Comparative Analysis of IGBC Green Building Rating System and Vaastu Shastra

Shivani Shrivastava1 Dr. J. P. Tegar2
1,2NITTTR Bhopal, India

Abstract— This study discusses Vaastu Shastra (an ancient Indian tradition of architecture) in relation to the idea of sustainable development through Green buildings. By comparing Vaastu Shastra with the concept of green building this study has taken a step to explore the possibility of creating a living environment that is self-sufficient, ecologically balanced and culturally stimulating. It explains the concept of sustainable development based on ancient Indian traditional knowledge, through its culture, heritage and orientation towards forest sustainability, as a way to address elements within sustainable development. Further, the fundamental principles, the relevance of Vaastu-Purusha-Mandala and the history of Vaastu Shastra are highlighted with discussions on its philosophical and social aspects. Also the criteria and methodological aspect of IGBC (Integrated Green Building Concept, a green building rating system) are discussed in this study. Lastly, an attempt has also been made to create a close relationship between Vaastu Shastra and sustainable development that can redefine the present form of planning human settlement.

Keywords: IGBC Green Building Rating System, Vaastu Shastra

I. INTRODUCTION

In India there are many infrastructure developmental tasks are going for walks since previous few decade. As a reality the buildings are one of the maximum electricity consuming shape because of this truth Architecture and building network has main contributions for annual green emission. As all of us know the truth that in present technology climate change & global warming are the toughest troubles over the world. To assist healthy & green surroundings most of the development businesses are that specialize in Green Building construction.

Green structures are condition inviting they give centre around asset productivity all over the life cycle of building enduring planning stage, development action, support period, renovation and destruction work. The fundamental target of green structure is to build up a procedure so as vitality uses can be decreased to a level that its effect on vitality expenses and ozone harming substance discharge can be limited.

There are many rating frameworks everywhere throughout the world to rate or execute the Green structure plan. In India we have GRIHA, IGBC, LEED India, BEE and so on rating frameworks.

Other than this as we a whole are well-known of the name of “Vastu Shastra" an old practice for arranging and situating of any structure. Vastu Shastra is characterized as a part of Vedic writing, which gives the thought regarding the development of home love or whatever other structure which can synchronize with the characteristic vitality sources likewise it is accepted to be the most established study of Architecture. In the old period rishis were very much aware of this normal vitality reality and henceforth they connect engineering with the study of vast and created it as a Vedic order of information, collectively known as the “Vastu Shastra”.

In this work a detailed comparative study has been carried out on IGBC (Green Building Criteria Rating system) and Vastu Shastra Concepts for construction of any building.

A. Objective
Build a relation between Green building criteria based on IGBC Rating system and Vaastu Shastra.

B. Scope of Work
Focus of this study is mainly on building a correlation between IGBC Green Building Rating system and Vaastu Shastra. Due to time constraints no practical practice has done on the developed correlation.

II. LITERATURE SURVEY

A. “Analysis of the Present Situation of Public Institution Buildings Green Transformation in Shenyang based on Investigation and Survey” by Guohui Feng, Yanhe Wang, Shui Yu, Xiaoxu Cai in 2015

In this paper they look at 6 existing structures in Shenyang. They had considered the government buildings, research institutes and other private buildings that have been changed in green structure based on examination survey, meet and on location visit. The reason for this study is to find changes in before and after reconstruction and energy consumption impact.


In their examination they have utilized the information mining-based SVM-RFE (Support vector machine-recursive feature end) highlight to perceive the shaky variables that affects the cost exhibition of pre-project planning period of any green structure projects. The discoveries propose that the pre-project planning, feasibility and idea improvement stages greatly affect the cost exhibition than the detailed stage.


In this work, another programmed calculation is created to demonstrate the existing buildings façade and extricate a few significant parameters for building greening. Though it is a moving activity to modify the plan of existing huge and tall structures to cause them to depend on natural energy. Among them is the enormous measure of parameters and geometric estimations required, for example, stature, width, plot proportion, aspect proportion, windows measurements, and so forth.

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D. “Examining Contemporary Issues for Green Buildings from Contractor’s Perspectives” by Mohsen Aozuza, and Jin-Lee Kim in 2015

This paper can serve as a stepping stone on the perceptions of the general contractors and the subcontractors when future research can be built off on the results presented here so that the green building delivery method is more acceptable for them to cure the misconceptions towards green building projects. The issues contractors face during each phase of a construction project is as follows:

- Pre-Design
- Design
- Construction
- Post-Occupancy

III. METHODOLOGY

In order to establish sound characterizations of the assessment method under study information about the background and methodological aspects of the assessment method under study is quite relevant.

The detailed information about the IGBC assessment methods and Vaastu Shastra. This chapter starts with introducing the IGBC and subsequently we focuses on the responsible organization, the organization’s mission and profile, their assessment philosophy, how they develop their criteria, pathway to certification and outcome label. The methodological aspects comprise information on the certification process to attain a label, introduce the method under study in detail, their scope, the category, criteria and evaluation aspects as well as the output of the label. Along with this a detailed study has been carried out on various aspects of Vaastu Shastra like Principle of Vaastu, Elements of Vaastu, its application etc.

A. GBC (Indian Green Building Council)

This is an agreement based program which works voluntary. This rating system has developed on the basis of latest construction materials and working technologies. The aim of IGBC rating system is to avail a universal approach to build environment friendly buildings having features like water efficient, proper waste treatment, optimum use of energy, apt focus on inhabitant comfort & well-being.

Some aspects under IGBC rating system are:

- Recognition for architectural excellence through integrated design approach.
- Recognition for passive architectural features.
- Structural design optimisation with regard to steel and cement.
- Water use reduction for construction.
- As the certified green product encouraged more in market, IGBC has initiated an approach for certification of green products under this products will be evaluated right from the process of extraction to the disposal.
- Before award of the rating there must be a site visit and audit.
- To monitor the energy and water consumption they encourage to maintain an annual report for energy and water consumption statistics.

B. The Organization

IGBC is a part of Confederation of Indian Industry (CII). It was formed in year 2001. The Confederation of Indian Industry work as an advisory and consultative body which develop and sustain the environment encouraging environment which ultimately helps in the development of India also improves the sustainable growth of partnering industry, civil society etc. CII is a not-for-profit, non-government, industry-led and industry-managed organization. This organization plays a proactive role in sustainable development of India. The aim of the body is, “To enable a sustainable built environment for all and facilitate India to be one of the global leaders in the sustainable built environment by 2025”.

C. Criteria Development

This rating systems of green structures uses a prescriptive and performance based approach to assess some predefined mandatory requirements & credit points. This system has developed in such a way that it can be comprehensive and user-friendly, at the same time. There are seven major categories which are subdivided into different criteria. These seven categories are illustrated below.

1) Sustainable Architecture and Design
2) Site Selection and Planning
3) Water Conservation
4) Energy Efficiency
5) Building Materials and Resources
6) Indoor Environmental Quality
7) Pathway to Certification

This rating system focuses primarily on newly constructed Buildings, weather owner or tenant occupied. The project team assess all the possible points under the rating system and evaluate accordingly. Any project/building can apply to get certification from IGBC rating system, if the project meets all Credit mandatory requirements and achieve the minimum required points then only project will get certified.

Any Organizations or Client who are interested to get certified from IGBC Rating system, need to first register on IGBC website. Registration is the very first step to establish initial contact with IGBC and provides access, the detailed process of certification is defined below.
IV. CO-RELATION AND DISCUSSION

A detailed study has been carried out on Green Building Concept and Vastu Shastra in previous chapters. On the basis of this previous study the Green building concept as per IGBC rating system and Vastu Shastra has compared and presented in this chapter.

A. Points of Discussion between Green Building Concepts with Vaastu Shastra

To compare the two concepts of building planning we have taken following four parameters which are really essential for our healthy and eco-friendly environment.
1) Sustainable site selection
2) Water resources
3) Energy and atmosphere
4) Indoor environment quality

B. Discussion

All above mentioned parameters has been discussed in detail in previous chapters. On the ground of these parameters now we will compare the criteria of IGBC and Vaastu Shastra for planning of building.

C. IGBC Recommendation on Sustainable site selection

There are 13 criteria which deal with the sustainable site selection for green building. These criteria have two compulsory condition and total 15 points. The criteria are:-
1) Compulsory Condition 1:-Local Building Rules
   Building must fulfil essential statutory and regulatory codes.
2) Compulsory Condition 2:-Soil Erosion Control
   Provision must be made to control the erosion & sedimentation of soil.
3) Credit 1:- Basic Amenities
   Site selection should be like that the occupant can have minimum seven basic amenities around 1 km of the building entrance. This will reduce negative impacts caused by automobile use.
4) Credit 2:- Easy Approach of Public Transport
   Encourages usage of public transport this will help in reducing the harmful impacts of automobile.
5) Credit 3:- Low-emitting Vehicles
   Encourages the use of non-fossil fuel vehicles, this will reduce the adverse impacts of fossil fuel through automobiles.
6) Credit 4:- Preservation of natural topography/vegetation
   In order to minimize the long-term negative environmental effects we should reduce site disturbances or restore the site.
7) Credit 5:- Conservation or Transplantation of Trees
   Natural topography should be retained (and/ or) design should incorporate at least 15% of the site area for vegetation/plantation, this will avoid the disturbance to the site.
8) Credit 6:- Provision to reduce Heat Island, Non-roof
   To minimize the adverse impact on micro-climate, heat island effect should also be reduced.
9) Credit 7:- Heat Island Reduction, Roof
   Reduce heat island effect so as To reduce adverse effect on micro-climate.
10) Credit 8:- Provisions for reduction in outdoor light pollution
    Reduces light pollution through increasing access to night sky and enhancing the night-time environment.
11) Credit 9:- Universal Design
    There should be a provision in building design to serve for differently disabled and senior citizens.
12) Credit 10:- Basic Facilities for Site workers
    There should be some provisions of safe and healthy working environment for the workers.
13) Credit 11:- Awareness of Green Building
    Recommendations to the occupants
    Provision should be made to give proper knowledge regarding descriptive guidelines of green building so that they can able to implement and maintain the green design features.

D. Vaastu Shastra Recommendation on Sustainable site selection

1) Utilization of resources.
2) Suggest east and north is the topography for a site selection. Also the site should be having high ground levels in south-west/west-south direction.
3) Suggest productive earth to plant fruit trees, grass, flowering plants etc.
4) Suggest water table up to a depth of a man’s height with his hands raised above his head. Also sites without the source of ground water should be avoided.

E. IGBC Recommendation on Water resources

There are 8 criteria which deal with the water conservation of green building. These criteria have two mandatory condition and total 18 points. The criteria are:-
1) Compulsory Condition 1:-Rainwater Collecting, Roof & Non-roof
   Enhancement of ground water table and reduction in water demand from municipal bodies through optimal rainwater management.
2) Compulsory Condition 2:- Water Efficient Sanitation Fittings
   Minimising potable water use.
   a) Credit 1:- Landscape Design
      Designs should ensure the landscaped zone will be plant with drought tolerant, adaptive or native species. Proper designing for landscape should be done for proper water conservation.
   b) Credit 2:- Efficient Water Management for Irrigation
      There should be an efficient water management system/techniques through which irrigation water demand can be fulfilled with minimum losses.
   c) Credit 3 Efficient Collection of Rainwater, Roof & Non-roof
      Proper management of rainwater harvesting can boost the ground water table and reduces the water demand from municipal corporactions.
   d) Credit 4 Efficient Water Plumbing Fittings
      Enhancing efficiency of plumbing fixtures, so as to minimise the potable water losses.
   e) Credit 5 Treatment of wastewater and make the reuse of it
      There should be a waste water treatment unit on site to treat the waste water which is generated on construction site, so as the water can be reused and the receiving streams will also not get polluted by safe disposal.
f) Credit 6: Water Metering
Encourage sub-metering for water supply so as the wastage of water can be controlled and water performance can be improved through users.

F. Vaastu Shastra Recommendations on Water resources
1) Vaastu placing and positioning of water tank/ reservoir is preferred in North East direction.
2) The positioning of overhead tank is recommended in west side of building.

G. IGBC Recommendations on Energy and atmosphere
1) Compulsory Condition 1: Reduce the use of Ozone Depleting Materials
Eco-friendly refrigerants and haloes should be used in the building so as the adverse impact on the ozone layer can be minimised.
2) Compulsory Condition 2: Minimize Energy consumption
The consumption of energy should be optimal so as the adverse impact, on environment, from use of excessive energy can be reduced. The building should be designed to comply with different codes like Energy Conservation Building Code, BEE etc. e.g the in the building For interior, exterior and parking areas of building the use of Lighting Power Density (LPD) should be minimize upto 10% over ECBC base case.
3) Compulsory Condition 3: Commissioning Plan for Building Equipment & Systems
It should be verified and ensured that the equipment & systems provided in the building are commissioning their job to accomplish the performance as planned during design phase.
4) Credit 1: Eco-friendly Refrigerants
It should be verified that the Heating, Ventilation & Air-conditioning (HVAC) equipment provided in the building should be eco-friendly and should have low/no Ozone Depletion Potential (ODP) and Global Warming Potential.
5) Credit 2: Enhanced Energy Efficiency
The consumption of energy should be optimal so as to reduce negative environmental impacts through unnecessary energy use. In the building the fans, lighting, motors etc. should be provided as per B star rating.
6) Credit 3: On-site Renewable Energy
Minimising the environmental effects due to use of fossil fuel energy.
7) Credit 4: Off-site Renewable Energy
We should use the renewable technologies so that the adverse environmental effects due to use of fossil fuel energy can be reduced.
8) Credit 5: Provision for Monitoring on Post-installation of Equipment & Systems
Building equipment & systems should be commissioned in a way to achieve performances envisaged during design stage.
9) Credit 6: Provision for Metering of Energy and Management
There should be sub-metering system for minimum of five from the following energy use applications:
- Lighting meter for Interior & Common area
- Lighting meter for Exterior area
- Municipal water supply
- Ground water pumping

- Treated waste water pumping
- Renewable energy generation
- Power backup systems
- Elevators, Escalators, etc.
- BTU meter for chilled water consumption (for only tenant-occupied buildings)

Any other energy consuming equipment and systems Vaastu Shastra Recommendations on Energy and atmosphere
1) Suggest efficient utilization of energy the orientation of building is designed in such a way that utilization of daylight can be achieved at the maximum.
2) Suggest direction of different rooms for maximum optimization of daylight. The Vaastu Purush Mandala gives the idea about the right directions for the required rooms along with their maximum utilisation i.e. the room should receive maximum sunlight and wind efficient.
3) Suggest Kitchen should be placed exactly in south east corner of the house the scientific reason of positioning of the kitchen in the southeast is because it can be open to the positive effects of morning sunrays and gets fresh air most of the time.
4) Larger window can be constructed in the north east direction for receiving the morning light and fresh air. In place of air condition the placing of cross ventilation can be preferred for cooling.

H. IGBC Recommendations on Indoor environment quality
1) Compulsory Condition 1: Minimum Fresh Air Ventilation
There should be some provisions for suitable outdoor air ventilation, so that indoor air quality cannot get affected.
2) Compulsory Condition 2: Provision to Control Tobacco Smoke
To minimise the contact of non-smokers from the harmful health impacts because of passive smoking, smoking should be barred in the building as per the regulations of Ministry of Health & Family Welfare, Government of India.
3) Credit 1 Points: CO2 Monitoring
There should be continuous monitoring and control on carbon dioxide level in the building to safeguard inhabitant health and comfort. This shows that the building should install CO2 sensors in return air ducts to maintain a differential CO2 level of maximum 530 ppm in all regularly occupied areas.
4) Credit 2 Points: Day lighting
Ensuring connectivity between the exterior and the interior environment, by providing adequate day lighting.
5) Credit 3 Points: Outdoor Views
To connect the interior & exterior environment provisions should be made for adequate sights.
6) Credit 4 Points: Reduce Indoor and Outdoor Pollutants
Provision should be made to minimize the contact of people in the buildings with injurious indoor and outdoor pollutants because it can have adverse effects on indoor air quality and consequently on the health of human being.
7) Credit 5 Points: Low-emitting Materials
Inspiring the use of low VOC emitting materials, which will lower the negative impacts on the health of building inhabitants.
8) Credit 6 Points: - Provision of Well-being Amenities (Only For House Owner)
For well-being of occupants, some provision should be made through which physical, emotional and spiritual health of person can be enhanced.

9) Credit 7 Points: - Provision for Post Construction and Pre Occupancy Indoor Air Quality test
A pre occupancy testing system of Indore air quality should be provided to reduce the airborne contaminants during construction which can lower the exposer of contaminated air with occupant after occupancy.

10) Credit 8 Points: - Maintain Indoor Air Quality during Construction
To provide a safe and healthy work environment to the workers at site, it’s important to reduce the air quality problem developed due to the construction work.

I. Vaastu Shastra Recommendations on Indoor environment quality

1) As per the Vaastu Shastra positive energy travels from North East corner to South West corner of a house thats why the positioning of bedroom is suggested in South west direction.

2) A positive energy released from Pooja room which energize the whole house. The lamp should facing the east direction, also if possible (depends on design provisions) some invisible sun radiation join the east facing lamp and it will give good health to the family.

3) For large plots, big trees like Mango, Peepul, Tamarind, Banana, etc., are good at sufficient distance from plot, because it prevents the outside noise and controls noise pollution. Site which has fertile earth, flowering plants, fruit trees, grass etc., is good for indoor and outdoor atmosphere of house.

V. CONCLUSION
In present days the most critical issue is our environment and how we can contribute to a healthy environment. As far as structures are concerned, the need of healthy environment leads us to the ‘Green Structure’. As per previous chapters this is very much clear that green building concept is aiming to sustainable development. Along with this “Vaastu Shastra” is Hindu tradition for planning and construction of various types of building. As per the concept of Vaastu Shastra the designs are intended to integrate architecture with nature. The Vaastu Shastra principles are not just mythological but also based on the various scientific reasons which affect the planning and construction of various structures. In this study I have tried to find a co-relation between the above mentioned concepts. There are many Green Building criteria prescribed by IGBC which are similar to the concept of Vaastu Shastra.

VI. FUTURE SCOPE OF WORK
- A detailed study may be carried out on existing building which is designed as per Vaastu Shastra to establish a relation between Vaastu Shastra and Green Building criteria, also
- A comparison study may be carried out on existing green building and a building which is designed as per Vaastu Shastra.

REFERENCES