

Integration of Green Technologies in Building Projects

Priyabrata Das¹, Tikendra Singh Chandra², Amitabh Kumar³, Dixit Mahajan⁴

^{1,2,3,4}Student, Dept. of Civil Engineering, National Inst. of Construction Management of Research, Pune, India

Abstract: With the expanding use of feasible advancement idea in construction industry, the green construction innovation has generally utilized in construction phase of design ventures which advanced the improvement of the construction building in India. Green construction has been an overpowering pattern of the constructional business advancement in everywhere throughout the world. This paper for the most part considers the basic implication of the green building construction, shows the essentialness and importance of the green construction and dissects the green construction standards. At that point, the valuable green construction specialized estimates will be advanced so as to give reference to scientists and architects. In the real projects it is show the application and the board measures to limit contamination, lessen common asset utilization, and make ecologically cordial vitality sparing green structures. The fundamental components of green construction, work workmanship and necessities of green construction application and management, occupational health and safety management measures are outlined also.

Keywords: Construction, Green, Innovation, Utilization, Building, Energy, Material, Nature.

1. Introduction

Lately, with the quick financial advancement and living quality enhancement, individuals put more consideration on ecological assurance mindfulness and economical improvement of society. These days, green construction has been the principal prerequisite and choice of construction industry (Zhu and Ren 2002). Green construction can decrease the ecological contamination and negative impacts of the construction venture and enhance the financial and social advantages, particularly the natural advantages. Thusly, it is important to consummate the green construction innovation, enhance the green construction level and fabricate financial, ecological and green construction for society. The land and space possessed by building, building materials creation and transportation and the waste treatment and transfer produced from construction greatly affect the natural condition (Tan et al. 2011). The usage of maintainable improvement procedure in construction industry reflected in the entire procedure of construction. The analysts as a rule focus on the utilization of reasonable innovation in basic leadership and arranging phase of the construction venture. In any case, the construction arrange is additionally a standout amongst the most critical stages in the actualize of maintainable advancement

methodology in construction industry. Construction process will seriously affect the earth and its resources. Residue, particles and contaminations produced in the construction procedure can cause medical issues. The construction technique with the reasonable improvement thought can diminish the impedance of the earth, the measure of the landfill squander and the characteristic assets under construction process and decline the antagonistic effect on indoor air quality to the base level. The green construction strategy additionally assumes a vital job in understanding the economical innovation application in venture basic leadership and arranging and configuration organize (Yong et al. 2007).

This paper for the most part thinks about the crucial undertone of the green building construction, represents the centrality and importance of the green construction and breaks down the green construction standards. At that point, the helpful green construction specialized estimates will be advanced so as to give reference to researchers and architects. Projects with show the application and the executives measures to limit contamination, lessen regular asset utilization, and make naturally well disposed vitality sparing green structures. The primary components of green construction, work craftsmanship and necessities of green construction application and the executives, word related wellbeing and security the board measures are delineated too.

2. Significance and meaning of green construction

Green construction is another construction thought which is advanced under the foundation of "reasonable improvement", "recycling economy" and "low-carbon economy" of the entire society. In the entire procedure of plan, construction and fix, the use effectiveness and ecological effect of asset should be thoroughly considered. Use proficiency and waste release ought to be very much controlled in all exercises in green construction. Lastly the objective of "resource sparing, condition benevolent and quality affirmation" will be come to. The execution of green construction of Indian enterprises is an unavoidable decision dependent on India's fundamental national conditions. Green construction will be the green go for a construction venture to enter the construction market. The construction enterprise will confront the challenge and test in construction market. The execution of green construction of construction undertaking can make financial, ecological and

social advantages, which is beneficial to enhancing construction the board level, expanding the worldwide market intensity and the long haul sound improvement. In this way, green construction is the inescapable pattern of the economical improvement of the enterprises. Green construction assumes an essential job in the entire life cycle of the building. So as to execute green construction, it should advance the general plan, consider the general prerequisites in the arranging and configuration stage and give fundamental conditions to green construction require.

Green construction is framework building. Green construction innovation the executives is the way to the usage of green construction (Arditi and Pattanakitchamroon 2006). The key thought of manageable improvement is the utilization of green construction in the entire construction process. The usage of the green construction is to lessen the impact to the earth and the resources. Green construction is the use of feasible advancement thought in the entire construction process and the extensive utilization of green construction innovation. The green construction isn't just to actualize shut construction with no residue and clamor, however the assurance of biology and condition, the use of resource and energy and the improvement of social economy too.

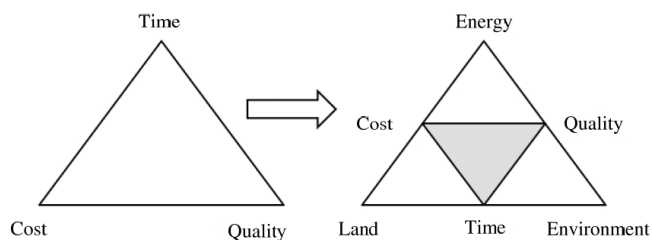


Fig. 1. Transformation process of traditional construction method

Green construction is a totally confounded framework building which is the control procedure of construction arranging, material buy, site construction and construction acknowledgment. Contrasted the conventional construction strategy, green construction has an incredible transformation process, as appeared in Figure 1. The customary construction technique is to meet the project index as reason and to accomplish the undertaking quality, schedule and cost as the fundamental objective. The resource preservation and the nature assurance has infrequently considered in the construction. At the point when the construction meets the necessities of the undertaking quality, schedule and cost, it will cause the resource waste and the ecological harm. Be that as it may, green construction underscores the effective utilization of resources as the center and the ecological preservation as the need standard so as to seek after the incorporated construction technique with the high proficiency, low utilization and nature assurance.

In the execution of the green construction, green construction innovation is the technique and establishment. Green construction management is the procedure of action. The

utilization of the green construction innovation and green construction the executives strategy is the key issue of the present construction undertakings to accomplish the green construction. The usage of the green construction is the social obligation of the enterprise also.

3. Green construction principle

A. Reduce the site interference and respect the environment

Designing construction would truly upset the site condition, particularly for the new undertaking of undeveloped area, excavation, dewatering, permanent and temporary offices construction and site waste treatment will influence the current resources of creatures and plants, groundwater level and geography (Abidin 2010). In this manner, to regard the base condition and to diminish the site impedance has extraordinary hugeness on the natural insurance. The proprietor, plan unit and the temporary worker should perceive the regular, social and auxiliary highlights inside the construction site and to safeguard these highlights by the levelheaded structure, construction and the executives. Manageable site configuration assumes an essential job in decreasing this obstruction. In the construction, the temporary worker should make site use arrangement dependent on the necessities of the proprietors and structure units which can limit the unsettling influence of the construction site. This arrangement ought to include:

1. The territory and plants to be secured and the technique ought to be detailed.
2. Reduce the site region to clean and irritate and limit the transitory offices and the construction pipeline.
3. Reasonably organize the construction site use for temporary worker, subcontractors and constructors and decrease the development of materials and hardware.
4. Deal with and wipe out the construction waste and break down the impact to the nature and condition.
5. Isolate the construction site from the general population.

B. Construction combined with the climate

The climate should be viewed as when the contractual worker chooses the construction strategies, construction machinery and the plan of the construction sequence, which can diminish the expansion of the construction measures, assets and energy and viably decrease the construction cost. It can decrease the obstruction on the construction site and condition brought about by the additional construction measures. So as to think about the climate amid construction, the temporary worker initially ought to comprehend the qualities of meteorological information and field territory including precipitation and snowfall information, temperature information and wind information. The substance ought to include:

1. The contractual worker should make sensible courses of action for the construction grouping beyond what many would consider possible to make

the construction procedure can be done before the antagonistic climate comes. For moment, before the rain season, the earthwork and establishment construction designing must be finished so as to lessen the impact of groundwater ascend on construction.

2. The waste and flood control framework ought to be organized so as to decrease the effect on the construction site and encompassing condition.
3. The construction site design ought to be joined with the climate condition under the work insurance, wellbeing and fire assurance prerequisites.
4. The reasonable regular construction strategy or the viable measure should be chosen amid the construction in winter, stormy season, wind season and sweltering summer particularly for the solid designing, earthwork building, profound establishment designing, submerged designing and high height activity.

C. Conservation of resources

Construction extends for the most part utilize huge measure of materials, energy and water resources. In this way, to diminish the utilization of resources, sparing energy, enhancing productivity and ensuring the water resources is the essential origination of maintainable improvement. The protection of resources in construction has the accompanying substance:

1. The prudent utilization of water resources incorporates observing water resources, introducing the low-stream control gear and machine and reusing the precipitation and the construction squander water to diminish the water utilization and the expense of water in the construction time frame.
2. Energy sparing incorporates checking the usage, introducing energy sparing lights and equipment, utilizing acousto-optic sensor lighting control framework and energy sparing sort of construction apparatus and decreasing power utilization.
3. Reduction of the material misfortune incorporates watchful obtaining, sensible capacity, lessening the material dealing with times and bundling, enhancing the task procedure, expanding the turnover times of material amortization and usage effectiveness of material.
4. The usage of recyclable resources is the principle sort of sparing resource and the heading to be reinforced later on, which is reflected in two angles as pursues: right off the bat, the utilization of inexhaustible items and materials can isolate the reusing part from the construction energy. In the meantime, it can decrease the utilization of the first material; also, it should build the reusing utilization of resources and materials. For example, the foundation the waste reusing framework in construction site can recycle and reuse the evacuation material, lessen the material utilization in

construction or increment the salary of the venture by moving the expulsion material and decline the landfill costs for the enterprise.

D. Reduce environmental pollution and improve environmental quality

Countless, construction commotion, toxic and unsafe gas and waste will cause serious effect on nature quality and will be unfavorable to the field staff, clients and public health. Subsequently, to decrease the natural contamination and enhance the ecological quality is the essential standards of green construction. The enhancement of the indoor and open air quality in construction is the fundamental substance of this standard. In the construction procedure, the residue created from the building materials and construction framework, the unstable natural mixes or particles produced from the construction gears, materials and items may cause the indoor air quality issues. Bunches of these unstable natural mixes or particles represent a risk and potential harm to the wellbeing which needs unique safety assurance. These risk and harm has a long haul impact, even deadly impact. What's more, in the construction procedure, these air contaminations may likewise infiltrate into the neighboring structures and stay inside the working until the finish of the construction. This impact should be given careful consideration particularly for the individuals who need to do the construction in the building. The usually utilized green construction procedures to enhance the air nature of the construction site are as per the following:

1. The construction the executives plan on indoor air quality should be made before construction.
2. Low volatile materials or items ought to be utilized amid construction.
3. Neighbourhood impermanent exhaust fan or refinement and filtration equipment require to be introduced.
4. The building trash ought to be forestalled to heap up in the building and the materials that may cause the defilement ought to be put away cautiously.
5. More sheltered and solid construction machinery or generation ought to be received, for example, the utilization of product concrete rather than on location concrete mixing.
6. The sensible construction grouping should be organized so as to limit the building materials, for example, the carpet and ceiling that can retain the toxins.
7. For the structures that still being used in amid the construction, it should orchestrate the dangerous work in the non-working time combined with the ventilation measures.

E. Implementation of scientific management and construction quality

The usage of the green construction in our nation is constrained which has not achieved the dimension of green

construction framework yet. The green construction impact isn't self-evident. In addition, the low administration dimension of the enterprise and the poor financial impact of the green construction is one of the primary reasons. Subsequently, the execution of green construction must complete logical administration, increment the executives dimension of the enterprise and empower ventures to actualize green construction institutionalization and organize which will assume an essential job of green construction onto advancing reasonable advancement and increment the monetary impacts of green construction and the energy of temporary worker (Hwang and Ng 2013).

In the usage of the green construction, it should decrease the site impedance, enhance the use proficiency of resources and materials, increment material reusing and guarantee the construction project quality.

4. Constraints of the implementation and promotion of green construction technology

During the time spent the usage and advancement of green construction innovation, the construction industry involves the primary unequivocal position (Chan et al. 2010). In the utilization of the green construction innovation, the spotlight should put on the ecological protection and conservation, after the unification of social advantage, financial advantage and environmental advantage in the entire procedure of construction and activity. Since there is no green construction innovation assessment standard for green construction innovation, the usage and advancement of the green construction is confined by the accompanying elements.

A. Lack of green construction evaluation standard

As of now, there are no green construction innovation guidelines, in this way it isn't confirmative which construction innovation is green construction innovation. The administration supervision divisions are additionally helpless to set up the impetus instrument of green construction. The legislature can just give careful consideration to the construction execution, designing construction safety, building quality, and so forth.

B. Lack of green construction knowledge and comprehension

In our nation, green construction is still in the first place arrange on account of the absence of green construction innovation assessment measures. Most ventures just spotlight on the fundamental piece of the green construction, for example, lessening the commotion from the construction, exasperating the general population on the construction site and the natural contamination. The learning and cognizance of the green construction is inadequate. The green construction innovation with high innovation standard has not been aced by the construction venture.

C. Consciousness deviation of sustainable development

Because of the issues of constrained undertaking capital, low administration level and uneven work force quality, the

construction industry just spotlights on the momentary financial advantages rather than the green construction. The construction enterprise use the conventional construction innovation and gears and have restricted thought on big business the board, economical advancement and green construction. In this way, the construction undertaking can't utilize suitable innovation and logical administration strategies methodically to build up the center intensity in the advancement bearing of green construction.

D. Lack of the reward and punishment mechanism

The administration office is absence of remuneration and discipline component up until now. Construction industry require all the more understanding on the vitality sparing and utilization decrease of the green construction execution and mechanical development through the reward and discipline component so as to build the eagerness on the specialized usage of green construction.

E. Green construction concepts

1. The use of the energy sparing glass curtain wall. The glass curtain wall is appeared in Figure 2. The energy sparing glass curtain wall reflects the magnificence of cable structure, the penetrability of the curtain wall and the aestheticness of the entire structure, which understands the motivations behind energy saving, ecological assurance and the amicability between indoor living and workplace and open air natural habitat.
2. Solar boiling water supply framework. So as to address the issues of the heated water supply of each capacity room shower and latrine, the project plans the sunlight based high temperature water supply framework which comprises of parallel straightforward glass vacuum tube collector.
3. Rainwater accumulation system. This project plans an underground water accumulation pool. This water framework can gather the water on the rooftop and the ground which is fundamentally utilized for washing, green water and landscape water.

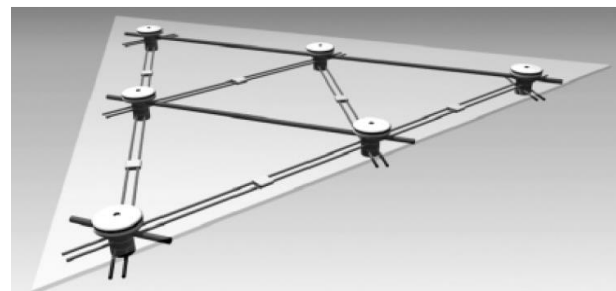


Fig. 2. Cable clamp and glass

5. Conclusion

The usage of green construction is the utilization of the idea of sustainable development in the phase of building

construction, which has extraordinary importance on advancing the manageable advancement of the construction business. Green construction is the far reaching use of green construction innovation identified with biological and environmental protection, resources and energy use, social and monetary advancement and feasible improvement. This paper shows the principles of green construction and obliges of the green construction execution which will give the reference material and usage runs on the advancement of green construction in India. In the usage of the green construction, it should decrease the site obstruction, enhance the use efficiency of resources and materials, increment material reusing and guarantee the construction project quality. At long last, the actual project is acquainted for instance with show the application and the management measures to limit contamination, decrease normal resource utilization, and make ecologically cordial energy-saving green structures.

References

- [1] Doloi, H., Sawhney, A., Iyer, K. C., and Rentala, S. (2012). "Analysing factors affecting delays in Indian construction projects." *Int. J. Project Manage.*, 30(4), 479–489.
- [2] McGraw Hill Construction. (2006). "Green building smart market report: Design & construction intelligence." New York.
- [3] Bostancioglu, E. (2010). "Effect of building shape on a residential building's construction, energy and life cycle costs." *Journal of Architectural Science Review*, 53(4), 441–467.
- [4] Lv, J.Y. and Zhu, S.C. (2011). "The problem of energy construction and strategy." *Journal of Construction Technology*, (16), 72–73.
- [5] Ye, K.M. (2011). "Constant improvement of green construction level depending on technological innovation." *Construction Technology*, 40(1), 8–10.
- [6] Xu, J. and Shen, Q.M. (2008). "Analysis on restrictive factors and strategy of green building development." *Journal of Chongqing Jiaotong University (Natural Science)*, 27(1), 1005–1008.
- [7] Edwin, H.W., Chan, Q.K., Qian, P. and Lam, T.I. (2009) "The market for green building in developed Asian cities-the perspectives of building designers." *Energy Policy*, 37(8), 3009–3019.
- [8] Feng, R.P. and Ran, Y. (2012). "Game analysis for developing and promoting green building." *Proceedings of 2012 IEEE International Conference on Engineering Technology and Economic Management (ICETEM2012)*, 6, 17–19.
- [9] Castleton, H.F., Stovin, V., Beck, S.B.M. and Davison, J.B. (2010). "Green roofs; building energy savings and the potential for retrofit." *Energy and Buildings*, 42(10), 1582–1591.
- [10] Abrahamse, W., Steg, L., Vlek, C., and Rothengatter, T. (2005). "A review of intervention studies aimed at household energy conservation." *J. Environ. Psych.*, 25(3), 273–291.
- [11] Ministry of Power. (2012). "Report on the working group on power for twelfth plan (2012–2017)." http://planningcommission.gov.in/aboutus/committee/wrkgrp12/wg_power1904.pdf (Apr. 3, 2015).
- [12] Saxon, I., Goldenberg, N., and Kawai, D. (2006). "Report on an economic feasibility study of green buildings in Vancouver." http://www.iansaxon.com/academic/Green_Economics.pdf (Sep. 10, 2014).
- [13] Kibert, C. J. (2005). *Sustainable construction: Green building design and delivery*. Wiley, Hoboken, NJ.
- [14] Indian Green Building Council (2007). *LEED INDIA NC reference guide, Version 1.0*, Confederation of Indian Industry, New Delhi, India
- [15] Energy & Resource Institute (2006). "GRIHA rating system." http://grihaIndia.org/?t=Green_Rating_for_Integrated_Habitat_Assessment#&Green_Rating_for_Integrated_Habitat_Assessment (Jan. 9, 2012).