation have been an inevitable trend in the world. Vietnam is not an exception and has witnessed some positive progress in the development of green buildings in recent years. Green buildings have also received great attention of the governmental authorities and the whole society.

However, Vietnam seems still behind many other countries in Southeast Asia with regard to the commitment to green buildings. One of the reasons is that building owners, developers, designers, and constructors in Vietnam have limited understanding of green buildings. This may prevent concerned parties from adopting green building design and construction practices in their projects.

This paper presents a voluntary green building rating system in Vietnam (called LOTUS) and compares LOTUS with popular rating systems in the world. This paper then discusses implementation issues of LOTUS and green building practices in Vietnam based on interviews with local green building experts and practitioners. It should be noted that green building in Vietnam have not only been certified with LOTUS but also with other rating systems such as LEED (U.S.) or Green Mark (Singapore).

II. GREEN BUILDING RATING TOOL- LOTUS

Currently, many countries have rating systems for green buildings, such as BREEAM (U.K.), LEED (U.S.), Green Star (Australia). These standards are pioneering in sustainability. Besides, various countries have adopted ratings from other countries. However, the full adaption of the standard from other countries can result in negative effects due to the dissimilarities in geography, climate or knowledge about sustainable development. Table I presents some green standards around the world.

LOTUS, the voluntary Vietnamese green building standard, was released in 2008. LOTUS was referred to many different tools in the world when developed. The typical referred tools are LEED, Green Star, BREAM, and

Greenmark. LOTUS is considered consistent with economic and social conditions in Vietnam as input of local experts and practitioners were obtained. Table II shows a comparison of the weighted evaluation criteria among LOTUS, BREEAM, LEED, and Green Star. One can see the different priorities among the criteria across the tools. For example, BREEAM gives prominence to criteria "Management" than LOTUS, LEED and Green Star. LOTUS, BREEAM, LEED, and Green Star all focus on the criteria of "Energy & Traffic." The "Energy & traffic" criteria receive the most significant weight, which indicates that they are one of the most important criteria of these green building rating systems.

TABLE I
A NUMBER OF RATING TOOLS IN THE WORLD

U.K. and Europe	American	Others
BREEAM (U.K.)	LEED (U.S. & Canada)	Green Star (Australia)
HQE (France)	Green Globes (U.S. & Canada)	BEAM (Hong Kong)
BREEAM (Netherlands)	BREEAM Canada (Canada)	LEED (China and India)
		Greenmark (Singapore)
		Green Star (South Africa)
		CASBEE (Japan)
		LOTUS (Vietnam)

In the criteria group of "Health & Amenities", BREEAM again provides the highest weight in compared with the others. LEED and Green Star are quite similar, while the lowest point is in LOTUS. This is understandable because Vietnam is still an underdeveloped nation. These "luxury demands" have not been paying much attention. About "Material", LEED has highest point in compared with the remaining tools. Obviously, LEED appreciates this criteria group. It is clear that, in the U.S., they often

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encourage to widely use environmentally friendly materials which have the ability to recover quickly (such as wood).

TABLE II
 COMPARISON OF WEIGHTED CRITERIA THROUGH RATING TOOLS

No.	CRITERIA	LOTUS	BREAM	LEED	Green Star
1	Management	8	15	7.8	12.8
2	Energy & Traffic	24	25	24.5	25.6
3	Health & Amenities	10	15	12.7	12.8
4	Water	14	5	4.9	15.4
5	Materials	13	10	18.6	12.8
6	Community	5			
7	Land Use & Ecology	10	15	4.9	10.3
8	Waste & Pollution	8	15	10.8	10.3
9	Sustainable Site			15.7	
10	Adaptation and mitigation	9			
Total			100%		

Source: Refer to the rating tools

LOTUS appreciates the criteria "Community" and "Adaptation & Mitigation". These two criteria groups are unique to Vietnam. These groups mention a consensus of surrounding communities about construction and an ability to cope with disaster (such as flood). This is entirely consistent with the climatic and social conditions of Vietnam. These are also the problems often encountered in Vietnam construction project. Water conservation in Green Star has the highest rating when compared to the other rating tools. This is not a surprise when considering the record-breaking drought conditions in Australia. The UK is one of the highest population density countries in the world, so understandably BREEAM has a high weight with respect to "Land Use & Ecology". Looking a whole, the development of each rating tool reflects the issues of sustainable development and environmental conditions of the host country.

According to the experts' opinion, Vietnam mostly adapted LEED to develop LOTUS. To clarify this assessment, a comparison between LOTUS and LEED is carried out and shown in Table III. In this table, the criterion appeared both in LOTUS and LEED is marked "x". Table III shows lots of similarities between the two rating tools. The criteria which appeared in both two tools are also the most basic criteria. These criteria are appreciated by the experts and also appeared in various other tools in the world. Besides, there are some nature-specific criteria. In Table III, the criteria which not marked "x" are specific to LOTUS. These criteria only appear in LOTUS and are rarely found in the other tools.

TABLE III
 GREEN CRITERIA OF LOTUS

No.	ASSESSMENT CRITERIAS	NOTE
I Energy		
1	Conduct Passive Design Analysis	
2	OTTV of wall and roof meet the requirements of the EEBC	
3	80% of common areas are designed for cross ventilation and are not air conditioned	
4	Thermal efficiency of fuel water heating systems surpass the requirements by 5-10% or Solar thermal system produces 40-60% of total domestic hot water consumption	
5	Reduction of energy consumption: using energy saving devices	x
6	Using renewable energy sources: solar, wind,...	x
II Water		
7	Reduced water consumption: using water saving devices	x
8	Water use efficiency: do not use water for watering plants	x
9	The amount of rainwater collected meet 10-15% of domestic water consumption	
10	Reuse water supply for building	
III Materials		
11	Using recycled materials used for the project	x
12	Using recycled materials for the project	x
13	Using local materials for the project	x
14	Using easy-renewable materials for the project	x
15	Wood for the project have a clear origin, derived from sustainable sources	x
16	30-90% non-load bearing walls are made of unbaked materials	
IV Ecology		
17	Performing environmental impact assessment	x
18	Selecting location reasonable construction, not build in areas with high ecological value	x
19	Protect and regenerate environment within construction site	x
20	Select the land need to process before construction	
21	At least 30-50% of the roof area is green roof	
V Waste and pollution		
22	Reducing the amount of waste water (30-40%)	
23	Design follow QCVN: National Technical Regulation on waste water	
24	Refrigerant management in buildings	x
25	Develop and adopt a specific plan for the management of substances / materials released during demolition or new construction	x
26	Use/recycling of substances/materials released during demolition/new construction	x
27	Reducing light pollution	x
VI Health and Amenities		
24	Have reports of toxic substances	
25	Prohibit smoking at all common areas in buildings	x
26	Speed ventilation in buildings must meet the requirements of national standards or international standards	x
27	Entire walls and floors are designed as standard soundproofing	x
28	(50-95%) of the area used to be the natural lighting to illuminate the average coefficient of about 1.5-3.5%	x
VII Adaptation and mitigation		
29	Prepare a flood warning report for the building	
30	Design building with resistant highest flooding level of current / or the highest level is forecast for the next	

	50 years	
31	Buildings have ability resistant natural disaster	
32	Widely reported information about public transport is available to users building	
33	Drainage area (30-60%)	x
34	(30-50%) of the total area of roofing / flooring capable of limiting the heat island effect	x
35	Select the location where building in connection with the public transport system	x
36	(20-30%) of the total materials used are produced within a radius of 500 km from site	x
VIII Community		
37	Implement survey heritage in area of building (a part of the EIA)	
38	Comply with QCXDVN 01: 2002 construction standards to ensure disabled access to use	
39	Take opinion of people regarding building construction	x
40	Have 5-10 essential services are within a radius of 0.5km from building location	x
41	Buildings have (10-40%) of the area for public spaces	x
IX Management		
42	Provide manuals for each apartment building, building owners / managers building	x
43	PMB is done under a system recognized by international	
44	Make maintenance planning for building	
<i>Note: The same criteria of LOTUS and LEED marked "x". The remaining criteria are specific criteria of LOTUS</i>		

The specific criteria derived from two reasons. The first is due to geographical location and climate and the second is due to the socio-economic conditions.

The criteria related to using collected rainwater and flooding disaster prevention... are unique to Vietnamese tropical monsoon climate with a high annual average rainfall and flood disaster. Other criteria such as "community surveys", "implement heritage survey", etc... emphasize the social characteristics of Vietnam - a country with long history of development and many historical sites. Currently, there is a lot of construction projects causing great impact on the lives of local communities, as well as causing destruction of historical monuments. LOTUS sets high priority on these criteria to heal the situation.

Various other criteria such as "analyze passive design", "design wall and roof insulation", "natural ventilation", "project management according to international standards", "perform maintenance planning", etc... only demonstrate a limited economic-technical condition in Vietnam. In developed countries, these criteria are almost mandatory, but in Vietnam are indeed new and uneasy to apply widely in the current situation.

III. ADVANTAGES/BENEFITS AND DIFFICULTIES IN IMPLEMENTING GREEN BUILDING IN VIETNAM

A. Advantages/Benefits

The advantages of green buildings have primarily derived from the benefits that green building brings. The first benefit is that green buildings are designed with strict criteria about energy and water saving. Thanks to that, a

significant reduction in operating costs has been achieved. According to the experts and practitioners, on average, a certified green building has saved approximately about 20% of energy and 40% of water in compared to noncertified buildings. Thus in long-term aspect, green buildings can reduce the risks of operating costs in the context of continuously rising prices of electricity and water in recent times (Vietnam Green Building Council).

The second benefit now which is particular about commercial and residential buildings is related to investment and trading. The sale price and rent rate of certified green buildings tend to be clearly higher than noncertified buildings. This situation of Vietnam is similar to the other observations in the world. For example, a representative of IFC shared at the Annual Meeting of green building (2015, in Vietnam) that the average selling price of homes with green certification in California (United States) was about 9% higher than the normal while in Singapore was at 4%.

The third benefit is directly related to the investors of green buildings. In the current condition, the social responsibility of the investors has increasingly demanded in Vietnam. The enterprises or the investors can build up their social image to the public by contributing to environmental protection. The responsible image is a strong competitive advantage in the market. And all the investors of certified green buildings have actually used this 'star' as their differentiation in the marketing plan. As one investor of a certified building said that this differentiation was used in highest priority as one of the main points in the marketing plan; and this building actually achieved the afore-mentioned second benefit. A similar situation is found for the investors of a super market as they revealed. Even though Vietnam is a developing country the current environment-friendly green building has been receiving a great interest of the society.

Various owners of both certified and noncertified buildings also shared another benefit that in their very limited number of certified buildings the labor productivity tended to be higher than in noncertified ones. Because there currently is no chance for a systematic comparison to prove this opinion this benefit of the owners is accepted as an anecdote in Vietnam.

Besides, the local authorities have a good impression and often give high priority to green building investments. Hence the implementation process of green building construction projects often has get a number of advantages in approving certain paper records, planning approval, construction permits, etc... These advantages are really significant with the investors in the condition that Vietnam has been always blamed for a complex and complicated legal framework by investors.

B. Difficulties

However, the implementation of green buildings in Vietnam now has been facing with various obstacles according to the practitioners. The first is the limited knowledge of investors about green building. This will impact significantly on the ability to make decisions to invest in green building. Very frequently when thinking about green building, many people directly and strongly relate it to the increase of the construction cost. This thinking is not false. The life cycle cost is a rather new concept in Vietnam. Indeed construction cost is always set highest priority in investment decisions because Vietnam is poor and less developed. The investors in Vietnam are not fully aware of the benefits that green building brings.

One embarrassment to the owner is the cost of consulting in green buildings. There are no norms or detailed calculations. The consulting costs are proposed by the consultants and negotiated subjectively. The investors simply agree or disagree. Many investors said that it was difficult to determine a reasonable expense for the consultant work. This difficult are especially hard for government-funded projects because this cost is very difficult to disburse. It is very easy to explain why all certified green buildings in Vietnam are private or foreign-invested buildings.

Besides, the competence of green building consultant company in Vietnam is weak. Almost all of the design consultants, project management consultants and contractors currently lack for both the knowledge and the practical experience in execution of green building projects. As many owners said their hesitation in implementing green building project was excusable and unavoidable in their circumstances.

Finally, most practitioners showed their concerns with some practical supports from the state authority. They hope to have incentives as their counterparts in other countries such as tax incentives or cost incentives.

IV. DISCUSSION AND CONCLUSIONS

A. Discussions

Since the first certified building in 2008 in Vietnam, there are now a total of 50 buildings either certified or under progress. Of which, 30 buildings achieved the LEED certification, 10 achieved GreenMark, and 10 were certified by LOTUS. However, this number is not comparable with other countries in the region. All GreenMark certified projects were invested by Singaporean investors. 60 percent of achieved LEED projects are manufacturing projects invested under foreign direct investment (FDI) condition. The limited number of certified green buildings reveals that Vietnam is at the early stage of the development of green concept. Looking at some cities in Southeast Asia, Kuala Lumpur (Malaysia) with 90 buildings, Bangkok (Thailand) with 38 buildings or Phnom Penh (Cambodia) with 7 buildings certified

green, while Ho Chi Minh City had only one building named President Palace.

Many comments from experts on green building in Vietnam said that the current pace of development of green building in Vietnam is still slow. They guess that the prospective development of green building is 5-10 years from now. However to achieve green target in construction in Vietnam, the experts and practitioners came up with some solution that must be implemented. It is needless to say that raising awareness of green environmental protection is the first. This perception would generate motivation for the implementation of green building. The right way to do that is education about it in schools or universities.

In addition, the state agencies need to create a legal framework for the implementation of green building. Besides, the government should also consider a number of incentives for investment projects on construction of green buildings such as tax reduction, loan support and facilitate legal procedures in process implementation...

B. Conclusion

This paper presents an overview about the formation and development of Vietnamese green building rating tool called LOTUS. This paper also presents some major similarities and differences between LOTUS and some other well-known green rating tools. LOTUS was launched based on adaptation of various well-known green rating tools such as LEED, BREEM, Green Star. However, various criteria in LOTUS are distinctive. The distinction is due to Vietnamese geography, climate, and socio-economic conditions.

Some interviews were conducted with the experts and practitioners in green buildings in Vietnam. It helped to identify the benefits/advantages of green investment in Vietnam. However the implementation of green building construction projects is not entirely favorable. This paper pointed out a series of obstacles of the implementation of green concept in Vietnam. These obstacles have made the slow growth of green building in Vietnam.

Last but not least, the development of green building in particular and sustainable construction in general is unavoidable and is prosperous in a near future in Vietnam, according to the practitioners.

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