



RESEARCH ARTICLE

APPLICATION AND LIMITATIONS OF NOVEL BUILDING TECHNOLOGY - A CRITICAL REVIEW

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ABSTRACT

The study describes about the basic concept and application of novel building technology. The green building technology gives many solutions to the emerging construction problems. Building with energy conserving factors develops the infrastructure and also the economical development of the nation as well as the environment. The main objectives of this study is to study the concept of novel building technology and its application. This paper also helps us to know the usage and limitation of variable energy renewable sources in building construction. The results of this works are useful to provide guidance that usage of renewable resources helps to reduce 30-40% of carbon emission of building which is caused by concrete and other materials.

Key words: Green Building, Construction Technology, Novel Building, etc.

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INTRODUCTION

In a modern urbanized society, today more and more building owners and investors claim that they prefer to use energy-efficient construction technologies and adhere to the policy of sustainable development. So this study is made to know the various techniques and policies that are followed in the various parts of construction fields as Buildings and its Constructions consume 30% to 40% of all primary energy. So This present reviewed paper that we made is to solved various problems and to boost Green construction and save natural resources and other resources by understanding various techniques to its extent and getting its limitations and places where it can be abundantly used in a bold manner. Which will play a huge role in the demanding need for construction in the both developed and developing countries. Now days, Energy Conservation in the construction field and the building sector plays a major role, which do paves way for lots of Creative, additional and upgraded Strategies. These concepts of energy conservation are analysed from various literature papers and reviewed provided its advantages and limitations are detailed in this review paper.

Literature Review

Several Authors are presented about various applications and limitations for the novel building technology.

- Abhiney Gupta (2017) presented a building a green home using local resources and sustainable technology. This paper mainly focuses on the developing of Green residence in Jammu City where the concept of sustainability is a new born baby which is done by utilizing the natural resources to the maximum and results in reducing Carbon foot print to a whopping amount using simple Green Materials (i.e. Voc Paints, Intulted glass, Upvc) and also by planting trees and conserving resources to the maximum.
- E. Candelari et al (2017) paper was an attempted a novel vertical greenery module system for building envelopes: The results and outcomes of a multidisciplinary research project. This paper makes a study on Vertical Greenery Modular system (VGMS) i.e. modular box to cover buildings with vegetation that is made up of recycled/natural and highly performing materials from the energy/environmental point of view. In this study the actual performance of the VGMS was assessed, through laboratory and long-term in field monitoring, and at the same time, the technological issues, biometric parameters, and the acoustic, thermal and mechanical aspects were investigated. And revealed

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the use of VGMS could facilitate the spread of this kind of greening over the next few years by adopting different materials/species/technical solutions.

- Elena Korola, Natalia Shushunovaa (2016) Studied on benefits of a modular green roof technology. The main aim of this research is to provide an effective apparatus and method for green roof system and the principal results of this research is focused on adjusting of optimal physical parameters of green roof modules. This article concludes that obtain that the optimal sizes and optimal physical parameters which consist of providing the least-time laborious installation and gets technical and well-being benefits and help to accomplish a variety of sustainable goals as it also helps in participation of agriculture roofing which brings the job creation, Increases family income.
- G. Ficco et al (2016) carried out a novel model for the evaluation of heat accounting systems reliability in residential buildings. In this paper, a statistical model to estimate and predict the on-field reliability of heat accounting systems is proposed. The developed model has been applied and validated in three different case studies i.e. two-family house, a small building, a large multiple building, This research reflects as developed model which represent a useful tool for both the design of new buildings, allowing the choice of more reliable accounting systems, and to define possible improvements of existing buildings i.e. the more accurate estimation of the radiators thermal out-put.
- Geetanjali Kaushik, Arvind Chel (2013) presented renewable energy technologies for sustainable development of energy efficient building. In this paper was focused by various aspects are studied to build an energy efficiency building with their economic and impacts on environment. They concluded as research compared made with this technology and conventional energy sources are discussed.
- Harun Turkoglu, Gul Polata, and Asli Pelin Gurgunbe (2017) carried out identification of Material-Related Risks in Green Buildings. This paper describe about completely makes a huge study and results on the Risk factors that involve in the terms of Sustainably, Cost, Time factor and other Risk Factors. By taking a huge Survey to 50 randomly selected Contractors, Designers, and Consultants. And concluded that “negligence of constructability in green designs” The main of the concept revealed by Green Building risks that happens which is followed by other two main risk Causing Factors such as “design-related” and “contractor-related” factors. And number of Specialized GB contractors and designers should increase to reduce risk factors.
- Ibrahim Dincer et al (2011) studied Exergetic and sustainability performance comparison of novel and conventional air cooling systems for building applications. The main objective of this purpose to proposes energy and exergy analyses and sustainability assessment of one novel and three conventional types of air cooling systems for building applications. In this research revealed Exergetic and sustainability performance assessments are done at twelve different dead state temperatures varying from -5°C to 50°C . And conclude Minimum and maximum wet bulb effectiveness, Specific energy destruction, Maximum energy efficiency, Sustainability assessments of the

systems are made using the SI method and also they conclude by recommending the M-Cycle based air coolers for the future.

- Matthew Graya, Hong-Trang Nguyena (2016) a review on Green Building in Vietnam. In this paper was an attempt about highly been criticised as being slow and lacking in the progress of green building Designs. Also it enclosed proposes that promoting green building could solve three inter-connected challenges hindering sustainable development, and provides a comparative review of progress and will play a major role in giving solution for demand for increase in buildings in VT. They concluded by that the government needs to take stronger actions such as ratifying regulations or offering incentives to Promote GB thought their country.
- Megat Mohamed Ghazali Megat Abd. Rahman (2013) et al carried out factors affecting green building investment in Malaysia" This paper presented by the factors that affect the investor on green projects. The aim of this paper is to analyses the risk factor under the investment only. The result indicate as a result good return are expected to the investor.
- Vera Roy et al (2016) studied as ‘Green’ technologies in the construction of social facilities" The article was analysis the pattern of introduction of "green" technologies in the design and social sphere objects building. To makes a comparative study of international certifications such as BREEAM and LEED. The main objective of this article is to provide a healthy education institutes such as schools where the construction and operation of buildings should not harm humans and the environment; rain water must be collected and used for different purposes, and for electricity provision solar and wind power must be used. They concluded as comes with necessary recommendations to be considered as most importantly people using these institutions must have a healthy environment.

MATERIALS AND METHODS

There are various methods used to reduce the energy consumption of the building some of them are:

- Proper Building design and usage of solar panels
- Selection and Usage of low embodied energy materials for construction
- Efficient consumption of energy
- Integrated renewable energy technologies.
- Estimation of uncertainty and reliability of heat sharing through indirect systems
- Monitoring of Integrated technology and systems
- Introducing the air cooling systems

APPLICATIONS

The concept of green/novel building technology is used in various countries:

Russia

The construction of hotels and offices are based on the green building concept. A case study of green school and Kindergarten building located at Moscow is thoroughly studied. The new concepts adopted are paint with silver nanoparticles (which act as antibacterial agent on the wall surface),

energy-efficient triple-panel windows with self-cleaning agent and thermal insulation of roof in building.

Italy

The research project was carried out in the city of Turin, North western part of Italy. The aim of developing Vertical Greenery Modular System (VGMS) involves in making of natural and sustainable materials such as vegetable species, substrates, irrigation system.

Malaysia

The concept was firstly developed in the year of 2007. Mostly Green office buildings are mostly used in the Klang valley of Peninsular Malaysia. The development of multinational companies and industries has increased the necessity for companies and households.

Vietnam

The Green building council in Vietnam is developed in 2011, to develop the green building technology by using green materials. The scholars point out that the concept of sustainability is still relatively new in the region, many important stakeholders in the construction industry are not aware of the GB concepts.

Singapore

A building located at Nanyang Technological University (NTU) campus in Singapore is studied. It consists of seven storeys in which the Gross Floor Area (GFA) is 29,578 m². The building is constructed mainly for laboratory purposes. The novel building technology is used by introducing the following: 80% daylight is utilized, 2.73% of energy consumption is replaced by using renewable solar energy, efficient water management, usage of green and sustainable construction materials, smart rain water discharge system and sensor technology.

China

The novel building technology is adopted by the name of "Evaluation Standard for Green Building (ESFGB), Green Building Labelling (GBL) in china. The Green building was firstly developed in 2009 at the central southern- region of Hunan Province, China. Two types of schemes are formulated namely: (a) GBL Public Building Scheme (GBLPBS) and (b) GBL Residential Building Scheme (GBLRBS)
G) India

Dhyanalinga, situated in Coimbatore, South-India, is constructed based on the concept of novel building technology. The construction materials includes cement, steel, concrete with burnt bricks, mud mortar stabilized with lime, sand alum and some other herbal materials. The *dome* is constructed of copper material with ventilated blocks, in which the dome has expected design period is about 5000 years. This project is done by Satprem (Auroville Earth Institute)

SIDBI Training Centre in Bhubaneswar has been constructed by reducing of about 35.2% energy consumption. The materials involved in this project includes Solar photo-voltaic (PV) panels fly ash bricks for block work; Portland Pozzolona Cement (PPC) for structural concrete; vitrified tiles, ceramic

tiles and kota stone for flooring; and mineral board and gypsum board for false ceiling

New Administrative Building for Indian Railway Institute of Civil Engineering in Pune has 75% reduction in energy consumption. It made use of low flow fixtures to achieve 67% water consumption, deployed 100% waste water treatment and made use of effective drip and sprinkle irrigation system.

DISCUSSION

Based on various researchers, it is observed that the following points were observed. It was carried out their guidelines and limitations of variable energy renewable sources in building construction.

- The results of using various energy consumption materials increases the durability and appearance of the building.
- Limitations of novel building technology are described since there is a problem of handling renewable resources.
- The materials used in construction should be managed with expertise team and managers.
- Various tests and analysis such as acoustic analysis, thermal tests, mechanical tests and biometrics are carried to achieve the novel building.

Hence, the study concludes that usage of renewable resources helps to reduce 30-40% of carbon emission of building which is caused by concrete and other materials.

Conclusion

Based upon above discussion and literature review could be concluded that entirely investigate consume their efforts to illustrate their successful green building construction with limitations. The main objectives of this study is to study the concept of novel building technology and its application. This paper also benefits us to know the usage and limitation of variable energy renewable sources in building construction. The results of this works are useful to provide guidance that usage of renewable resources helps to reduce 30-40% of carbon emission of building which is caused by concrete and other materials.

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