Inclusive Green Affordable Housing for All

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Introduction: Affordable Housing (AH) is deemed affordable depending on family's income and particular country's housing status. AH can address all three dimensions of sustainability and it can influence 13 goals set in Sustainable Development Goals (SDGs) out of 17 goals directly and indirectly (United Nations, 2014). SDGs are designed as action-oriented goal in 2012 to realize 8 Millennium Development Goals set in the year back in 2000. It is envisaged that AH would result in financial and social inclusion of Economically Weaker Section (EWS) and Low Income Group (LIG). AH can offer them an opportunity to prosper economically and to enjoy basic urban services (Sen, 1998). It will address the Goal 11 of SDGs i.e. *Make cities and human settlements inclusive, safe, resilient and sustainable*.

The approach: Well defined action-oriented objectives are required to realize Affordable Housing. Pre-design, Design, Construction and Post-occupancy are four major stages identified for intervention. Activities identified in each stage as shown in Table 1 can make AH as climate responsive, socially sensitive and economically promising habitat. To address urban housing scarcity, approach shall emphasize on reforms at concept and action levels, inclusive design, sense of belongingness, ownership policy, livelihood opportunity to prosper and climb social ladder, provision of sustainable water, sanitation and hygiene (WaSH) and healthy quality environment.

At **pre-design stage**, land and finance become most crucial. Infrastructure status for AH would be a big boost and a paradigm shift (MoHUPA, 2014). Contradictory and prescriptive Standards and specifications need attention for revision. Case studies reveal gloomy expression of sustainability in LIG/EWS Housing globally, where socio-economic concerns and environmental safety are greatly eluded. On contrary, limited studies reported novel solutions- experimentation with economic sustainability (income generation, construction/ maintenance cost, access to repayable loan), socio-cultural and environmental sustainability (JLL, 2014).

High rise apartments can be an apt response to limited land accessibility, though this option escalates construction and maintenance cost. Compensatory economic measures need to be planned to offset the additional cost.

Community participation at **Design stage** can bring remarkable difference to AH (Hart, 1999). Design brief developed for a specific site shall reflect the local aspects optimally (Altman, et. al, 1980) (Ventury, 2011); AH is meant to accommodate idea integration to address social, economic and environmental sustainability. Individual block and unit design, site-layout shall get prime attention from the designers and the community. Social interaction shall receive high priority during this stage; units clustered at each wing around interactive spaces (like street, courtyard or combination) create more humane and livable space instead of matchbox architecture that defies residents' social needs (Unwin, 1902) (Newman, 1973)(Appleyard, 1981)(Moudon, 1991). And culture shall bring the distinction (Pandya, 2005). Safety from Fire and other hazards, climate responsive design decision (orientation, use of Autoclaved aerated concrete (AAC) block, ample cross ventilation, daylight harvest) are notable feature at this stage. At community level multi-tasking activity spaces provide for health (play area/field/jogging track), education (crèche/vocational training), economic activity spaces like rental commercial spaces, community hall, pisciculture, urban agriculture etc. can be value addition (Mukherjee, 2014). Options for re-densification, slum rehabilitation, redevelopment, regularization, infill development are to be explored depending on the situation (Jacob, 1993)(Kundu, 2003)(Lavy, 2012).

Construction and Post-occupancy stages are meant to realise the dream dreamt together. Role of private sector can be crucial here. Environmental strategies for rain water harvesting, decentralized waste water treatment, bio-swales, zero water discharge from site, efficient plumbing fixture, energy management (solar panel, LEDs, balanced

phase loading) shall be worked out in detail. Community participation of different degree need to be integrated for success of such housing (Mukherjee, 2007). Resource flow mapping, strict monitoring, quality control and site management are all the more necessary during construction and maintenance afterwards for AH (HDB, 2013).

TABLE 1: Concepts and Actions identified for Stages of Affordable Housing	
Stages	**Concepts/ Actions**
Pre-Design Stage	**Land-**
	Fair and transparent land acquisition for Social Housing and Infrastructure
	Brown field redevelopment in comparison to green field development; regularization of informal settlements
	Increase FAR/ FSI; Introducing Incentives like TDR,
	Amenities and accessibility to job places
	Private developers compulsorily shall develop 15-20% of social housing in any of their project
	Social-
	Identifying general and special Social space requirement- be it livelihood, education, health or anything
	Self-help Housing Concept
	Nothing as freebee; repayment in kinds if not in cash
	Standards and Specifications- Benchmarking, Prescriptive to quality improvement,
	Economy-
	Livelihood opportunities,
	Access to finance- micro-finance, repayable loan terms
	Cross-Subsidy, Corporate Social Responsibility, Infrastructure Investment
	Stakeholders' meet on policy decisions
	Environmental-
	Stocktaking of natural resources
	Limited intervention through tree cutting, top soil disturbance
	Target setting for Sustainable WaSH
Design Stage	**Land-**
	Flexible Building regulation to optimally utilize land resource , Density , FAR, Height, Access Road width, neighbouring and within the site features to be considered
	Vertical construction
	Roads, drains, water, sanitation, street lighting, community halls
	Social-
	Avoiding typical matchbox solution to give wider scope to socialising
	Naturally- lit stair and lift lobby to enhance safety, security and interactions among community members
	Cultural distinction
	Social interaction at ground level
	Health (Club, ground, Gym, running/jogging track), Education (kindergarten, primary and vocational), crèche,
	Entry/Exit point safety, Universal Accessibility, Old and child friendly environment
	Economy-
	Good design for housing unit ensuring optimum use of natural resources
	Cross subsidy through mixed use and mixed economy group housing i.e commercial rentable spaces, HIG housing to offset cost
	Opportunity for Onsite Income generation
	Selection of construction method and materials
	Environmental-
	Inclusive Site planning
	Conserving natural resources

TABLE 1: Concepts and Actions identified for Stages of Affordable Housing	
Stages	**Concepts/ Actions**
	Efficient and Sustainable WaSH
Construction Stage	**Land-** Participation through Un/skilled labour from the community, Selecting long-lasting materials and techniques to minimize maintenance and operational cost **Social-** Social Interaction to be increased through self-help housing concept Design review , construction quality monitoring **Economy-** Resource flow management **Environmental-** Limiting construction footprint to optimum in order to preserve onsite biodiversity Effective implementation of toilet, drinking water, electricity, other amenities Roads, drains, water, sanitation, street lighting, community halls
Post-Occupancy Stage	**House-** legal ownership, asset, stricter norm to change ownership, **Social-** Education-preschool, non-formal, adult literacy, computer training Gender awareness, Preventive healthcare, **Economy-** Micro-credit, rental options, Income generation from home, job opportunity, vocational training Urban agriculture, pisciculture Security of tenure, strict check on ownership change **Environmental-** Strategic maintenance regime for Rainwater harvesting, efficient plumbing fixture, water conservation, Waste water treatment and recycle, Natural light and ventilation, Renewable Energy use, Check on Leakage, theft and transmission losses for water and electricity.

Conclusion:

- Success of AH will depend on political willingness and community participation in long term.
- Availability of approachable urban land, contemporary integrated low carbon housing design concept and Micro-credit would be crucial for realization of AH.
- Facility management (housing, open spaces, social and economic activities), policy decision on ownership and its change, future growth potential are likely key aspects to resolve regularly in an AH project.
- Affordable Housing will be socially inclusive, economically promising and environmentally responsive.
- This can be a mandatory action listed under SDGs as it addresses majority of the issues identified. And alternative roadmaps for the same for different geo-cultural context shall be taken up.

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