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A BRIEF REVIEW OF THE ENVIRONMENTAL ASSESSMENT OF GREEN BUILDING IN DEVELOPING COUNTRIES

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Abstract: **With the acceleration of the depletion of international energy resources and the increasing deterioration of the environment, renewable development has grown to become a typical understanding of the idealistic strategy for human long - term development. In recent years, green building has been the hot test key word in building industry. As urban building progresses rapidly, urgent demand has been placed on green building. Over the past few years, green buildings have become a component that is very important to achieve greater durability through much more use that will be effective from natural sources. As a general result of helping develop green building basic concepts, several countries have set up their green building councils and guidelines.Therefore, the present study is to be carried out in terms of the assessment of green buildings and the common materials used in it. First, the essence of green building is defined Some developing countries need to create a platform for more effective use of green building guidelines. Therefore, these developing countries certainly need to create a use platform to speed up the use of these green building guidelines. Environmental issues, including climate change, fresh water supply and global warming, have recently become an issue that is certainly essential. Nevertheless, it remains for humanity to damage nature and waste natural resources. Considerable amounts of water use and energy consumption worldwide are a consequence of buildings and in addition a large component of human life time is actually invested in buildings. All of these reasons lead to the world of green buildings that are environmentally friendly, comfortable, sustainable, energy - efficient and low consumption structures. Developed countries have complete knowledge of green building and sustainability concepts, as well as working with this awareness for over two decades. They founded various environmental assessment systems. The essence of green building is to serve people, stressing sustainable building development. In addition, the nature, development and difference in building energy saving and smart building. Modern green buildings have the virtues of conserving energy and protecting the environment.They tend to be contemporary building's growth. The current work presents green building characteristics.**

Keywords: **environment, green building, building industry, green building guidelines.**

1. INTRODUCTION

As society, economy and urbanisation develop quickly, global resources and energy are depleted and the environment deteriorates (e.g. greenhouse effects, acid rain, ozone degradation, desertification, species extinction). These problems have threatened human survival and the generation of offspring. The idea and theory of green construction and sustainable development have emerged in this context.

Construction activity is one of human beings' most important activities to the natural resources and environment. Based on statistics, over 50% of the materials obtained from nature are used to construct various types of buildings and ancillary facilities. These buildings, which are used in the process of consuming around 50% of global energy in total

environmental pollution, are constructed - air pollution, light pollution and electromagnetic pollution, which accounts for around 34%; construction waste accounts for 40% of the total amount of waste generated by human activities in developing countries.

Green building is a result of the concept of sustainable architectural development, which will dominate the future trend. Green building highlights the harmonious coexistence between nature and man, sustainable development, economic and population cohabitation, resources and the environment.

Green building assessment is a new concept that aims to deepen an understanding of the importance of green building. Gr een building assessment is the key link between philosophy and operational level of green building.
If there is no green building evaluation index system, evaluation methods and models, the idea of green building can only remain in the definition ; that is, it can not give a scientific definition, it can not guide the practical operation.
On the other hand, it is particularly important that green building as a development direction involves the practice of the p roposed formulation, demonstration and evaluation issues, in particular the practice of programs to meet the requirements of green building in order to make judgments.

Implementing and promoting green building will play a significant role in improving the quality of urban living environment, alleviating urban environment pressure and improving the city's ecological environment. Therefore, the development of the Green Building Index System as a set of measures to ensure local conditions can be quantified, promoting real implementation and promotion in the local area, has become the consensus of the construction industry scholars and agencies in many countries. In the 1990s, a large number of countries developed their own green building standards and assessment systems such as United States LEED assessment system, UK BREEMA assessment system, Canadian GBTool, etc. In the design and construction of green buildings, the evaluation system played a positive role.

The green building uses building materials locally available that tend to be energy efficient, sustainable and sustainable. One of these materials considered as accessible to local material lime, which significantly minimizes the internal room temperature, by 4 to 5 ° C compared to the use of cement in plasterworks. The use of lime in construction results in carbon absorption rather than carbon emissions, which also reduces the environmental risk [1].

Using concrete throughout its lifetime enables to deny the productive emissions of the concrete component with the technology currently available. Due to higher concrete mass, thermal tangible buildings provide natural insulation that saves heating and cooling energy. The concrete structures have an estimated 44 percent lower temperature energy and 32 percent less cooling energy than other material structures, depending on the location.

Concrete structures are also longer, durable, stronger and more stormy, and are resistant to reconstruction energy saving.

Problem Determination

Environmental difficulties such as fresh water supply and global warming have become much more of a concern, which is why sustainable buildings or environmentally friendly principles have become common in the past. Research results clearly show that buildings are responsible for major energy consumption and water use worldwide. People spent much of their lives in buildings during work, rest, etc. All these reasons make the front scene environmentally friendly, sustainable, more efficient and low - energy, namely green buildings.

In the past decade, the importance of green buildings and sustainability have increased significantly due to high natural resource consumption in the buildings. This high consumption tends to harm the environment, such as changes in the ecosystem and global warming. In the US, for example, buildings consume about 40 percent of all energy, 72 percent of all electricity, and about 39 percent of primary greenhouse gas emissions [2].

The location of buildings is also affected by building structures such as the spring, the air quality and the transport system around them [3]. It is estimated that 45 percent of the energy generated for power and maintenance, 5 percent for buildings, and 70 percent of all wood is used for buildings [4].

Green Building Evolution

In the United States, the first green building activities and commitments took place. Several architects paid more attention to the ecological effects of what they did in the 1960s and 1970s. The first U.S. energy standards - efficient government office buildings were built in California. The ASHRAE Standard 90 was created as a standard for prescriptive energy

design in 1975. It then became a point of reference for energy codes. Between the years 1978 and 1980. The dialog on mandatory performance standards has grown in response to new research funded by the DOE and intensive discussions coordinated by the National Institute of Building Sciences. In the eighties, green building activities raised the movement to a higher level in Europe.

The green building movement in the 1990s was characterized by green building resources, the creation of industry associations and consortia. The American Institute of Architects set up its Environment Committee in 1990. They tried to make this resource worldwide at their 1993 Convention and held a World Congress with the International Union of Architects in which over 3,000 architects signed a Declaration of Sustainable Future Interdependencies.

International awareness of climate change and the need for action has increased significantly since 2000. As a result, inter governmental and global non -
governmental organizations have increased the number of collaborative and green building initiatives.

The Kyoto Protocol had become the most widespread greening achievement in the world in 2005. 182 parties signed the P rotocol, required developed countries to reduce their carbon emissions by 2012, and established emissions monitoring and reporting in developing countries.

Research status of global green - building evaluation

Over the past 20 years, many countries have launched their own green green building standards and evaluation systems to promote and standardize green buildings. For example, the Green Building Council LEED "Green Building Assessment System," British Architecture Research Center BREEAM "Ecological Environment Assessment," Environmental Protection in Japan CASBEE "Comprehensive Building Benefits Assessment," Ecological Building Guidelines in Germany LNB, Building Environmental Assessment System in Australia NABERS, Holland COQuantum,

The development and application of the assessment system for urban construction advocates "Green" in each country has played an essential role in developing the concept that guides builders focusing on green and sustainable development.

Green Buildings Benefits

Green buildings offer financial benefits that classic buildings cannot offer. These benefits include significantly lower waste, improved indoor quality, energy and water savings and investment, lower employee health costs, lower total costs and maintenance costs. In 2003, Kats [5] has stated that reductions in energy consumption in green buildings are mainly caused by lower energy purchases and, secondly, lower peak energy consumption. The cost of poor environmental quality is difficult to measure indoors and is generally hidden during sick days, medical costs and lower efficiency. Green buildings help people to stay healthy by improving indoor air quality and comfort. The connection between employee productivity and building design is also complicated, and numerous studies and reports emphasize reduced absenteeism and increased productivity in green buildings.

Below are some important common features in green buildings that improve healthier working environments [5]:

1. An average energy efficiency of 30 percent.

2. Enhanced thermal comfort and better overall ventilation, CO_2 monitoring to improve the performance of air conditioning and heating systems.

3. Lower emissions from sources from measures such as better positioning and better controls of the source of building material.

4. Better lighting quality, including more daylight and shade use, less glare and more light occupancy control.

Indication and features of green buildings

Since our country's green building is still new, people will naturally. There are misunderstandings, so what is the green building, exactly? There is currently a lack of a unified definition of green building at home and abroad.

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Economic development level, geographic location, technology concept and energy resources per capita conditions are different in the world, so there is a big difference between green building research and understanding. The basic definitions of green buildings, ecological buildings and sustainable buildings are summarized in different countries:

1. Ecological Architecture.
2. Sustainable architecture.
3. Energy-efficient type of residential and public buildings.
4. Green building.

The long-term benefits of green buildings protect ecosystems and ecosystems, enhance air and water quality, decrease waste streaming into canals and maintain natural sources. Green buildings can also reduce operating costs as they typically use less energy and materials, as well as improved indoor air quality, which improves occupant health [6].

Green Design Motivation

In the environment research community, the concept of life cycle assessment has generally been accepted as the only legitimate basis for the development of environmental assessment methods [7]. It is a method to assess the environmental aspects and potential effects related with a product, process or service by inventorying relevant parameters of energy and material and releases to the environment, assessing the potential impact of identified inputs on the environment and interpreting the results to help decision - makers make more informed decisions [8]. Building life cycle analyzes are however more complex than other products. Cole (2010) [7] stated that building materials and components have environmental impacts that can be divided into different phases of the entire life cycle:

1. Impacts and use of resources during the completed building's useful life.
2. Detailed evaluation of the impact of acquisition and production and use of resources .
3. Effects on demolition and disposal.

There are also some reasons why customers would like to work or live in green buildings. For example, households seek to reduce their utility bills, employers try to increase productivity in office buildings during working hours, governments have to use green building tools as pioneers to encourage people who are reluctant to have green structures, and businesses prefer green commercial buildings to gain a reputation and follow market trends.

According to the McGraw - Hill Green Building Market Report (2008), which used data from 45 countries, green buildings offer the possibilities listed in

Table 1. Reduce the negative impact of buildings on the environment.

A major change has taken place, however, since the market report was the primary motivation for green building when doing the right thing. Customer demand and market demand became the dominant market forces by 2012, despite the fact that the rate they regard as crucial drivers has remained relatively consistent since 2008 [9].

Table 1: Reducing environmental impacts from green buildings [10].

Impact	Reduction [%]
Energy Use	30-50
CO_2 Emissions	35
Waste Output	70
Water Usage	40

Green building characteristics

First, the building's energy efficiency can be reduced to the lowest level, attempting to use solar energy, bioenergy and other natural and renewable energy, using energy - saving technologies and preventing pollution. Green buildings can reduce energy consumption by 70 percent -75 percent compared to existing buildings, and the best can be reduced by an 80 percent factor (Figure 1).

Secondly, environmental protection to the benefit of future generations, rational land use, non - polluting use.

Third, green building with regional characteristics, emphasizing the use of local raw materials, respect for local humanities, is completely located in style, producing a new architectural aesthetics and a healthy and comfortable living environment, standardizing the construction process.

Fourthly, green building has a healthy and comfortable layout, orientation, shape and reasonable layout of indoor space, a good natural lighting system and natural ventilation conditions, pleasant environments, internal and external means of effective connectivity can automatically adapt to climate change.

Fifthly, the environment of the green building has a clean air, water and soil to prevent the damaging nature of the environment, not susceptible to natural disasters, to maintain a green opening, to plant trees to improve the landscape, to maintain the balance of nature, wind, shade, etc.

Sixth, the green building emphasizes the exploitation of raw materials, processing, transportation to construction, use until the building is abandoned, Responsible for all humanity, so the architectural concept is comprehensive.

Seventh, green building features are flexible, adaptable and easy to maintain.

Eighth, green building through the use of advanced technology to reduce costs, save operating costs, making the cost of construction and operation management reasonable.

Finally, green building follows the concept of sustainable development which reflected the concept of green balance in its overall science design, integrated green configuration, low energy consumption envelope structure, new energy use, water re-use, green building materials and smart controls.

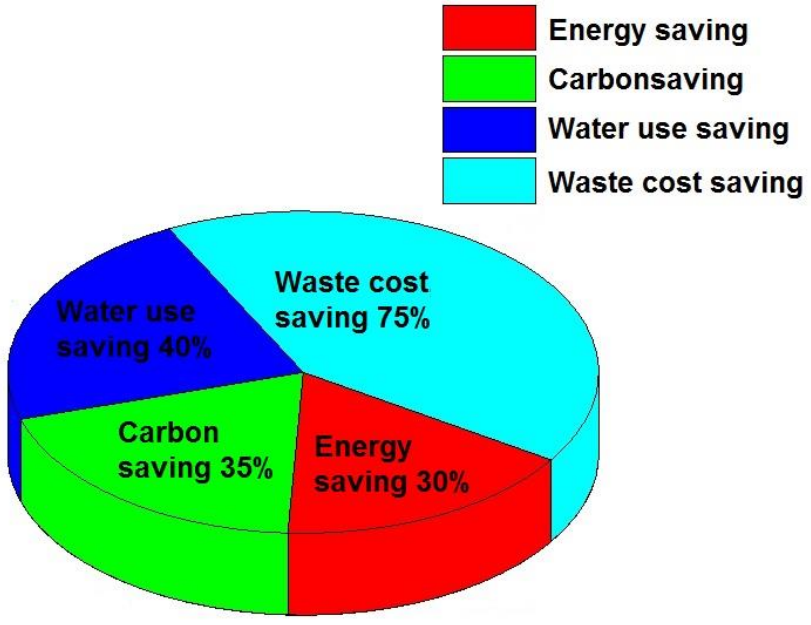

Figure1 Benefits of green construction [10]

Green Buildings Performance

Diamond (2011) conducted research on the energy actual performance level of first new generation LEED certified commercial buildings [11]. He sought to evaluate the actual and simulated energy performance of green buildings in a quantitative way. There are reasons for not modeling buildings. Instances are changes in design and construction or operation and maintenance issues that can change the building's energy consumption. Diamond's research has investigated several LEED - NC buildings in America, and problems such as comparing model and actual consumption have arisen. Buildings can differ dramatically from model one as they are simply built. Clearly different occupancy patterns and densities can make these comparisons difficult to interpret.

Diamond suggests some LEED buildings were within 10% of their design values, despite possible reasons for differences. According to the results he pointed out, the mean simulated energy savings for 17 LEED certified buildings was 27 percent. Actual consumption of 18 buildings was 1 percent lower than simulated, and the number of LEED energy efficiency points did not correspond to actual energy savings.

Another study on the evaluation of green building performance in the USA was launched [12]. In this study, performance metrics for collected, standardized and analyzed buildings include water, energy, maintenance and operation, waste generation and recycling, occupant satisfaction and occupant travel. These performance metrics were chosen to assess the purpose of sustainable design or reduced environmental impact while maintaining low operating costs and high occupant satisfaction. According to the results, the study buildings have an average operating cost of 19 percent lower than the baseline. These costs include water and energy utilities, general maintenance and ground maintenance, waste and recycling and sanitation costs. Energy performance is 25 percent better. In addition, the overall average building satisfaction level is 27 percent higher than the baseline. Emissions from transport modes result in 29 percent lower emissions of carbon dioxide compared to average travel, based on the occupant's response to survey questions. This may be due to the location of buildings, community culture, sustainable design decisions such as preferred carpool parking, alternative vehicles and bikes, or the location of a building close to mass transit options.

Green building and energy-saving building

There is a difference between green buildings and energy-saving buildings ,they are two concepts [6]. Energy-saving buildings are designed and constructed based on energy-saving design standards. Architecture is bound to be at the forefront of energy saving as a high - energy consuming industry, so it is necessary to put forward the energy saving requirements for green buildings. Building energy efficiency is generally believed to be the most direct and efficient way to save energy, according to nearly 30 years; it is one of the most effective measures to resolve the conflict between social and economic development and lack of energy supply.

Green building and smart building

It is smart to conserve energy, reduce resource consumption and waste, reduce pollution. The direction and purpose of building development, but also the only way to fully realize green building, can not be confused. Green building is the result of using information technology by emphasizing intelligent building. Network controls technology to achieve safer living, reducing environmental impact. In the information and network era of the rapid development of smart technology, the foundation was laid in green building development.

Green building can not only solve the building, the sustainable development needs of the city, but also rich in the long run . To develop the content of traditional architecture, it is a powerful way to realize the leap development within the constru ction industry.

Comprehensive environmental assessment system

Founded in 2001, Japan Green Building Council (JaGBC). Because of the increasing need to certify the assessment results, CASBEE was published in 2005. CASBEE has no system of registration and certification only. There are 200 buildings certified as reported [13]. JaGBC was set up by government agencies, private and university sector to develop and support a national evaluation system based on this close partnership and cooperation. It has conducted biannual training and seminars in Tokyo and other major Japanese cities.

These training programs are financed by the fees paid for registration by the participants. In accordance with these policies, CASBEE was developed:

1. The system should be structured to provide superior buildings with high evaluations and Therefore the incentives for designers and others are increased.
2. The assessment system should be as simple as possible.
3. The system should cover a wide range of construction applications.
4. The system should take Japan and Asia - specific problems and problems into account.

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World green building council

In 1999, the World Green Building Council (World GBC) established San Francisco.The founding countries were: USA, Spain, Canada, the United Kingdom, Japan and Korea.

The Council's aim is to support Green Building Councils in forming and transforming their own markets, to share information on successful market transformation strategies, having a common voice in international affairs and collecting funds and developing a common understanding of difficult matters.Currently, the World GBC includes 20 established countries, 9 emerging countries, 26 prospective countries and 27 associated countries. (Figure 2). India is a member of the group established in Asia Pacific, Indonesia is a member of the emerging group in Asia Pacific and Turkey is a member of the emerging group in Europe [14].

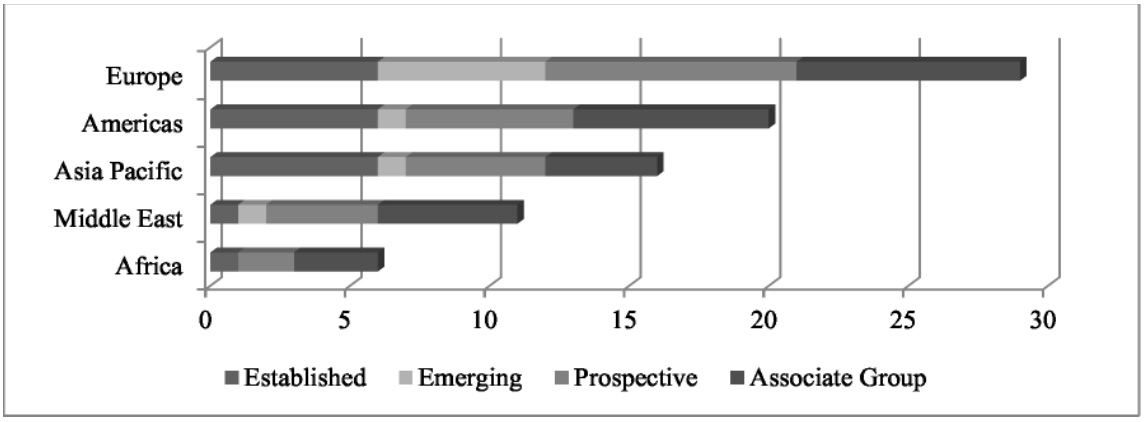

Figure 2: Members of World Green Construction Council [14].

Concrete admixtures' environmental impact

Figure 3 reveals the ecoprofile of the superplasticizer in a concrete lifetime. This ecoprofile contains the processes shown in this figure's dotted line.This figure shows synoptically different characteristics included in the procurement of raw materials, their processing and the production of chemical additives.

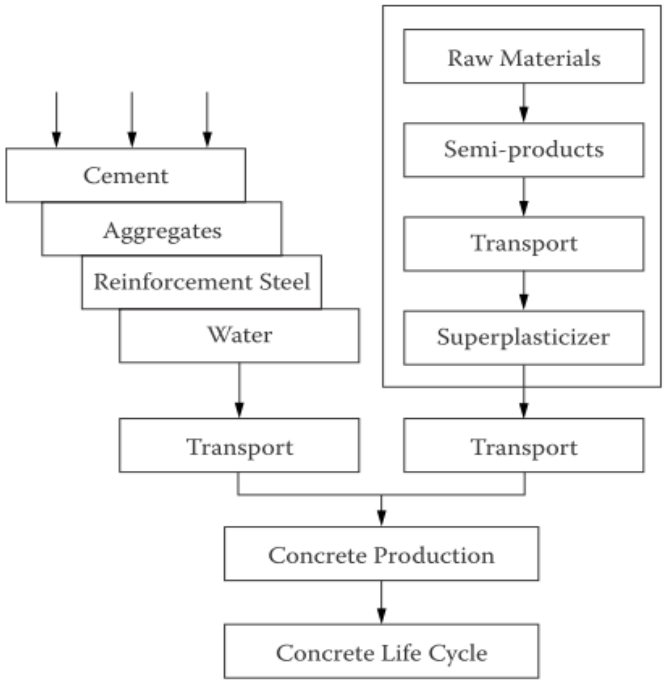

Figure 3: Ecoprofile superplasticizers in a concrete life cycle [15].

Characteristics of a green building guideline

Based on a detailed review of LEED, BREEAM and CASBEE, Potbhare et al.[16] identified the characteristics of a green building guidance. This research paper also uses the characteristics found by Potbhare et al. as BREEAM, LEED and CASBEE Green building guidelines are still the most widely used in the world to date.

2. CONCLUSIONS

Moreover, from the guiding ideology for developing green building work ideas, policies and laws and regulations, social organization, technology, talent and other aspects of promoting green building strategies.

According to the objectives:

(1) Proposing a strategy for implementation to speed up adoption of guidelines on green buildings in developing countries.

(2) In order to validate and improve the framework, to compare them to the previous study for the adoption of green building guidelines for developing countries.

(3) To understand the diffusion of green building guidelines as innovation in the construction industry.

This paper's innovation and work has been done as follows:

(1) The definition of green building was clearly defined.

(2) There are several reasons why owners can choose to implement green buildings.

The lack of approved LEED products, lack of building management skills, poor performance characteristics and unsuitable orientation of old buildings are the main barriers to green retrofit projects in the country.

Therefore, the operating and maintenance costs of the buildings have been reduced. In addition, employee satisfaction and tenant comfort have been enhanced in renewed living spaces. The amount of solid waste was also reduced. In addition, the projects contributed to the conservation of natural resources. Despite the difficulties of the process, the advantages overweight the disadvantages. Furthermore, once a project team finishes a green all projects were in line with the organizations ' visions and missions based on their environmental policy. The organizations have a good opportunity to participate in a green building project to polish their image, as the project managers also agreed. The completion of green refurbishment and renovation projects gives these organizations prestige. Furthermore, after LEED certification, employees become more aware of the environment. Therefore, building green should be encouraged by companies operating in the construction sector.

3. FUTURE WORK

Developing countries outside Asia can be validated for future work. Developing countries on various continents have different features and unique conditions, allowing them to adopt different guidelines on green building.A quantitative research method can be used as a future research to reinforce the findings of this thesis and to diversify the resources used in it. Questionnaires and case studies may be used in the same study. A questionnaire would provide a wider range of information resources for participants from different disciplines and sectors and would offer different opinions of individuals not participating in the construction of a green building project.

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