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Introduction and Review Paper on Slum Rehabilitation by Public Private Partnership Using Rapid Wall Technology under PMAY

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Abstract— Population in cities of India is increasing due to rapid urbanization and cities are becoming more congested. Urbanization, growing population and migration pressurize cities which result in haphazard development and poverty. Poverty is the basic reason behind slum settlement in cities. Slum settlement is done on private as well as government land, although slum are facing many problems like drinking water, health problem etc. As slums are major national challenge for developing countries like India, Indian government launched various schemes for slum rehabilitation but these schemes are facing problem due to lack of funds. The purpose of this project is to study techno economic feasibility of slum rehabilitation by Public Private Partnership in order to solve the problem of funds by PPP. Project includes Rapid Wall technology which is recent technology, time and cost effective and most suitable for low rise buildings. In this project an attempt will be made to check the feasibility of rapid wall technology by applying it to slum rehabilitation scheme.

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Introduction

Slum is an area with heavy population living in substandard housing with lack of basic and civic amenities. Urbanization, growing population and migration pressurizes cities leading to overflowing infrastructure which results in increase of urban poverty and haphazard development of cities. Thus rehabilitation of slum is necessary to provide fair and affordable houses to slum dwellers. Urban industrialization changes the face of urban area and its functions also. City provides better income in compare of rural area. So the surround rural population has attracted towards nearer city or urban area. This urban provides seasonal employment. It results in migration. Rural threshold has been migrated towards city or urban area in search of jobs. These migrants are low educated, unskilled and skilled labour force for urban industrialization. This type of jobs provided low income, labour force. For accessible purpose the labours are in search of house. But city has higher land cost; due to this the labour can't purchase their own house in city area. So they shelter in public open land, other open pieces of city, places nearer to industrial area and also footpath. This process gives birth to formation of slum and slum area. Slums are one of the major challenges for urban environment planning and management. For overall development of the city, eradication and rehabilitation of the slums is very important for which several government and non-government organizations are working. Slum rehabilitation is a social service with benefits in terms of TDR (Transferable Development Rights) for developers who are involved, if the time and cost of construction of slum rehabilitation is reduced without comprising with its quality and then more and more private developers will be encouraged. Rapid wall, also called gypcrete panel is an energy efficient green building material with huge potential for use as load bearing and non-load bearing wall panels. It can also be used as intermediary floor slab/roof slab in combination with RCC as a composite material. Since the advent of innovative Rapid wall panel in 1990 in Australia, it has been used for buildings ranging from single storey to medium - high rise buildings. Light weighted Rapid wall has high compressive strength, shearing strength, flexural strength and ductility. It has very high level of resistance to fire, heat, water, termites, rot and corrosion.

Methodology

To study various schemes of slum rehabilitation in India in order to know the hurdles occur during the slum rehabilitation. Study Public Private Partnership, its funding decisions and rapid wall technology in detail. Pradhan Mantri Awas Yojana Housing for All Scheme (Urban) will be applied for slum rehabilitation. Slum Rehabilitation will be carried out under the Public Private Partnership in order to reduce financial burden on government. Aim of the project is to prepare a model for slum rehabilitation witch will be economical and

efficient by Rapid Wall technology and check feasibility of Rapid wall technology over Conventional technology.

Reasons of Privatization of Slum

PPP involves a contract between a government authority and a private party, in which the private party provides a public service or project and assumes substantial financial, technical and operational risk in the project. In case of slum rehabilitation government take a back seat and enable the for-profit private companies to enter the market of slum rehabilitation. Following are the reasons behind slum privatization-

1. Economic growth depend on infrastructure

2. Limited budgetary support

3. Demand exceeds budgetary support

4. People's willingness to get shelter with minimum investment.

5. Public private partnership is successful in other countries.

Pradhan Mantri Awas Yojana Housing for All Scheme. (Urban)

The President of India, on 9thJune, 2014 has announced "By the time the Nation completes 75 years of its Independence, every family will have a pucca house with water connection, toilet facilities, 24x7 electricity supply and access." Prime Minister envisioned Housing for All by 2022 when the Nation completes 75 years of its Independence. In order to achieve this objective, Central Government has launched a comprehensive mission "Housing for All by 2022" The mission aims to address the housing requirement of urban poor including slum dwellers.

Following are the features of this scheme for slum rehabilitation using land as a resource.

1. Centrally sponsored scheme

2. Beneficiary's family should not own any king of pucca house in any part of county.

3. Rights are given to the state to decide when beneficiaries need to be resident of that urban area for being eligible for the scheme.

4. Mission effective from 17-06-2015 up to 31-03-2022

5. For slum redevelopment land can be used as a resource and extra FSI/TDR/FAR given to the private developers for making project financially viable.

6. Slums on central government/state government/private land/ULB land taken for redevelopment.

7. Private partners for slum development are selected by open bidding process.

8. Government grant 1 lakh per house in rehabilitation.

9. A viable slum rehabilitation project would have two components i.e. "slum rehabilitation component" which provides housing along with basic civic infrastructure to eligible slum dwellers and a "free sale component" which will be available to developers for selling in the market so as to cross subsidize the project.

Rapid Wall Technology

Rapid Wall is also known as Glass Fiber Reinforced Gypsum (GFRG) Panels. These rapid wall panels are made up of gypsum which may either be naturally occurring or manufacturing factories under name of FACT RCF Building Products Ltd. Experimental studies and research in Australia, China and India have shown that GFRG panels, suitably filled with plain reinforced concrete possesses substantial strength to act not only as load bearing elements but also as shear wall, capable of resisting lateral loads due to earthquake and wind. GFRG panel can also be used advantageously as in-fills (non load bearing) in combination with RCC framed columns and beams (conventional framed construction of multi-storey building) without any restriction on number of stories micro-beams and RCC screed (acting on T-beam) can be used as floor/ roof slab.

Advantages

1.high speed of construction -demo building of IIT Madras with four flats in two stories (total 198sq.ft.) built within a month.

2.Rapid wall is a low cost and fast track technique which leads to saving of resources and money.

3.It can be used in the areas which have been struck with calamities and for restoring the lifetime of the area rapidly.

4.Rapid wall does not need formwork and is easy erection process and lead to light weight structure.

5.Rapid wall technique is a pre-planned construction technique where opening are cut in the factory itself where they are manufactured.

6.Rapid wall technique is ideal for construction of slum rehabilitation projects where low rise buildings are to be constructed with high speed and

where there is shortage of resources.

Construction & workmanship

Rapid wall for rapid construction

Building shall be designed on the basis of Design Manual by a qualified structural Engineer. As per the building plan and design, each wall panel shall be cut at the factory using an automated cutting saw. Door/window/ventilator and `openings for AC unit etc. shall also be cut and panels for every floor marked as per the building drawing. Panels are vertically loaded at the factory on stillages for transportation to the construction site on trucks. The stillages shall be placed at the construction site close to the foundation for erection using crane with required boom length for construction of low, medium and high rise buildings. Panels shall be erected over the RCC plinth beam and concrete is in filled from top. All the panels shall be erected as per the building plan by following the notation.

Concrete infill

After inserting vertical steel reinforcement as per the structural design and clamps for wall corners are in place to keep the wall panels in perfect position, concrete having 12mm aggregate shall be poured from the top into the cavities using a small hose to go down at least 1.5 to 2m into the cavities for directly pumping the concrete from ready mixed concrete truck. For small building construction, concrete can be poured manually using a funnel.

Embedded RCC tie beam all around at each floor/roof slab level

An embedded RCC tie beam is provided at each floor slab level as an essential requirement, web portion to required beam depth at top shall be cut and removed for placing horizontal reinforcement with stirrups and then concrete to be filled**.** GFRG panel for floor/roof slab shall be cut to required size and marked with notation. First, wall joints, other cavities and horizontal RCC tie beams are in-filled with concrete; then wooden plank 0.3 to 0.45m wide shall be provided to room span between the walls with support wherever embedded micro beams are there and then roof panels shall be lifted by crane. Each roof panel shall be placed over the wall in such a way that there will be a gap of at least 40mm. This is to enable vertical rods to be placed continuously from floor to floor and provide monolithic RCC frame within Rapid wall.

Erection of wall panel and floor slab for upper floor

Vertical reinforcement of floor below shall be provided with extra length so as to protrude to 0.45m to serve as start-up rods and lap length for upper floor. Once the wall panels are erected on the upper floor, vertical reinforcement rods, door/window frames fixed and RCC lintels shall be casted. Then concrete where required and joints shall be filled.

Finishing work

Once concreting of ground floor roof slab is completed, wooden planks with support slabs shall be removed after 4th day. Finishing of internal walls and ceiling corners shall be done using wall putty by experienced POP plasterers. Simultaneously, electrical work, water supply and sanitary work, floor tiling, mosaic or marble works, staircase work etc. shall also be carried out for each upper floor.

GFRG panel erection

Methods of erection of GFRG Panel shall vary depending upon the use of the panels recommended. The method of erection of the panel is as follows:

1)Align the wall by marking with line dori, where wall is to be erected.

2)Then fix the hold fast (regular door frame hold fast of 150mm) by plumbing wall. Two nos. of hold fasts are required for each panel.

3)Simultaneously cut the pocket of electrical points & electrical conduits to be inserted inside cavity of Rapid wall.

4)Then erect the panel by supporting with props.

5)Fix electrical switch boxes.

6)Fix other panels same as per the above method up to required length

7)Check the plumb & line of the wall.

8)Fill the holdfast gap with concrete.

9)Finish the joints of two panels by fixing fiber tape with stucco as follow:

i) Make a slot of 8mm wide & 2mm deep at the joint of Rapid wall.

ii) Fix the jointing fiber tape and finish the surface with stucco.

10)Joints of Rapid wall with RCC column/ beam shall be finished by stucco with reinforcing fiber of used cement bags.

11)Finish the gap around electrical points and between Rapid wall & slab/beam by stucco.

Skilled /Training needed for installation

Result and Discussion

Government needed to allow Public developers for slum rehabilitation in order to reduce huge financial burden. Although there are various slum clearance schemes in India but they are not able to carry out overall slum clearance hence the drawbacks of those schemes are minimized in PMAY scheme e.g. beneficiaries should not own any kind of pucca house in any part of country only when he/she will be eligible for scheme. Nowadays land cost and construction cost are increasing rapidly hence there is need to use Rapid Wall technology which is cost effective, time effective and also eco-friendly. By using this technology it is possible to provide houses to slum dwellers within minimum time and minimum cost as compare to conventional method.

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References

Bouddha, Charumitra,SharmaAnupama Res. J. Engg. Sci"Slum Redevelopment Strategy: A Way Forward to Urban Environment Management through Inclusive Approach" (2014)

Debora De Camargo Cavalhriro, Alex Abiko ,Habitatinternational. "Evaluating slum resettlements: The case of the Serra do mar Project Sao Paulo Brazil".(2015)

Kalpana Gopalan*,1, "Madalasa Venkataraman, Affordable housing: Policy and practice in India"

MortezaFarajian, Qindbin cui ASCE "A Multi-Objective Decision Support System for PPP Funding Decisions" (2011)

R.R. Sorate ,Alka Dhiman ISOR-JMCE "Slum Rehabilitation with Fast Track Techniques. " (2014)

TingLiu ,Albert Chan, Shouqing Wang ASCE "PPP Framework for Public Rental Projects in China . " (2014)

Robert Osei-Kyei& Albert P.C Chan, International journal of Construction Management, "Implementing public private partnership (PPP) policy for public construction projects in Ghana: critical success factors and policy implications"

SuhasTayade, NavnathShinde, SachinPatil, IJMTE "Study of an Efficient Building material: Rapid Wall"

Bing Li, A. Akintoye, P. J. Edwardsand C. Hardcastle, Construction Management and Economics, "Critical success factors for PPP/PFI projects in the UK construction industry"

Omar El-Anwar, A.M.ASCE1; and Tamer Abdel Aziz2 "Integrated Urban-Construction Planning Framework for Slum Upgrading Projects" (2014)

Yung Yau1; Wai Kin Lau2; and Daniel Chi Wing Ho3 ASCE "Principle of Selectivity in Housing Rehabilitation Subsidies: Case Study in Hong Kong" (2014)

M. S. Mir1; K. V. Krishna Rao2; and J. D. Hunt3 ASCE "Space Development Modeling of Urban Regions in Developing Countries" (2010)

Juli Ponce1 ASCE "Affordable Housing and Social Mix: Comparative Approach(2010)

Pradhan Mantri Awas Yojana Housing for All Guideline

Glass Fibre einforced Gypsum panel guideline by rashtriya fertilizer