

Community Acceptance of Sustainable Social Housing in Mumbai

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Housing is an essential aspect of sustainable development. Through its construction, design, use and demolition, housing contributes to the consumption of natural and man-made materials resources, water and energy. As sustainable development is highly interlinked with the concept of quality of life, well-being and liveability, sustainability measures are increasingly at the forefront of housing provision efforts as housing is a significant tool to deliver both quality of life and sustainable development. The imperative of climate variability means that people's housing technologies and design need to be more sustainable in reducing their contribution to greenhouse gas (GHG) emissions. Sustainable housing is expected to improve energy efficiency, ensure access to safe drinking water, sanitation and hygiene, and reduce waste and water pollution. These structural and design elements of housing, alongside other housing components such as housing location, environment and expenditure burden, can, directly and indirectly, affect people's choices and chances to improve their quality of life.

sustainability

social housing

community acceptance

housing affordability

housing accessibility

India

1. Introduction

Housing is an essential aspect of sustainable development. Through its construction, design, use and demolition, housing contributes to the consumption of natural and man-made materials resources, water and energy ^[1]. As sustainable development is highly interlinked with the concept of quality of life, well-being and liveability ^[2], sustainability measures are increasingly at the forefront of housing provision efforts as housing is a significant tool to deliver both quality of life and sustainable development. The imperative of climate variability means that people's housing technologies and design need to be more sustainable in reducing their contribution to greenhouse gas (GHG) emissions ^[3]. Sustainable housing is expected to improve energy efficiency, ensure access to safe drinking water, sanitation and hygiene, and reduce waste and water pollution. These structural and design elements of housing, alongside other housing components such as housing location, environment and expenditure burden, can, directly and indirectly, affect people's choices and chances to improve their quality of life.

In practice, sustainability is one of the neglected aspects of housing provision for the poor. The low-income housing sector has been unable to effectively adopt innovative technologies to improve housing sustainability and cost-effectiveness ^[4]. Moreover, despite the extensive efforts to make housing and infrastructure more sustainable, it remains to be seen to what extent sustainable housing contributes to the overall work of improving the poor's

overall quality of life. The technological aspect of housing, aside from basic services (e.g., water and sanitation, waste management, heating and cooling), is yet to be part of the social-economic system of housing policies. Social housing projects are not motivated by sustainability policy but by the need to improve economic indicators in the generation of housing stocks [5]. Whenever available, a critical issue facing the introduction of technological innovation in housing is that the selection of materials and quality of assembly does not always go hand-in-hand with reducing long-term operations and maintenance costs and minimising environmental impacts.

These gaps are further exacerbated by practical issues, such as the preferences and behaviours of the public toward sustainable housing remaining vague [6]. There are also challenges associated with low acceptance of the introduction of energy technology among low-income urban dwellers [7]. Lack of available sustainable housing indicators, especially targeting the poor, and little consideration for underlying socio-cultural causes are some of the main reasons for this drawback. Some housing indicators have captured economic, social and environmental sustainability [8][9], but these are very limited when applied to developing countries. In some cases where policymakers are motivated to deliver housing that meets the energy and financial needs of the poor, the implementation is often not well-planned, resulting in agendas framed by the assumption that the poor will readily accept the new technology [7]. Governments and developers also often assume that a new technology or approach's high general popularity should be a vital precursor for the acceptance of a specific project.

As part of efforts to overcome these issues, factors influencing community acceptance are increasingly recognised as essential to understanding the apparent contradictions between support for sustainable housing and the difficult realisation of low-income housing projects [10]. The concept of collective social influence is also argued to positively affect the socio-cultural acceptance of energy technologies amongst low-income urban dwellers in developing countries [7]. The impact of socio-cultural, socio-economic and socio-technological outlooks on the acceptance of sustainability measures in a low-income context merits further research and understanding to inform the policymaking process.

2. Community Acceptance of Sustainable Housing

Community acceptance is one of the three dimensions of social acceptance, along with socio-political and market acceptance. It refers to the specific acceptance of decisions and projects by local stakeholders, particularly residents and local authorities [11]. Community acceptance through public participation can be operationalised as procedural justice in project planning [12]. Social processes with residents' engagement and participation in the life cycle of the green building show a dynamic trend, which can improve residents' happiness and productivity [6]. In social housing projects, the degree of public involvement can be measured through residents' participation in planning, design, operation and maintenance. Such public involvement could range from one-way communication through information sharing to active involvement in decision-making. In practice, public participation in the planning and designing of social housing is highly limited. None of the slum rehabilitation schemes being implemented in Mumbai so far mentioned any kind of participation from the slum dwellers [13].

A key factor for the acceptance of sustainable housing is a consideration of economic and non-economic determinants, which include environmental effects, technology-oriented aspects and user-focused aspects [6]. The introduction of new technology in housing means users' economic viability, such as housing expenditure and household income informality, can influence residents' perception of the technology installed. Social and humanistic needs interplay with economic consideration and create a dynamic role in the life cycle of green buildings [6]. As such, social processes involving resident engagement and participation need to be considered in all stages of buildings, from the conceptual and development stages to operation and maintenance in order to prevent design failures and advance the users' quality of life [6][14]. This means when a local government or a housing project developer introduces various technologies in developing sustainable housing projects, residents' acceptance becomes relevant in implementation decisions and ideally should be included in the decision-making process.

Acknowledging the need for broader understanding of residents, social acceptance scholars have proposed examining social acceptance of different new technologies in a less exhaustive but comprehensive approach by establishing a survey organised to accurately identify the needs, wishes, preferences and expectations of the residents. For example, Yuan et al. [15] identified the role of income, age and education of residents in the level of awareness of solar energy technologies and their decision to implement them. With the introduction of vertical farming in housing, perceived benefit, risk, location, demographic characteristics, value and belief, trust, fairness and knowledge are recognised as crucial determinants influencing community acceptance [16]. These studies suggest that resident perceptions can influence the success of the technology installation project in housing projects. In turn, there is a positive effect if projects advance and they can utilise the technology well. Hence, community acceptance can become a catalyst that encourages sustainable lifestyles and, in a broader scope, steer cities toward more sustainable consumption [17].

Despite the interest in advanced studies on social acceptance in the housing sector, considerations related to community acceptance are seen as desirable but are rarely included in projects developing novel building systems [14]. Among the available studies, even less available are those looking at community acceptance of new technologies implemented in social housing [18][19]. Energy efficiency received the most interest in existing research addressing the introduction of new technology in social housing. In this setting, studies have argued that inherent barriers and success factors are embedded within the relationship between the housing provider and low-income residents during the installation of new technologies [20].

Systematic research on factors affecting community acceptance is scant, and it is challenging to recognise divergences between relevant drivers in diverse socio-cultural and political contexts [21]. As a result, community acceptance should be viewed according to specific sectors and disciplines [16]. In the housing sector, community acceptance is shaped by factors associated with the information made available to users, public involvement in the projects, residents' trust in developers during the project development, and the anticipation of projects, including risks and benefits [22]. In cases where the installation of new technologies in social housing is decided by governmental policy instead of a decision by the residents, efforts are needed to inform and involve them regarding the benefits of technologies to avoid abandonment and replacement [18]. Additionally, since introducing new technologies in housing affects many stakeholders differently depending on various contexts, greater

understanding of socio-economic and socio-cultural determinants of different technologies across different localities is needed. Research suggests that introducing technology which requires extensive awareness from residents, such as solar panel installation, involves capacity building and awareness-raising for residents during the pre- and post-design stage. In introducing technology that entails alteration of building façades, such as solar PV and vertical farming, the research argued that attitudes towards the technology and its application and perception of aesthetics are also important factors affecting acceptance [14]. Developers play an important role in raising residents' awareness and ensuring necessary information is available. However, developers also often lack awareness and information on the technologies introduced in the implementation.

Aside from the information and physical features of housing and technology offered, accessibility of economic opportunities and affordability are key factors linked to the acceptance of sustainable housing. The increased focus on the sustainability of housing does not necessarily go hand-in-hand with affordability; using traditional design and construction methods has led to poor cost-effectiveness of sustainable, affordable housing [10]. Affordability, forming the basic economic unit of human settlement in the built environment, is a crucial component of housing research focusing on the poor. As socio-environmental sustainability is closely linked to economic sustainability, studies have pointed out that financial assistance often fails to help the poor meet their housing needs as the affordability of a household depends on its command of the various resources required for housing [23]. The households' actual and potential savings are the most important financial resources, and employment or income generation enables the poor to afford a dwelling and maintain it [24]. The housing sector is employment-intensive during its life cycle, construction and proper maintenance [25]. The affordability of housing, thus, should be seen beyond rent and as an integral part of economic sustainability, which strengthens the economic self-reliance of the household, especially for the poor [23].

3. Development of Indian Sustainable and Affordable Housing

The concept of sustainable housing that incorporates green technologies and designs is still emerging in India. In 2013 (later updated in 2016), a new Part 11 was added to the National Building Code of India to cover the parameters required to be considered for planning, design, construction, operation and maintenance of building and land development from the point of sustainability. Despite the housing sector having adopted creditworthiness for environmental protection, work on sustainable housing has been largely limited to standalone projects catering to upper-middle and high-income populations. A large section of the Indian population is unaware of green building practices [26]. Regardless, sustainable and affordable housing has gained importance in India. Indian Green Building Council (IGBC) has launched the green affordable housing rating system providing no or minimal additional cost to the developer or the residents. It is a voluntary, consensus-based and market-driven rating system by an independent third party that received incentives from several Central and State Government agencies to promote the green building movement. There is also a promising trend where developers are showing interest in investing in housing for low-income groups in cities where demand for high-income groups is in a semi-

saturated state [27]. An example of a successful case is the passive solar housing using passive thermal heating in the Kargil district, which reduces the fuel consumption needed for indoor heating by up to 60 per cent [28].

The main reason behind adopting green technologies in the Indian housing sector is energy conservation, including reducing utility bills [29]. India has a lesser record in implementing prefabricated technology with sustainable industrial byproducts and insulation materials in its housing projects [30]. Hence, sustainable housing measures primarily focus on energy- and water-saving technologies and design, waste management and healthier spaces for residents. These measures align with the Leadership in Energy and Environmental Design (LEED) and Green Rating for Integrated Habitat Assessment (GRIHA) rating systems as well as the recent national focus on energy and resource efficiency. The latest Energy Conservation in Building Construction enacted in 2017 is also a positive step toward expanding the current energy conservation practices for the construction and operation of housing. However, more efforts are needed to link energy conservation practices with the built environment, contributing to healthy living space and overall comfort. A behavioural study in slum rehabilitation housing has revealed that slum dwellers who moved to social housing perceived that such housing suffers from lack of comfort levels and indoor air quality [31]. Lack of ventilation and fresh exchanges lead to relocated dwellers seeking more healthcare visits [32], establishing a critical link between the quality of the built environment and health outcomes in affordable housing [33].

Mitigating built-environment-related discomfort can improve energy conservation practices and the sustainability of low-income housing. The design of the low-income social housing often exaggerates residents' discomfort due to incompatible common attitudes and practices. For example, windows designed to regulate thermal comfort may not properly function as residents keep windows closed to prevent burglary, dust and insects. The previous study has pointed out that the lack of basic literacy, education and levels of empowerment of the community affected residents' capability and mentality to maintain and operate the building in Indian affordable housing as the designers would have expected [34]. Households' adaptive actions such as window opening, energy knowledge related to electricity-related expenditure, and energy habits in operating household devices are observed as important variables influencing actions within low-income social housing in Mumbai [35]. Energy and water access and housing design also affect women's practices indoors (e.g., cleaning, cooking and childrearing), creating undesirable impacts such as higher energy intensity, reduced social interaction and loss of women's social capital [36]. Understanding the local socio-cultural contexts, which influence household practices, attitudes and emotions, becomes critical for the success of sustainable and affordable housing projects [33]. Developing low-income housing aimed at comprehensively and concurrently achieving a higher quality of life and well-being with the introduction of new building technology and designs needs to facilitate adaptive actions based on socio-cultural characteristics.

The urban housing shortage is estimated to be around 18.78 million in 2012, with 96 per cent of it skewed towards the poor [37]. Transition to sustainable housing thus is greatly needed for the housing sector to contribute significantly to the GHG reduction. However, research pointed out that housing and resource-efficiency objectives are not being pursued concurrently. The broad themes or rationales of India's main policy instrument on housing and the urban sector focus extensively on affordability and quantity rather than sustainable social housing [28].

Despite the inherent connection between housing and well-being, slum rehabilitation and low-income housing guidelines are missing sustainability elements such as energy conservation and sustainable healthy community in housing and built-environment plans. Housing units under the slum rehabilitation policy in Mumbai, for instance, are restricted to an area of 25 square meters (approximately 269 square feet) with no basic guidelines for energy efficiency or building design ^[32]. Housing policies such as Rajiv Awas Yojana or Pradhan Mantri Awas Yojana also have not made sufficient linkages with the environmental policies and commitment at the national level. As observed in Mumbai, this lack of sustainability guidelines in affordable housing is aggravated by insufficient planning tools and methodologies available to the city planning departments ^[38]. Recent government-led climate change adaptation and mitigation missions could offer synergies with the housing sector. For example, the National Mission on Sustainable Habitat (NMSH) 2010 covers climate change adaptation through the betterment of housing and infrastructure related to water, sanitation and energy, among many. Since there is no information on the level to which NMSH is resourced, it remains unclear how this mission could lead to better implementation of sustainable housing in India and those for the poor in particular.

Existing climate change adaptation actions in Indian cities focus greatly on building local capacity and are primarily project-based and reactive with limited consideration of long-term climate risks ^[39]. Actions such as solar-powered buildings and cool-roofs (e.g., Ahmedabad, Hyderabad) are small interventions as part of smart city projects. With the challenges associated with affordable housing and slum rehabilitation, climate change adaptation policies for the housing sector remain a blind spot in the current housing policies. Addressing the affordable housing challenges and specific socio-cultural characteristics of the low-income population would require a deeper involvement of socio-architectural elements in the design process ^[38]. The ultimate goal of sustainable and affordable housing should go beyond conserving resources by introducing technology to improve the quality of life. Hence, climate change adaptation in the housing sector, including through the introduction of new technology, needs to take into account factors affecting the quality of life of the residents and the economic burden of health and adaptation costs at the household level.

4. Slum Rehabilitation and Social Housing Policies in Mumbai

In the Indian context, the term affordable housing is more common and is used interchangeably with social housing ^[28]. While in other countries, social housing covers all housing that receives some form of government support or assistance, in India, it refers to affordable housing regardless of the providers. Social housing in India, thus, includes affordable housing provided by the private sector, cooperatives, community groups, non-profit private firms and political organisations. The government, however, remains the main provider of low-income social housing, i.e., housing for the Economically Weaker Section (EWS) and Low-Income Group (LIG). The government also defines affordability as a ratio of housing expenditure to annual household income.

Given the challenges in providing housing, a number of policies have been enacted at the national level. Aiming to make India slum-free, the pilot phase of Rajiv Awas Yojana was launched in 2011. The scheme has a progressive architecture that includes in situ rehabilitation of slums and legislation to provide property rights to slum dwellers.

The twelfth FYP said that urbanisation should be guided towards inclusive, equitable and sustainable growth of towns and cities with proper civic amenities. Good urbanisation would ensure that towns and cities are free from slums and provide adequate employment opportunities and a decent quality of life to all their inhabitants, including the poor. The plan recognised that the private sector's supply of decent, affordable housing has remained woefully inadequate. A multi-pronged strategy is required to meet the need for housing for the urban poor.

The most recent initiative by the central government is the Housing for All 2022 or Pradhan Mantri Awas Yojana (Urban) (PMAY (U)) scheme. Under this scheme, around 20 million urban houses have to be constructed in India by 2022. In March 2022, the scheme recorded 5.635 million houses completed, 11.544 million houses sanctioned and 9.518 million houses grounded ^[40]. A key aspect to the success of this programme is slum rehabilitation, a long-standing government strategy to provide housing for the poor. The current scheme can be traced back to the beginning of the 1990s when the state government formulated a new Slum Rehabilitation Scheme (SRS), preceded by a succession of programmes and policies beginning in 1956. It is worth noting that the year 1991 marked the start of the privatisation of slum rehabilitation in India. Under this SRS, slums can be redeveloped, and as an incentive to those conducting the redevelopment, permission could be granted for extra building space. By providing the developer with extra building space that can be sold on the open market, accommodation for slum dwellers would be cross-subsidised. For the state government, this arrangement is aimed at fulfilling its obligation to the "Housing for All 2022" scheme ^[13]. The private housing and construction industry was expected to contribute significantly to this programme. Guidelines spelt out the profit limit (25 per cent) and the extent of the incentive (based on the Floor Space Index (FSI)). A group headed by the municipal commissioner had to approve each proposal, but the programme did not take off in any significant way. Critics pointed out that the scheme needed better regulatory guidance ^[41] and that it was driven by the private developers' interest instead of serving the interest of the slum population ^[13].

The security of tenure is indispensable when addressing slum rehabilitation and delivering successful social housing measures. However, the security of tenure was not considered to be an important parameter when declaring any area as a slum by the Slum Act, Census or National Sample Survey Organisation (NSSO). Across the states in India, including in Mumbai, the concept, perception and definition are different, depending on the socio-economic conditions. This leads to discrepancies between the parameters adopted by State Governments, the Registrar General of India (RGI) and NSSO. In Mumbai, according to the Maharashtra Slum Areas (Improvement, Clearance & Redevelopment) Act, 1971, any area can be declared as a slum area by the district collector if the area is or can be a source of danger to the health, safety or convenience of the public of that area or its neighbourhood. Having inadequate or no basic amenities or being unsanitary, squalid, overcrowded or otherwise is considered detrimental to the public's health, safety or convenience in that area. An area can also be declared a slum if the buildings used or intended to be used for human habitation are unfit for human habitation due to various reasons such as dilapidation, overcrowding, faulty arrangement and design of such buildings, narrowness or faulty arrangement of streets, lack of ventilation, light or sanitation facilities or any combination of these factors. The following conditions should be fulfilled to decide whether the buildings are unfit: (a) repairs; (b)

stability; (c) freedom from damp; (d) natural light and air; (e) provision for water supply; (f) provision for drainage and sanitary conveniences; (g) facilities for the disposal of wastewater.

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