Reformulation modelling Specifications for Energy Efficient Green Buildings

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Abstract : This paper personify about green energy efficient structural building and design specification method to redesign green building industry designed schema based on sustainable development principal framework based on cost efficiency and human adaption as each situation involving around green buildings project as it shows the redefining strategy for making energy efficient reinvent modelling based structures and buildings.

Index -Terms **- Green building, cost efficiency, human adaption, conceptual framework.**

I. INTRODUCTION

One of the primary requirements to achieve a global sustainable energy system is energy efficiency. On a fundamental level, the term basically calculates the percentage of energy input to a machine which is utilised in useful work. It can also be thought of as the ratio of output performance to the input. Ultimately, an energy efficient device or a building uses a significantly lesser amount of energy to produce the same output. The International Energy Agency notes that energy efficiency can practically alleviate climate change and global warming. It can also improve the energy security of nations while advancing the economies. The ratification of the Energy Conservation Act in 2001 has been one of the milestones in India's Energy Policy. This legislation opened doors to various policy initiatives and market solutions in the building sector. This paper endeavours to study the economic ramifications of energy efficient infrastructure.

II. GREEN BUILDINGS

A green building is such a building which consumes less energy and less water. It includes a systematic waste management system in such a way that it uses maximum natural resources without compromising on the future needs. The ultimate goal is to achieve a sustainable planet through friendlier construction methods. In addition to achieving energy efficiency, green building have a plethora other benefits: lower building operational costs, better living quality and augmented comfort. Energy efficient and smart buildings can be included under the larger superset of green buildings. According to estimates, buildings annually consume almost 40% of the total energy consumption of a country. This figure is alarming. Hence, the focus should now be on improving design specifications of already existing buildings to make them more environment-friendly.

III. FACTORS AFFECTING ENERGY EFFICIENT BUILDINGS

1) HVAC System
2) Doors
3) Lighting
4) External roofs and walls
5) Windows

Design modifications in the above - mentioned areas can ultimately lead to more energy efficient living and office spaces.

IV. HVAC SYSTEM

These systems provide heating/cooling for residential and office spaces. In order to produce energy efficiency, the focus should be on minimizing the requirement for HVAC, while maximizing the energy savings

V. HEATING SYSTEMS

The industry accepted standard used to measure the energy efficiency of heating systems is Combustion Efficiency (CE). It refers to the amount of fuel consumed when a boiler is working under stable conditions during a certain period of time. We have two kinds of boilers, under standard efficiency and under high efficiency conditions. Both, hot water and steam boilers have a standard efficiency of 80% (CE) while the oil or gas units with high efficiencies can achieve 87% (CE) in the case of hot water and 84% (CE) in the case of steam.

Annual Fuel Utilization Efficiency (AFUE) is another parameter which refers to the general fuel consumption of the boiler during a certain period, including all its phases. The makeup systems are responsible for providing fresh air to the building. They are evaluated under AFUE. In their standard version, they can efficiencies up to 85% (AFUE), while the high-efficiency systems can achieve up to 95% (AFUE).

An economizer heater that preheats the boiler water can be a great way to improve the system efficiency, while also cutting down significantly on the transportation cost. IoT can be employed to modernize the system controls. It can be used to monitor the system as well as to give real time feedback about the water levels.

VI. HEAT RECOVERY

The use of heat/enthalpy wheels and energy recovery ventilators allow them to absorb moisture from the air while simultaneously cooling the air that is absorbed, to finally exhaust the heated air. This system allows the capacity of the HVAC system to be reduced since it can be used in both summer and winter months. In summer, it would take the heat and humidity outside the building while in winter, it would exhaust the recovered heat inside the building.

VII. LIGHTING

Lighting accounts for 15% of India's total energy consumption. It forms a significant component of the peak load. The commercial sector lighting demand contributes 25-40% of the building energy requirement. Lighting technologies, including Compact Fluorescent Lamps (CFLs), Light Emitting Diodes (LEDs) and high efficiency lighting systems can significantly reduce the energy consumption. In comparison to incandescent lights, CFLs can save up to 80% of energy. The residential sector has been reluctant to accept them owing to their high cost per unit but the sales in the commercial sector have definitely leaped. The LED bulbs have seen a slow growth rate in the country owing to both, technological and economic barriers. The import duty of 30% makes them almost inaccessible to common folk. Another reason could also be the lack of fiscal impetus to national manufacturers by the government. Suitable policy interventions can lead to higher success of LEDs in the Indian market

VIII. WINDOWS

Windows are an integral part of building design for aesthetic, ventilation and lighting purposes. Following are some useful design modifications:

1. **Low Emissivity**

Windows that are able to stop the sun rays from entering will reduce heating effects, thereby reducing cooling requirements.

2. **Opaque Windows**

A very innovative solution that is sort of like a semi permeable membrane where it permits light to enter but stops the heat absorption.

IX. EXTERNAL WALLS AND ROOFS

1. **Insulation**

One of the most effective design implementations to promote energy efficiency is the employment of insulation on walls. It is quick and its application is easy. Most importantly, it can be used on already existing buildings and is economical. Its goal is to obviously shield the building from external climatic changes, thereby decreasing energy consumption. [7]

2. **Reflectivity**

Low emissivity frontispieces and roofs can significantly reduce heat in buildings.

X. DOORS

1. Seals

One of the easiest and the most cost- effective ways to ensure minimal loss of energy indoors is to guarantee proper sealing of doors

2. Vestibules

The space between two doors are beneficial for isolating external temperatures in buildings with large populations. It is estimated that the usage of vestibules can save up to 40% of energy where the differential temperatures are high.

In this academic study, we propose to analyze the economic feasibility of energy conservation using day lighting. The main focus is to reduce the dependency on artificial lighting and promote the admittance of day lighting in a building. According to the U.S. Green Building Council, 50-80% reduction in energy requirement can be achieved by designing daylight-lit buildings (USGBC,1996). Therefore, it is imperative to explore day lighting techniques to evolve feasible energy conservation methods. Various approaches have been employed to conserve energy in buildings. Shen et al. provided a quantitative comparison of shading control strategies integrated with user comfort and maximum energy efficiency using energy simulation. It was observed that the best control strategy was to integrate lighting controls with day lighting system to achieve maximum energy efficiency. Manzan and Padovan presented an optimization approach for designing a fixed external shading device for an energy efficient office to protect it against external thermal load. They took into account the energy demand for heating, cooling, and lighting appliances, along with the interaction with an internal movable venetian blind for providing shading from sunlight.[9] Krarti ,in his paper, concluded that a large atrium area, high window-to-wall ratio, and clear glass windows provide maximum energy savings with the help of dimming controls. He noticed that the lighting energy savings achieved due to day lighting can be up to 40%. From the above literature, we can safely conclude that energy performance can be increased by promoting day lighting in a building.

XI. COST EFFECTIVE SYSTEM

During the construction phase demanding viability of the building are long- term economic performance and cost. Building project are used to promote utmost efficiency system and reduce financial cost. Building represent a large and long-lasting contribution in financial terms as well as in other resources. Redefining the cost effectiveness of building is consequently of common interest for society.

It consists of three types: Initial cost, Cost in use and Recovery cost.

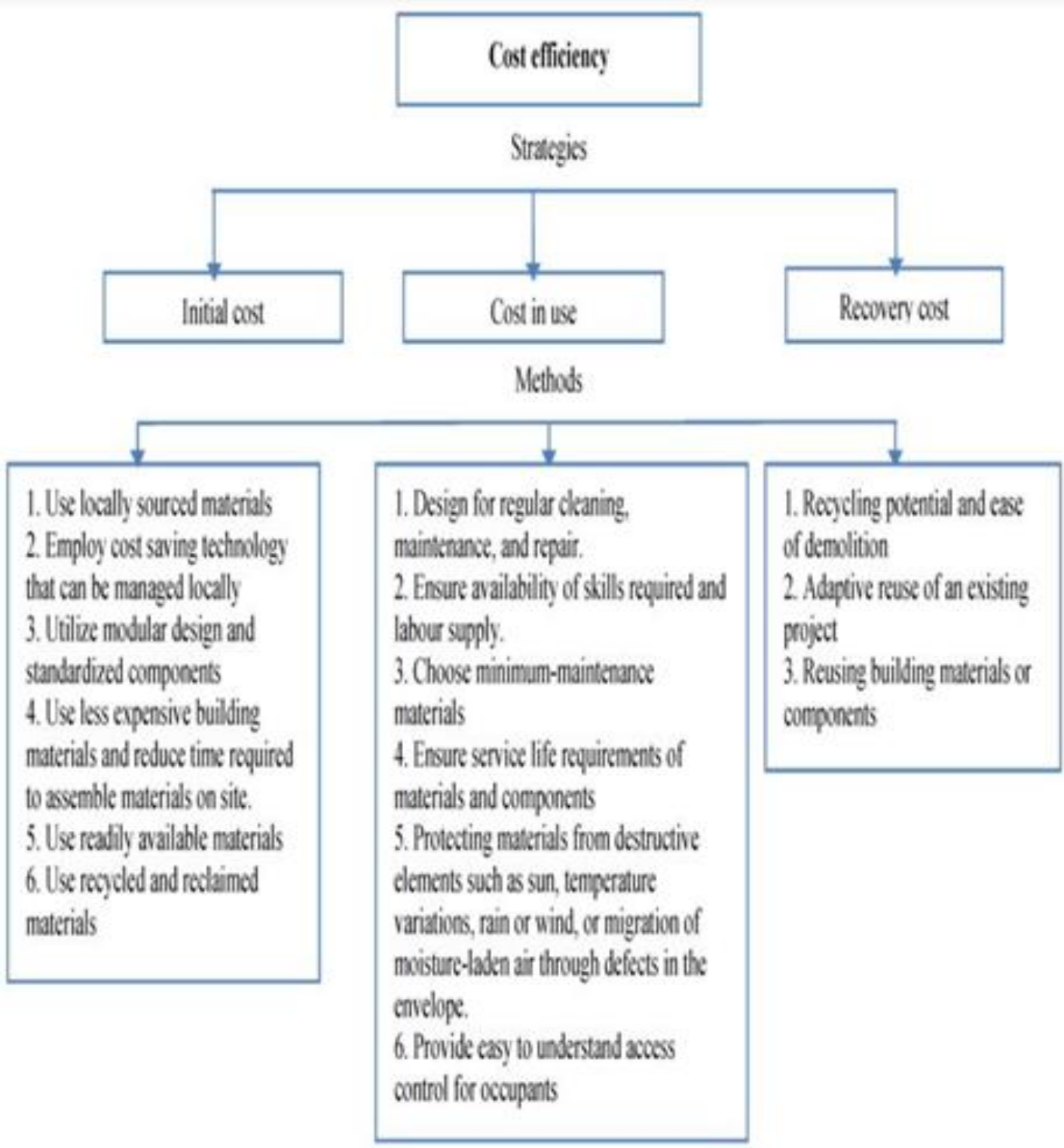

Fig 1: strategy and system of cost effectiveness

XII. ARCHITECTURE OF HUMAN ADJUSTMENT

Determination of sustainable building is to give assurance about healthy and comfortable environment for human curricular activities. As the accommodation and redefining structure built for and provide several processing -system for living. Sustainable development requires that building which does not cause any risk problem and may effect environment as promote and enhance human adaption for methodology.

The human adjustment consists of Protecting human health and comfort and Protecting Physical Resources.

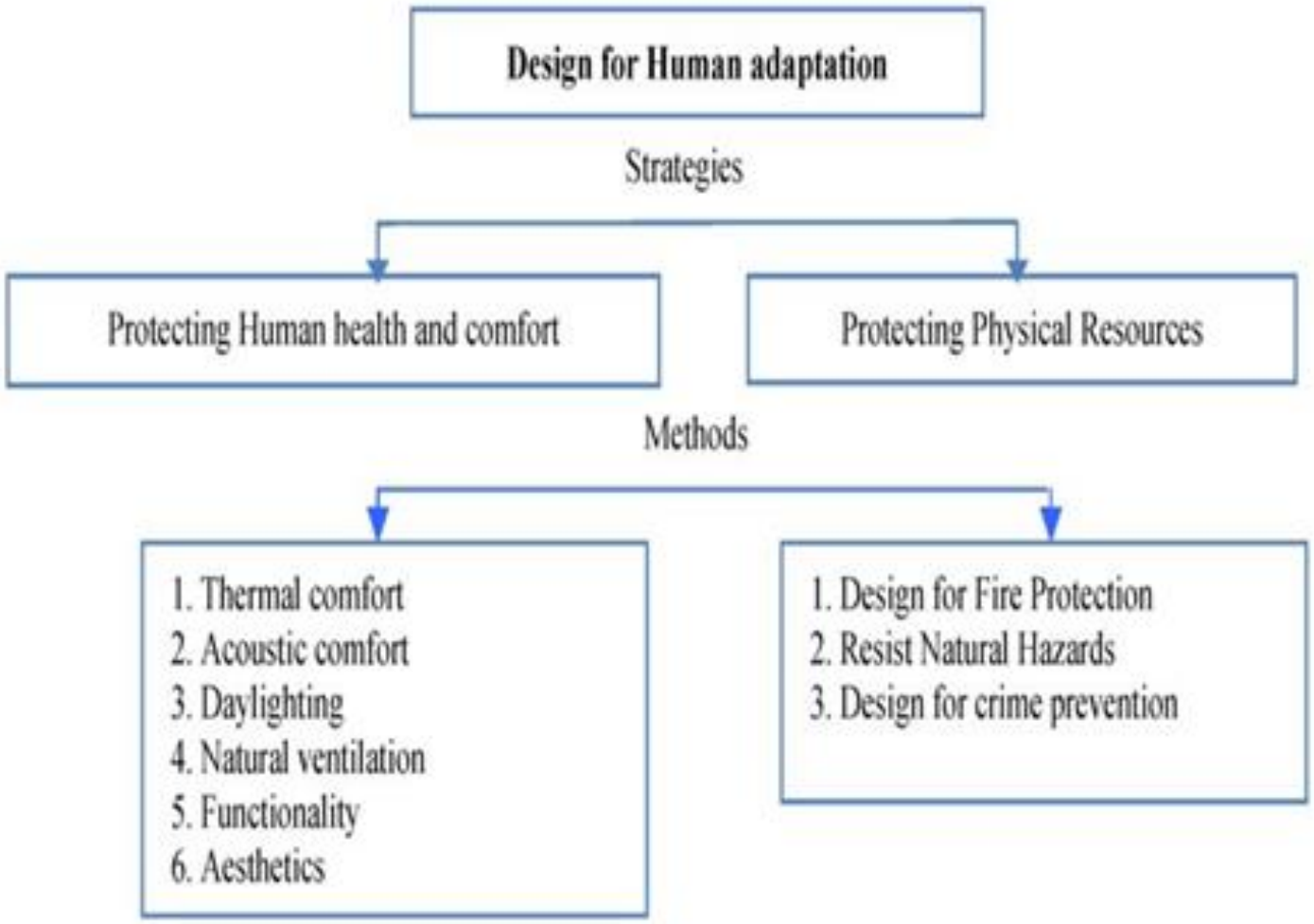

Fig 2: architecture of human adaption

XIII. CONCLUSION

Energy efficient building is considered a way to start an initiative towards protecting the environment. The redefining aspect of energy efficient buildings. To make balance structure between natural environment and social life. It shows the combination and future advancement to integrate the resource prospective, cost effective and how human adapt that system in peaceful way.

XIV. REFERENCES

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