

# PROMOTION OF GREEN AND AFFORDABLE HOUSING AND ALLIED SECTORS IN INDIA: FOR THE FASTER AND SUSTAINABLE ECONOMIC DEVELOPMENT IN THE DIGITAL ERA

William George A J <sup>1</sup> and Dr. Manoj P. K <sup>2\*</sup>

<sup>1</sup> PhD Scholar (FT), Department of Applied Economics, CUSAT, Kochi, Kerala, India. ORCID ID: 0009-0009-7779-1203.

<sup>2</sup> Associate Professor and Head Department of Applied Economics, CUSAT, Kochi, Kerala, India. \*Corresponding Author ORCID ID: 0000-0002-5710-1086.

DOI: [10.5281/zenodo.10780776](https://doi.org/10.5281/zenodo.10780776)

## Abstract

Housing is one of the most essential pre-requisites of human life and is second only to the need for food. So, providing this vital need of citizens is being accorded the topmost priority by the Governments worldwide and India is no exception. In India, in particular, 'Affordable Housing for All' has been the country's national goal, ever since 2017. Though India had sought to attain the goal in 2022 – the year when it attained 75 years since independence in 1948, the country could not attain the goal because of Covid-19 pandemic problem and other reasons. Right now, India is trying to attain this goal at least by the year 2025. In this context, it may be noted that the 'Real Housing Problem' in India is the housing problem of the poor and the marginalized – those in Low Income Group (LIG) and Economically Weaker Sections (EWS). Thus, a focused approach to address their housing problem is essential to attain the national housing goal in India. Besides, in order to ensure sustainability of the housing development, it is inevitable that 'Green' or environment-friendly materials, processes and technologies are employed for housing development. The obvious benefits of housing investments include the personal wellbeing of the members of the households including greater productivity and also their socio-economic empowerment like higher social status. Over and above these, investment in housing accelerates economic development of the whole economy because housing sector has got linkages, both forward and backward, with more than three hundred allied industries. Investments in such allied sectors (e.g. tourism and hospitality) is also good for the economy. In this context, this paper analyses the significance of promotion of Green and Affordable housing for the faster economic development of India, when the national goal of the nation is 'Affordable Housing for All'.

**Keywords:** Linkages, Mortgage to GDP Ratio, Green Housing, Green Tourism, ICT, AI.

## 1. INTRODUCTION

Housing is one of the most essential pre-requisites of human life and is second only to the need for food. So, providing this vital need of citizens is being accorded the topmost priority by the Governments worldwide and India is no exception. In India, in particular, '*Affordable Housing for All*' has been the country's national goal, ever since 2017.

Besides the social and familial dimensions of housing, it can bring about rapid economic development because of its linkage effects with hundreds of other industries. Hence, housing investment is deliberately encouraged by the Governments during periods of recession because it can push the growth of several allied ('linked') industries because of linkages (both forward and backward) with industries such as cement, steel etc. (backward) and paint, consumer goods etc. (forward) etc.

This in turn brings about faster economic development of the whole nation. For instance, during the post-Covid scenario in India, the Govt. of India had announced concessions to the housing sector in the country so as to trigger growth in allied industries also. So also, during the early 2000s when there was a general slump in the

industry the retail credit portfolio (primarily includes housing credit) was aggressively encouraged by banks in India. A policy of investing in housing and allied sectors (e.g. tourism and hospitality), including commercial real estate (CRE), in a 'Green' and sustainable manner can ensure faster economic growth.

## 2. RELEVANCE AND SIGNIFICANCE OF THE STUDY

India, as a nation, is mandated to attain the goal of '*Affordable Housing for All*' ever since 2017. Even though India had sought to attain the goal in 2022 – the year when it attained 75 years since independence in 1948, the country could not attain the goal because of Covid-19 pandemic problem and other reasons. Right now, India is trying to attain this goal at least by the year 2025. In this context, it may be noted that the 'Real Housing Problem' in India is the housing problem of the poor and the marginalized – those in Low Income Group (LIG) and Economically Weaker Sections (EWS). Thus, a focused approach to address their housing problem is essential to attain the national housing goal in India.

Besides, in order to ensure sustainability of the housing development, it is inevitable that 'Green' or environment-friendly materials, processes and technologies are employed for housing development. The obvious benefits of housing investments include the personal wellbeing of the members of the households including greater productivity and also their socio-economic empowerment like higher social status. Recent studies, like, Pagani et. al. (2023) [52] for instance, clearly shows that residential satisfaction influences environmental conditions. (Figure 1).

**Figure 1: Cause-loop diagram - Housing, satisfaction, health etc.**



Source: Pagani, et. al. (2023) [52], p.638.

The social, familial and such other dimensions of housing suggest that good housing conditions and residential satisfaction of households support the health conditions (Figure I). Besides this fact, from a broader perspective, it may be noted that housing investments could accelerate the economic development of the whole economy because of its linkage effects, both forward and backward, with more than three hundred other industries. Above all, given the fact that India has got a very low Mortgage to GDP ratio of about 10 percent which is much lower than other nations, there is enough scope for further penetration of housing (mortgage) loans in India. Thus, a detailed study on investing in sustainable ('Green') and affordable housing is significant, and so also is the investing in allied sectors like tourism.

### 3. OBJECTIVES OF THE STUDY AND METHODOLOGY

The specific objectives this study are as follows: (i) To study the significance of promotion of Green and Affordable housing in India for its faster and sustainable economic development; (ii) To study how ICT and other technological advances including artificial intelligence (AI) influence the rapid growth of Green and Affordable houses in India; and (iii) To suggest strategies for the faster and sustainable growth of Green and Affordable housing in India.

This study is structured into a descriptive-analytical cum exploratory study which is based primarily on secondary data from authentic sources like the publications of the Govt. of India (GOI) and Govt. of Kerala (GOK) as well as those of regulatory bodies, like, National Housing Bank (NHB) and Reserve Bank of India (RBI).

### 4. PREVIOUS STUDIES

The need for environment-friendly housing and hence sustainable housing has been noted by many recent studies, like, Assetmonk (2023) [1] *India's Magnetic Appeal for Private Market Real Estate Investments* that deals with the dynamics of private market investments in India's real estate investments and the high scope for the expansion of the market. ICRA (2023)[2] *Affordable Housing Finance Companies* has discussed the growth prospects of the AHFCs – the specialised HFCs that cater to the poor and the marginalised segments of the market.

The report by JLL (2023)[3] *Residential sales surge to a 15 year high in H1 2023* has specifically pointed out high growth momentum in the residential real estate market in the recent past. The recent report by IBEF (2023)[4] *Real Estate* too has highlighted the vast growth potential of the real estate sector in India. GOI (2023)[5] in its development journal *Yojana* has noted the high GDP growth of India vis-à-vis other nations, and so also in its annual report on the Indian economy GOI (2023)[6] *Economic Survey*. The subsidiary of RBI that regulates the housing finance in India, National Housing Bank (NHB)(2023)[7] in its latest report *Trend and Progress of Housing in India 2022* has dealt the developments in housing finance in India in FY 2022.

HDFC Securities (2023) [8] *Sector Thematic Housing Finance* has discussed the major developments in housing finance, including the gradually declining share of 'small-ticket' housing loans and ever growing trend in big-ticket (luxury) loans. Manoj, P.K. (2022)[9], ESG Reporting for Business Sustainability: Role of CMAs in Internal Audit, *The Management Accountant* has noted the utmost need for ESG adoption for the sustainability of business in the globalised regime. An earlier paper by this author

Manoj, P.K. (2005)[10], Cost accounting systems in Banks-for strategic advantage through effective cost management *The Management Accountant* has pointed the vital need for the application of scientific cost management by banks; and in another paper Manoj, P.K. (2005) [11], Scientific pricing of bank products through cost accounting-a vital need in the LPG regime, *The Management Accountant* the special need for scientifically pricing the bank products has been discussed. Manoj, P.K. (2014)[12], Role of ICT in Women Empowerment: A Study with a Focus on 'Kudumbashree' programme in Kerala State of India, *International Journal of Information Technology & Computer Sciences Perspectives* has noted the vast scope of women-based empowerment programme *Kudumbashree* in empowering women through their own SHGs.

The report by Knight Frank (2023) [13], *Single Family Housing Report* has noted the vast scope of SFH (single family housing) whereas another report by IFC (2019)[14], *Green Buildings A Finance and Policy Blueprint for Emerging Markets* has pointed out that 'Green' options only have sustainability in respect of housing. K.K Nasar and P.K Manoj (2014)[15] Factors influencing the purchase of apartments: some empirical evidence. *Clear International Journal of Research in Management, Science and Technology* have identified the major factors influencing purchase decision in respect of apartments, like, reputation of the developer, quality, price etc. Several studies have noted ICT adorns a key position as a catalyst of fast economic growth, including growth of diverse economic sectors and economic issues like, rural economy, women empowerment, etc.

The prospects of the ICT industry too were studied by some scholars. Manoj (2007)[16] "ICT industry in India: a SWOT analysis" *Journal of Global Economy* has studied at national level about ICT industry in India, pointed out the vital significance of this industry in the development of Indian economy, and made suggestions for sustainably promoting it.

Pickens (2009)[17] has demonstrated as to how a common ICT gadget (mobile phone) has played a key role in financial inclusion, empowerment of women and rural development through 'banking the unbanked' in Philippines. Manoj (2010)[18] "Impact of technology on the efficiency and risk management of old private sector banks in India: Evidence from banks based in Kerala" has observed that ICT-adoption by banks has made them more efficient.

Growing role of ICT in banking, including housing finance, is also noted in two reports: (i) *Banking*, (ii) *Real Estate*, of India Brand Equity Federation.(IBEF. 2023)[19]; thus ICT adoption has become an imperative in banking and healthcare sectors in India. A study by Nasar and Manoj (2013)[20] "Customer satisfaction on service quality of real estate agencies: An empirical analysis with reference to Kochi Corporation Area of Kerala State in India" has noted that greater level awareness should be provided to real estate agents; and that transparency and social networking are needed for customer service and business growth.

Manoj (2013)[21] "Prospects and Challenges of Green Buildings and Green Affordable Homes: A Study with Reference to Ernakulam, Kerala" has noted the good growth potential of green homes as they can create huge employment avenues and can ensure fast and sustained economic growth. Many studies have focused on the need for sustained economic growth through diverse kinds of interventions, models and tools; right from educational loans to exports and from SEZs to ecotourism.

Varghese, K.X, and Manoj, P.K. (2013)[22], “Educational loans and the higher education sector in India” have noted that study loans can improve HR quality in the nation, youth employability and they should be promoted. Manoj, P.K. (2015) [23]“International Container Transshipment Terminal (ICTT) and its impact on coffee exports from India: An analysis” has observed the vital role of ICTT to boost exports and economic growth. Manoj, PK (2009)[24], *Special economic zones in India: financial inclusion: challenges and opportunities* has noted the role of SEZs for expediting economic development. Manoj, P.K.(2017)[25] “Segmentation Strategy for Promotion of Ecotourism Products: Evidence from Thenmala Ecotourism” the author has pointed out that meticulous planning using segmentation of tourists can lead to economic growth through ecotourism.

Rajesh and Manoj (2015)[26]“Women Employees work life and challenges to Industrial Relations: Evidence from North Kerala” has noted the crucial importance of a trade-off between job life and family life of employed women to improve the industrial relations.

Manoj (2016)[27]“Employment Generation from Rural Tourism: A Field Study of the Local Community at Kumbalangi, Kerala” has noted the vital capability of tourism to create employment avenues, along with suggestions like better infrastructure, ICT resources, online services, etc. Manoj (2016)[28] “Real Estate Investment Trusts (REITs) for Faster Housing Development in India: An Analysis in the Context of the New Regulatory Policies of SEBI” has observed that innovations in financing models such as REITs are vital to bring about rapid development of India’s housing status which could lead to faster development of the whole Indian economy, given the linkages of housing.

Manoj (2016)[29] “Bank marketing in India in the current ICT era: Strategies for effective promotion of bank products” observed ICT-enabled marketing as a key need for India’s banking sector in this digital era. A study by Lakshmi and Manoj (2017)[30] “Service quality in rural banking in north Kerala: A comparative study of Kannur district co-operative bank and Kerala Gramin bank” has pointed out that KGB could make greater use of ICT than KDCB thus enabling the former to get an edge in the market.

A paper by Lakshmi and Manoj (2017)[31] “Rural Customers and ICT-based Bank Products A Study with a Focus on Kannur District Co-operative Bank and Kerala Gramin Bank” has observed that ICT-enabled services of Kerala Gramin Bank(KGB) have been accepted to a greater level than KDCB’s non-ICT-enabled services. A joint study by Joju, Vasantha, and Manoj (2017)[32] “Future of brick and mortar banking in Kerala: Relevance of branch banking in the digital era” has observed the vital need for ‘human touch’ as in ‘brick and mortar’ banking even if ICT or virtual banking is the new normal. Another study by Joju,

Vasantha, and Manoj (2017)[33] “Financial technology and service quality in banks: Some empirical evidence from the old private sector banks based in Kerala, India” has observed that Fin-Techs could significantly enhance quality of banking service and they have become essential for superior service delivery by banks. Manoj (2017)[34] “Construction costs in affordable housing in Kerala: Relative significance of the various elements of costs of affordable housing projects” ordered the different elements of cost based on their relative priority for effective control of costs, and ICT has been noted to be a vital tool for effective cost control.

Manoj (2017)[35] “Cost management in the construction of affordable housing units in Kerala: A case study of the relevance of earned value analysis (EVA) approach” has demonstrated that EVA could be a powerful tool for effective control of construction costs.

A study by Joju, Vasantha, and Manoj (2017)[36] “Electronic CRM & ICT-based banking services: An empirical study of the attitude of customers in Kerala, India” has noted the key significance of ICT-based banking practice called e-CRM (Electronic Customer Relationship Management) as an enabler of efficient and competitive banking, along with noting good feedback of customers to latest ICT-based products like e-CRM. Another CRM paper relating to bank management area by Manoj (2018)[37] “CRM in old private sector banks and new generation private sector banks in Kerala: A comparison” has noted that CRM adoption by the new private sector banks (NPBs) being to a greater extent than that of the old private sector banks (OPBs) particularly in respect of the latest ICT-enabled or Electronic version of CRM (i.e. e-CRM); thus enabling the NPBs to get a clear competitive edge in the market vis-à-vis the OPBs.

Manoj (2019)[38] “Social banking in India in the reforms era and the case of financial inclusion: Relevance of ICT-based policy options” has suggested ICT-based strategic options to enhance social banking that fits into the current digital banking regime. Manoj (2019)[39] “Dynamics of human resource management in banks in the ICT era: A study with a focus on Kerala based old private sector banks” observed the key relevance of ICT-enabled policies for the management as well as development of bank staff in this very competitive digital era. Manoj (2019) [40] “Competitiveness of manufacturing industry in India: need for flexible manufacturing systems” pointed out the vital significance for adoption of ICT as well as other technological advances such as flexible manufacturing systems (FMS) so as to make Indian manufacturing sector more competitive, given the globalization pressures.

A paper by Joju and Manoj (2019)[41] “Digital Kerala: A study of the ICT Initiatives in Kerala state” has studied the major initiatives in the ICR front in Kerala, the State in India having many unique ‘firsts’ like the topmost in internet penetration, topmost in literacy (universal literacy) etc. and has suggested strategies for the better use of Kerala’s vast ICT potential for its faster development. Joju and Manoj (2019)[42] “Banking Technology and Service Quality: Evidence from Private Sector Banks in Kerala” have observed ICT as an enabler of banking quality and as such ICT-adoption should be encouraged.

Ali and Manoj (2020) [43] “Impact of Falling Price of Rubber-A Case Study of Kothamangalam Taluk in Ernakulam District” has pointed out that due to frequent price falls affect the livelihood of farmers and that governmental interventions like minimum support prices are vital. Manoj (2015)[44] “Prospects of Responsible Tourism in Kerala: Evidence from Kumarakam in Kottayam District” has noted that responsible tourism (RT) has vast potential for supporting economic growth, if sustainably promoted.

Manoj (2016) [45] “Determinants of sustainability of rural tourism: a study of tourists at Kumbalangi in Kerala, India” has noted the key variables affecting tourism’s sustainability in the rural context and also suggested strategies like upgrading digital (ICT) resources as of the factors. Manoj (2015)[46] “Impact of Rural Tourism on the Environment and Society: Evidence from Kumbalangi in Kerala, India” noted certain

adverse impacts that are imminent in rural tourism and that it is vital to control such effects. Manoj, P.K. (2023) [47] “Housing Sector in India: An ESG Route into a Greener Future” *The Management Accountant* has noted imminent need for an ESG approach for the long term sustainability of the housing sector in India. Manoj (2019)[48] “Tourism Sector in Kerala in the Post-Flood Scenario: Strategies for its Sustainable Growth With a Focus on Responsible Tourism” observed the crucial part that RT could play for revival of flood-hit Kerala economy.

A study by Saritha and Manoj (2023) [49], “Social inequalities in IT sector: Evidence from Kerala State in India” has observed the existence of inequality among IT sector employees in Kerala along with the key requirement for removing it for equitable development of Kerala’s IT sector.

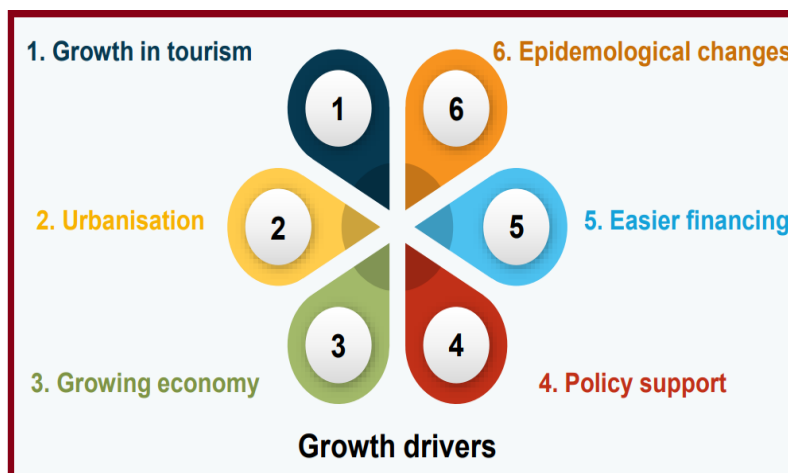
Manoj, P.K. (2015) [50] Housing Microfinance: A Study on Quality, Cost and Default Rate with Respect to Bhavanashree in Kerala has noted that housing microfinance (HMF) type home loans have lower quality (higher NPAs) and also that their transactional costs are higher. Manoj (2023)[51] “Affordable Healthcare and Affordable Housing: Need for an Integrative Approach for the Holistic Growth of the Digital Economy of Kerala, India” *Community Practitioner*, has noted that a knowledge society like Kerala must promote housing and healthcare sectors holistically using ICT. Pagani, et.al. (2023)[52] in their study have analysed the spatiotemporal interactions between variables like housing, health etc.

Manoj, P.K. (2023)[53] ICT for Sustained Community Development in India in the 5G Era. *Community Practitioner* has noted the vital need of high-end ICT resources to obtain better internet connectivity for fast and equitable growth. RBI (2019)[54] in its special report on securitisation market has discussed elaborately on housing finance market in India.

## 5. GROWTH PROSPECTS AND SIGNIFICANCE OF HOUSING AND REAL ESTATE SECTOR IN INDIA.

Due to the fast economic growth, urbanization, growth in tourism, epidemiological changes, easier financing, policy support etc., the housing industry has high prospects. (Figure I).

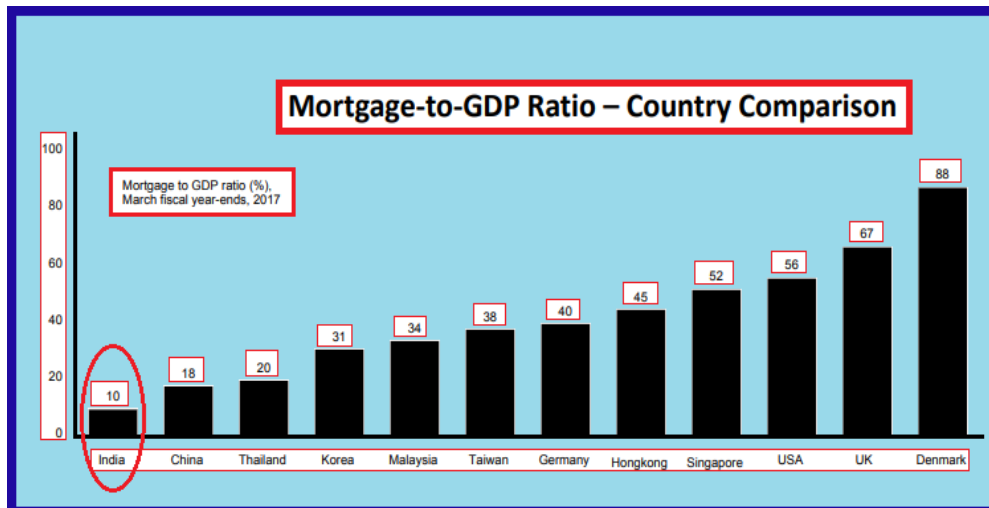
**Figure I: Growth Drivers of Housing and Real Estate Sector in India**



Source: IBEF (2023), *Real Estate*. p.8.

The growth potential of the growth in India’s housing and real estate sector is further supported by the fact that the mortgage to GDP ratio (MGR) in India is about 10 percent only as against as high as 88 percent of Denmark and 67 percent of the UK. Even for China, a typical emerging economy like India, the MGR is as high as 18 percent. (Figure II)

**Figure II: Growth Drivers of Housing and Real Estate Sector in India**



Source: Adapted from, RBI (2019), *Report on Housing Finance Securitisation Market*, p.12.

The low MGR in India (Figure II) and hence the high growth potential for developing better housing infrastructure through mortgage financing is further supported by the fact that there exists a huge housing requirement in India. As of 2022, India’s housing requirement is as high as 80 million units 97 percent of which is in the EWS and LIG categories. (Table I).

**Table I: Housing Requirement (Projected as of 2022) in India**

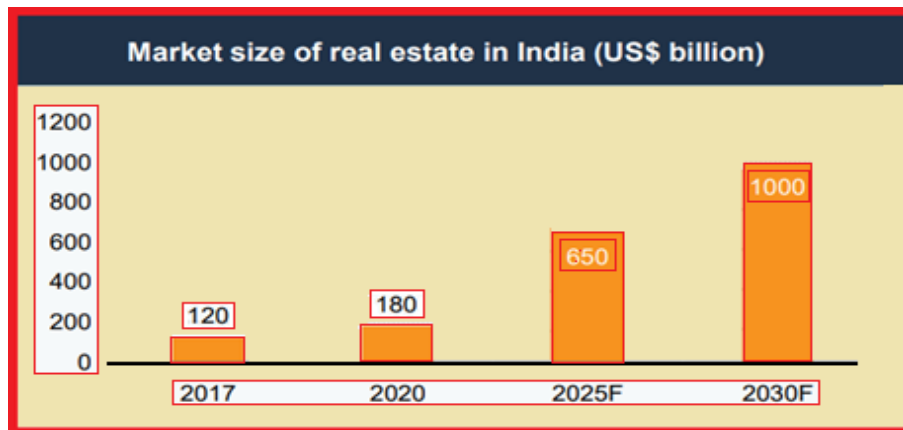
	Analyst estimate	Govt of India estimate
<b>Shortage and requirement (mn)</b>		
EWS	33.6	45.0
LIG	44.0	50.0
MIG and above	6.4	5.0
<b>Total</b>	<b>80.0</b>	<b>100.0</b>
<b>Value of units, LTV to be financed by HFCs, SCBs (Rs Lakh Cr)</b>		
EWS	25.2	33.8
LIG	88.0	100.0
MIG and above	51.2	40.0
<b>Total</b>	<b>164.4</b>	<b>173.8</b>
<b>Total (US\$ tn)</b>	<b>2.3</b>	<b>2.5</b>
<b>Construction costs (Rs Lakh Cr)</b>		
EWS	26.9	36.0
LIG	55.0	62.5
MIG and above	19.2	15.0
<b>Total</b>	<b>101.1</b>	<b>113.5</b>

Source: RBI (2019), *Report on Housing Finance Securitisation Market*, p.11.



Steadily growing trend in India’s housing and real estate sector has been observed over the years, because of the positive factors noted earlier (Figure I). Given the low MGR in India vis-à-vis other nations of the world (Figure II), it is quite natural that the high growth rate in this market as noted so far would continue, probably at a faster pace also, in the future. This fact is reflected in the market size of real estate in India and its future projections.(Figure III).

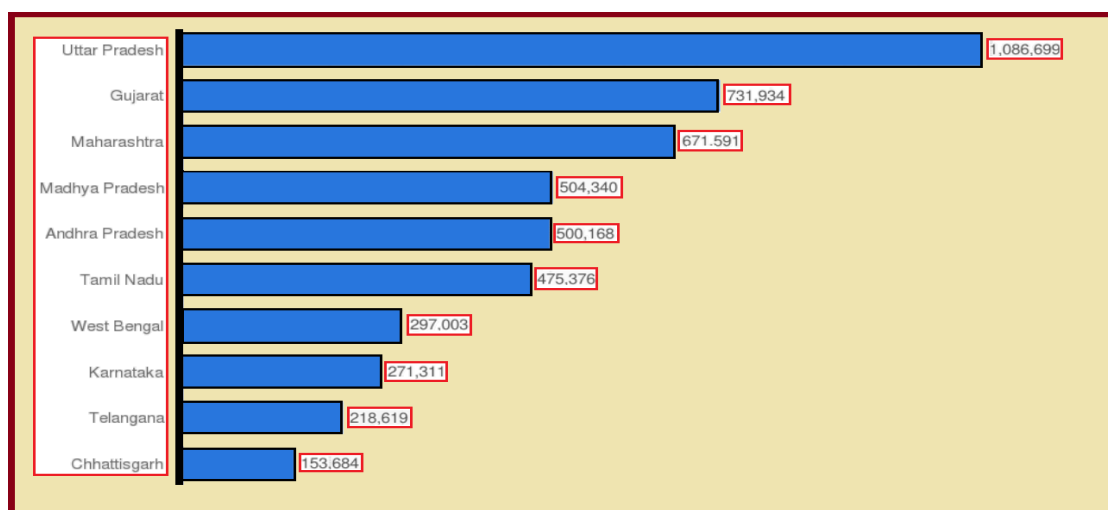
**Figure III: Growth Drivers of Housing and Real Estate Sector in India**



Source: IBEF (2023), *Real Estate*. p.8.

Given the fact that the vast majority of the housing requirement (as high as 97 percent) corresponds to the EWS (economically weaker section) and LIG (low income group) categories there is an urgent need for focusing on affordable housing units (rather than high income or luxury segments). This is in line with GOI’s *Affordable Housing for All* policy which is still relevant, though it was budgeted to be attained by 2022. Right now, the GOI has revised the target and extended the target to 2025. As per the statistics regarding the number of affordable housing units completed as of May 2022, it is noted that as a State in India, Kerala is not figuring among the major States that finished affordable houses. (Figure IV).

**Figure IV: Affordable Housing Units Completed in India by State as of May 2022**

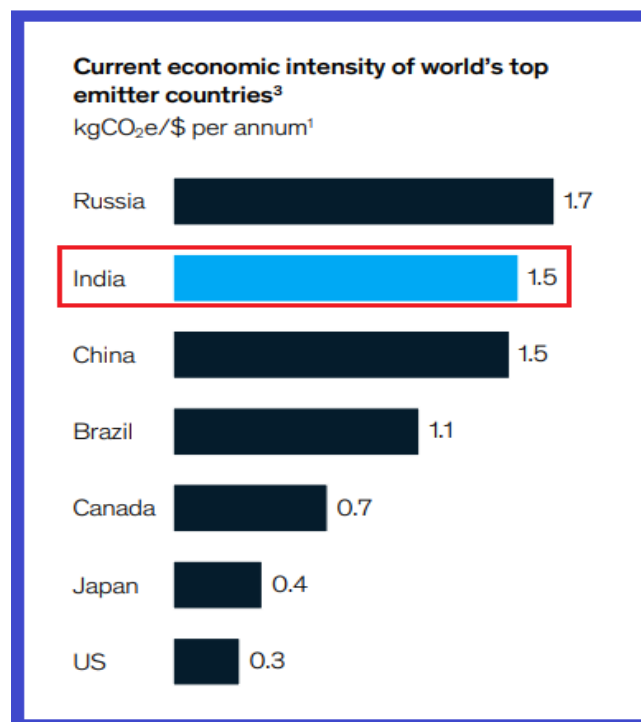


Source: Adapted from, Statista (2023).

Despite the immense growth prospects of housing due to low MGR (Figure II) and also a huge projected requirement for housing same (Table I), the long term sustainability of the housing development sector, or the business of developing of housing units, heavily depends on the usage of 'Green' (environment-friendly) building materials, construction methods and processes. This in turn minimises the emission of greenhouse gases (GHGs) and such other harmful emissions into the environment.

It may be pointed out here that India one of the topmost countries in the world with the highest economic intensity of 1.5 KgCO<sub>2</sub>e/USD per annum, and is second only to Russia which has a slightly higher economic intensity of 1.7 KgCO<sub>2</sub>e/USD per annum. Naturally, a country like India should be extra careful in decarbonising itself by minimising the emissions and the housing and real estate sector is a vital player in this regard. (Figure V).

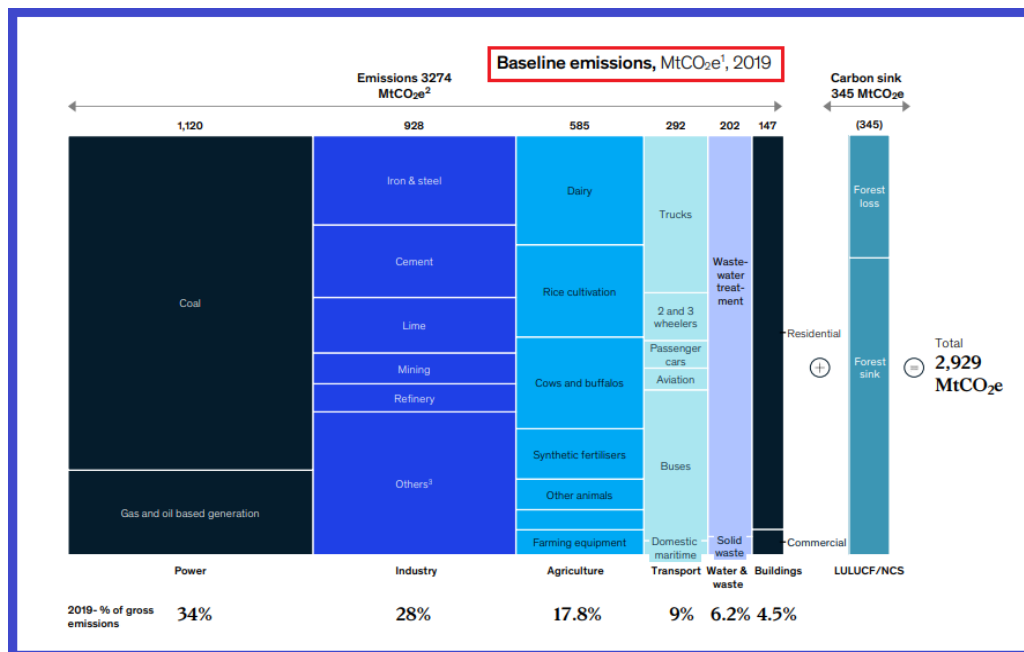
**Figure V: Topmost emitter nations of the world.**



Source: McKinsey (2023), *Decarbonising India*, p.5.

Coming to the Indian scenario, one of the top emitter nations of the world (Figure V), it may be observed that industries closely related to construction activities, like, cement, steel etc. are contributing a significant share along with construction industry, per se. So it is vital to use only environment-friendly materials, methods etc. for house construction. (Figure VI).

Figure VI: India's Carbon Emission Mix.



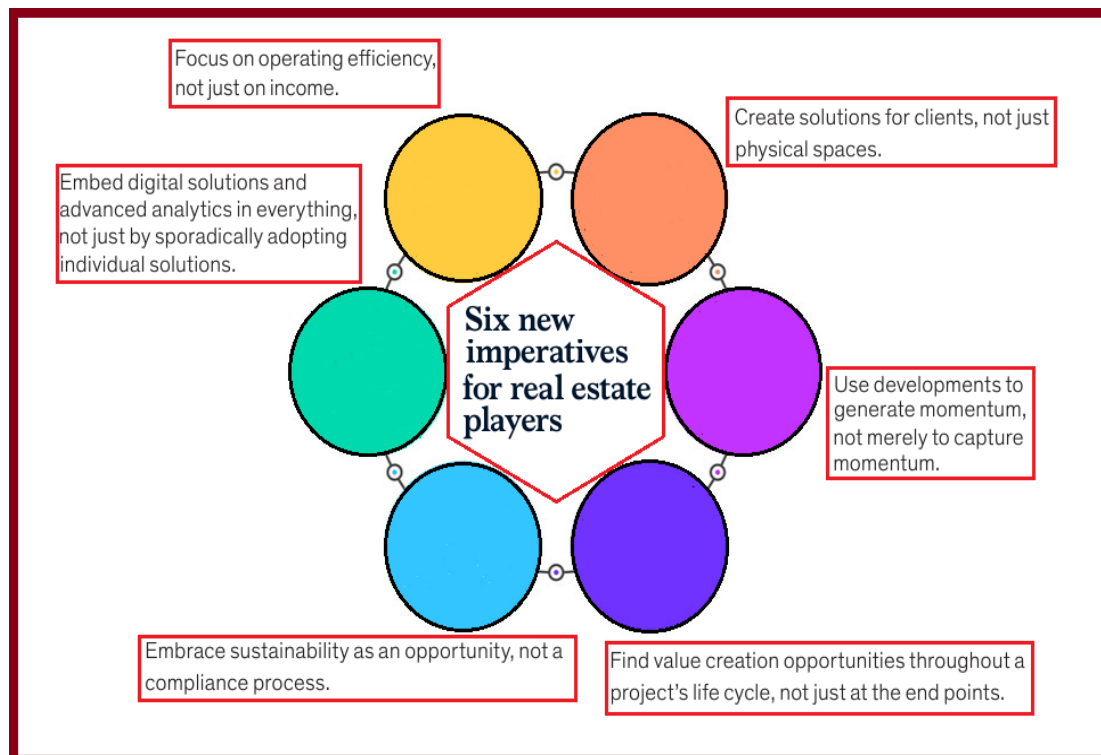
Source: McKinsey (2022), *Decarbonising India*, Oct.

## 6. ICT AND ARTIFICIAL INTELLIGENCE (AI) AND THE PROMOTION OF GREEN HOUSING IN INDIA

Due to the fast advances in ICT and allied technologies, including artificial intelligence (AI), there have been marked changes in the field of Green and Affordable houses in India. Advances in ICT and AI are inevitable for the sustainability and competitiveness of any industry, especially the housing and real estate industry. In fact, a recent global study done by McKinsey (2023) has revealed that there are six main inter-connected factors which are really 'imperatives' or 'inevitables' in this era of vast ICT and AI adoption. Unless and until the real estate players follow these six imperatives in their true letter and spirit it will be difficult for their long term sustainability.

The six imperatives are:(1) Creating solutions for the clients of real estate players, instead of providing them physical spaces alone, (2) Today's real estate players must strive for generating momentum rather than capturing momentum, (3) Value creation be done throughout the lifecycle of real estate projects rather than at the end points, (4) Sustainability be reckoned as an opportunity rather than simply as a compliance process, (5) Digital solutions and advanced analytics be applied in all situations, rather than just in individual solutions alone, and (6) Operational efficiency and its improvement be the motto, rather than business income. From these six imperatives, it is noted that ICT (and AI) has already become a vital tool that can facilitate the adoption of the six imperatives. (Figure VI).

**Figure VI: Six new imperatives for real estate players.**



Source: Based on McKinsey (2023), *Six new imperatives for real estate players*, March.

In India, the NHB initiatives of Green Housing has been encouraging over the last few years. NHB has already recognised that energy efficient residential housing and habitat is an imperative in the country as a vital area of concern that deserves close attention. So the apex housing regulator, in collaboration with KfW, Germany, has initiated the promotion of energy efficiency in India's housing sector.

In fact, this was the first of its kind move in this regard in the whole of India. Way back in in 2010-11, NHB had launched Energy Efficient Housing Refinance Scheme, so as to promote energy efficiency in residential housing sector. It had also launched the SUNREF Green Housing India Programme in August 2017, in collaboration with the AFD, and with the support of the European Union (EU). As per this programme CBs and HFCs were granted access to competitive funding avenues by NHB so as to enable them to finance green and affordable housing projects of housing loan borrowers.

NHB's SUNREF Green Housing India Programme could associate stakeholders on technical aspects related to sustainable and affordable housing in India. This programme aims to demonstrate the possibility of low-income households to access green housing at affordable prices through technical assistance and limited subsidy. Besides, NHB conducts AGHP (Affordable Green Housing Programmes) as a part of the above initiative across the geographies. NHB has extended a refinance Rs. 845 Cr. to 5,317 households under the above programme. This includes 3,144 households (59.13 percent) under the EWS/LIG categories.

## 7. SUGGESTIONS AND CONCLUDING REMARKS

In view of the foregoing, it is worth suggesting as follows:

- (i) NHB should continue with SUNREF Green Housing India Programme with added vigour. It should focus more on EWS/LIG types of households, as their share at present (59.13 percent) is relatively low vis-à-vis their share in the total population.
- (ii) Special subsidies be granted to all housing units that are based on the use of renewable energy sources (like, solar energy) so as to encourage energy efficiency and hence long term sustainability of the housing sector.
- (iii) Widespread use of ICT and allied technologies like AI (artificial intelligence) is a vital need in the emerging scenario in respect of housing and real estate sector. ICT and AI command a direct positive bearing on the six imperatives that this key sector should adopt, as per the international studies. ICT and AI would promote competitiveness and also energy efficiency of the built environment.
- (iv) RERA enactment in India in 2016 has already created transparency and thus customer confidence in the housing and residential real estate sector. The case of energy efficiency should preferably be embedded very strictly in the RERA Act at the national level, so that State level RERA Acts would also follow the suit.

Given the welcome initiatives of the NHB (like, the SUNREF Green Housing India Programme) and also the general upbeat in the market in the ongoing 'RERA Era', let us hope that NHB would initiate more such schemes with a special focus on affordable housing units as well as segments like the EWS/LIG.

### References

- 1) Assetmonk (2023). *India's Magnetic Appeal for Private Market Real Estate Investments*. Industry Report. ([www.assetmonk.com](http://www.assetmonk.com)).
- 2) ICRA (2023). *Affordable Housing Finance Companies*. Oct. ([www.icra.in](http://www.icra.in)).
- 3) JLL (2023). *Residential sales surge to a 15 year high in H1 2023*. 12<sup>th</sup> July.
- 4) IBEF (2023), *Real Estate*. Industry report. Feb. ([www.ibef.org.in](http://www.ibef.org.in)).
- 5) Govt. of India (GOI) (2023). *Yojana*, March. ([publicationsdivision.nic.in](http://publicationsdivision.nic.in))
- 6) GOI (2023). *Economic Survey*, Ministry of Finance, Jan. ([www.indiabudget.gov.in](http://www.indiabudget.gov.in))
- 7) NHB (2023). *Trend and Progress of Housing in India 2022*. National Housing Bank (NHB), New Delhi, March. ([www.nhb.org.in](http://www.nhb.org.in)).
- 8) HDFC Securities (2023). *Sector Thematic: Housing Finance*. April. ([www.hdfcsec.com](http://www.hdfcsec.com)).
- 9) Manoj, P.K. (2022). ESG Reporting for Business Sustainability: Role of CMAs in Internal Audit. *The Management Accountant*. 57 (7). 68-71.
- 10) Manoj, P.K. (2005). Cost accounting systems in Banks-for strategic advantage through effective cost management. *The Management Accountant*. 40 (7). 534-537.
- 11) Manoj, P.K. (2005). Scientific pricing of bank products through cost accounting-a vital need in the LPG regime. *The Management Accountant*. 40 (11). 890-896.
- 12) Manoj, P.K. (2014). Role of ICT in Women Empowerment: A Study with a Focus on 'Kudumbashree' programme in Kerala State of India. *International Journal of Information Technology & Computer Sciences Perspectives*. 3(2). 938-947.
- 13) Knight Frank (2023). *Single Family Housing Report*. March. ([www.knightfrank.com](http://www.knightfrank.com)).
- 14) IFC (2019), *Green Buildings A Finance and Policy Blueprint for Emerging Markets*. ([www.ifc.org](http://www.ifc.org)).

- 15) K.K Nasar and P.K Manoj (2014). Factors influencing the purchase of apartments: some empirical evidence. *Clear International Journal of Research in Management, Science and Technology*.4(8).1-11
- 16) Manoj PK (2007). ICT industry in India: a SWOT analysis. *Journal of Global Economy*, 3(4): 263–282. (doi: 10.1956/jge.v3i4.143.)
- 17) Pickens, M (2009). Window on the unbanked: Mobile money in the Philippines. <https://www.cgap.org/sites/default/files/CGAP-Brief-Window-on-the-Unbanked-Mobile-Money-in-the-Philippines-Dec-2009.pdf>
- 18) P.K. Manoj (2010)“Impact of technology on the efficiency and risk management of old private sector banks in India: Evidence from banks based in Kerala”. *European Journal of Social Sciences*, 14(2), 278-289.
- 19) India Brand Equity Federation (IBEF) (2023). *Banking report and Real Estate report*. Aug.
- 20) K.K Nasar and P.K Manoj (2013).Customer satisfaction on service quality of real estate agencies: An empirical analysis with reference to Kochi Corporation Area of Kerala State in India. *International Journal of Management, IT and Engineering*. 3 (6). 213-227.
- 21) Manoj P.K.(2013). Prospects and Challenges of Green Buildings and Green Affordable Homes: A Study with Reference to Ernakulam, Kerala. *Global Research Analysis*. 2(12).45-49.
- 22) Varghese, K.X, and Manoj, P.K. (2013), “Educational loans and the higher education sector in India”, *SS International Journal of Business and Management Research (SSIJMR)*. 3(1).12-21.
- 23) Manoj, P.K. (2015). International Container Transshipment Terminal (ICTT) and its impact on coffee exports from India: An analysis. *International Journal of Trade and Global Business Perspectives (IJTGBP)*. 4(3):1872-1875.
- 24) Manoj, PK (2009). *Special economic zones in India: financial inclusion: challenges and opportunities*. First Ed., Serials Publications. New Delhi.
- 25) Manoj, P. K. (2017).Segmentation Strategy for Promotion of Ecotourism Products: Evidence from Thenmala Ecotourism.*South Asian Journal of Socio-Political Studies*.18 (1).112-119.
- 26) S Rajesh and Manoj P.K (2015). Women Employees work life and challenges to Industrial Relations: Evidence from North Kerala. *IPASJ International Journal of Management (IJJM)*.3.(4).1-8.
- 27) P.K. Manoj (2015). Employment Generation from Rural Tourism: A Field Study of the Local Community at Kumbalangi, Kerala. *International Journal of Applied Services Marketing Perspectives (IJASMP)*. 4(4).1880-1888.
- 28) P.K. Manoj (2016). Real Estate Investment Trusts (REITs) for Faster Housing Development in India: An Analysis in the Context of the New Regulatory Policies of SEBI. *International Journal of Advance Research in Computer Science and Management Studies*, 4(6), 152-167.
- 29) P.K Manoj (2016). Bank marketing in India in the current ICT era: Strategies for effective promotion of bank products. *International Journal of Advance Research in Computer Science and Management Studies*, 4 (3), 103-113.
- 30) Lakshmi and Manoj, P.K. (2017). Service quality in rural banking in North Kerala: A comparative study of Kannur district co-operative bank and Kerala Gramin bank. *International Journal of Applied Business and Economic Research*, 15(18), 209-220.
- 31) Lakshmi and Manoj, P.K. (2017). Rural customers and ICT-based bank products: A study with a focus on Kannur district co-operative bank and Kerala Gramin Bank. *International Journal of Economic Research*, 14(14), 423-434.
- 32) Jacob Joju, Vasantha, S. and P.K. Manoj. (2017). Future of brick and mortar banking in Kerala: Relevance of branch banking in the digital era. *International Journal of Civil Engineering and Technology*, 8(8), 780-789.
- 33) Jacob Joju, Vasantha, S. &Manoj, P.K. (2017). Financial technology and service quality in banks: Some empirical evidence from the old private sector banks based in Kerala, India. *International Journal of Applied Business and Economic Research*, 15(16), 447-457.

- 34) Manoj, P.K. (2017). Construction costs in affordable housing in Kerala: Relative significance of the various elements of costs of affordable housing projects. *International Journal of Civil Engineering and Technology*, 8(9), 1176-1186.
- 35) Manoj, P.K. (2017). Cost management in the construction of affordable housing units in Kerala: A case study of the relevance of earned value analysis (EVA) approach. *International Journal of Civil Engineering and Technology*, 8(10), 111-129.
- 36) J Joju, S Vasantha, PK Manoj (2017). Electronic CRM & ICT-based banking services: An empirical study of the attitude of customers in Kerala, India. *International Journal of Economic Research*, 14 (9), 413-423.
- 37) Manoj, P.K. (2018). CRM in old private sector banks and new generation private sector banks in Kerala: A comparison. *Journal of Advanced Research in Dynamical and Control Systems*, 10 (2 Special Issue), 846-853.
- 38) Manoj, P.K. (2019). Social banking in India in the reforms era and the case of financial inclusion: Relevance of ICT-based policy options. *Journal of Advanced Research in Dynamical and Control Systems*, 11(7 Special Issue), 1654-1666.
- 39) Manoj, P.K. (2019). Dynamics of human resource management in banks in the ICT era: A study with a focus on Kerala based old private sector banks. *Journal of Advanced Research in Dynamical and Control Systems*. 11(7 Special Issue), 1667-1680.
- 40) Manoj, P.K. (2019). Competitiveness of manufacturing industry in India: need for flexible manufacturing systems. *International Journal of Innovative Technology and Exploring Engineering*. 8(12). 3041-3047. (DOI: 10.35940/ijitee.K2452.1081219).
- 41) J Joju and Manoj PK (2019). Digital Kerala: A study of the ICT: Initiatives in Kerala state. *International Journal of Research in Engineering, IT and Social Sciences*; 9: 692-703.
- 42) J Joju and P K Manoj (2019). Banking Technology and Service Quality: Evidence from Private Sector Banks in Kerala, *International Journal of Recent Technology*, 8 (4), 12098-12103.
- 43) Ali, O.P. and Manoj, P.K. (2020). Impact of Falling Price of Rubber-A Case Study of Kothamangalam Taluk in Ernakulam District. *Indian Journal of Economics and Development*, 16(1), 118-124.
- 44) Manoj (2015). Prospects of Responsible Tourism in Kerala: Evidence from Kumarakam in Kottayam District. *International Journal of Research in Management & Social Science*. 3(1) II. 54-59.
- 45) Manoj (2016). Determinants of sustainability of rural tourism: a study of tourists at Kumbalangi in Kerala, India. *International Journal of Advance Research in Computer Science and Management Studies*. 4(4). 17-30.
- 46) Manoj (2015). Impact of Rural Tourism on the Environment and Society: Evidence from Kumbalangi in Kerala, India. *International Journal of Advance Research in Computer Science and Management Studies*. 4(2). 148-159.
- 47) Manoj, P.K. (2023). Housing Sector in India: An ESG Route into a Greener Future. *The Management Accountant*. 58 (3). 51-55.
- 48) Manoj, P.K. (2019). Tourism Sector in Kerala in The Post-Flood Scenario: Strategies For Its Sustainable Growth With A Focus on Responsible Tourism. *Think India Journal*. 22 (33). 167-174.
- 49) Saritha, C.K & Manoj, P.K (2023). Social inequalities in IT sector: Evidence from Kerala State in India. *Environment and Social Psychology*. 8 (2). 1-13. DOI: 10.54517/esp.v8i2.1644.
- 50) Manoj, P.K.(2015). Housing Microfinance: A Study on Quality, Cost and Default Rate with Respect to Bhavanashree in Kerala. *International Research Journal of Finance and Economics*. 139. 7-20.
- 51) Manoj, P. K. (2023). Affordable Healthcare and Affordable Housing: Need for an Integrative Approach for the Holistic Growth of the Digital Economy of Kerala, India. *Community Practitioner*. 20(9). 412-435.

- 52) Pagani, A., Christie, D., Bourdon, V., Wall Gago, C., Joost, S., Licina, D., Lerch, M., Rozenblat, C., Guessous, I., & Viganò, P. (2023). Housing, street and health: a new systemic research framework. *Buildings and Cities*, 4(1), pp. 629–649. DOI: <https://doi.org/10.5334/bc.298>
- 53) Manoj, P.K. (2023) ICT For Sustained Community Development in India in the 5G Era. *Community Practitioner*. 20 (12). 340-356
- 54) RBI (2019). *Report of the Committee on the Development of Housing Finance Securitisation Market*. Reserve Bank of India (RBI). Mumbai. Dec. ([www.rbi.org.in](http://www.rbi.org.in)).
- 55) RBI (2022). *Trend and Progress of Banking in India 2022*. Reserve Bank of India (RBI). Mumbai. Dec. ([www.rbi.org.in](http://www.rbi.org.in)).
- 56) NHB (2023). *Annual Report 2022-23*. Habitat House. New Delhi. India. Oct. ([www.nhb.org.in](http://www.nhb.org.in)).