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Financing Options for Green and Affordable Housing (GAH): An Exploratory Study of South Asian Economies

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Abstract: Housing is a basic human need and its affordability has become a concern with the exponential population growth, especially in densely populated developing countries. Rapid urbanization, inadequate housing and increasing slums have also brought environmental challenges to urban areas of developing countries. To address such concerns, Green Affordable Housing (GAH) has emerged as a concept with the convergence of ideas and actions of affordable housing and sustainability. This research aims to identify the GAH adoption strategies and the financial options through case study analysis of three South Asian Economies (India, Pakistan, and Bangladesh) and validated the case study outcome by using content analysis approach. The findings reveal that India has made notable progress in establishing a GAH financial market, while Pakistan and Bangladesh are struggling due to a lack of appropriate funds and underrated financial markets. This study further proposed the financing framework to achieve GAH for South Asian economies because the low-income Credit Link Subsidy Scheme alone supporting the adoption of GAH would not be enough. The study provides policy recommendations for using Credit Link subsidies, energy-efficient mortgages, and Public-Private Partnerships for housing investment as effective methods for financingGAH.

Keywords: green and affordable housing; financing options; case study; content analysis; credit linked subsidy scheme; South Asian economies

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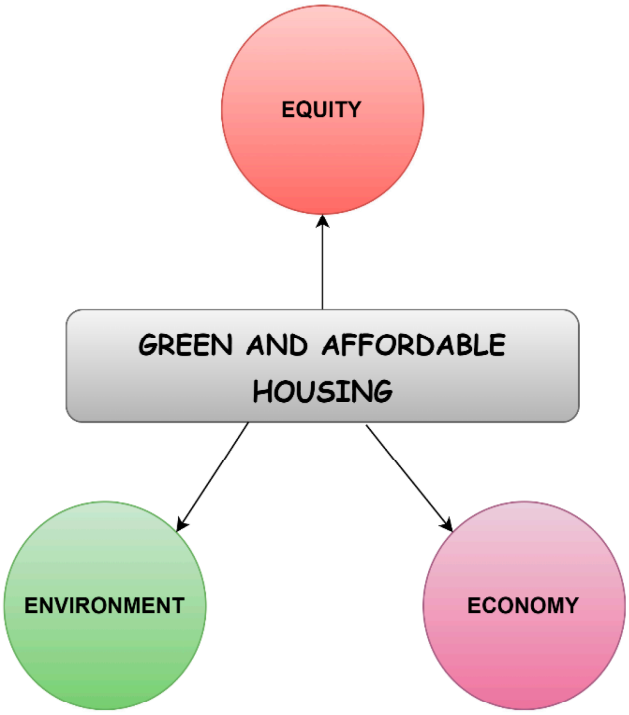
1. Introduction

According to the projection of the World Bank, approximately 300 million new homes will require to be developed globally by 2030, primarily due to the rapid pace of urbanization and population growth in various regions across the World [1]. Furthermore, almost 30% of urban households globally reside in inadequate housing, which is defined by overcrowding, insecure tenure, non-durable building materials, and a lack of access to safe drinking water and sanitation. Climate risk exacerbates the impact on the poor who reside in such housing. Although current housing development trends may reduce the rate of substandard housing in urban areas to 25% by 2030, the increase in urban population growth will significantly increase in the number of households lacking adequate housing [1].

Affordable housing has traditionally focused on promoting equity, and economy while housing practitioners and organizations embraced the third E (environment) as an additional amplifier for their social, equity, and economic objectives (Figure 1). Well-built, energy-efficient housing can aid households to adapt to climate-related calamities including extreme temperatures, drought, flooding, and tropical cyclones. Additionally, secure tenure and reduced energy expenses can pave the path to resilience and long-term financial independence [2,3]. Thus, the persistent need for affordable housing and the urgency of responding to address climate change calls for a renewed commitment to "Green Affordable Housing" (GAH).



Economy:

- Reduction in resident utility cost.
- Providing operations and maintenance savings to developers.
- Offering efficient, resilient, and durable housing assets.

Equity:

- Providing healthier indoor environment.
- Encouraging physical activities.
- Protecting the health of construction and manufacturing workers.

Environment:

- Using land efficiently through urban infill and brownfield development.
- Using passive energy and integrated infrastructure to reduce the need for natural resources.
- Specifying the efficient system and appliances that save water and energy and mitigate climate change.
- Promotional social cohesion that can support engagement for climate resilience.

Figure 1. Factors influencing GAH. Source: Author's compilation.

Residential energy consumption has significantly increased from 115 EJ to 135 EJ, accounting for 30% of global final energy consumption [2]. At the same time, tenants' households face affordability issues due to inflation and poverty, caused by rising house prices [4]. The observed trends highlight the urgency of addressing both affordable and environmental sustainability simultaneously in the housing sector to mitigate the concerns related to climate change, energy security, and the decreasing global reserves [5]. GAH presents a significant opportunity for creating value for home developers, homeowners, and investors and has the potential to attract a global investment of USD 15.7 trillion, including USD 1.5 trillion in South Asia [6]. However, the inadequate end-user finance, particularly the underutilization of mortgages, aggravates the housing supply deficit, limiting developers' ability to undertake projects for lower-income households due to the risk of off take.

Numerous studies have explored financing options for GAH which comprise housing bonds, tax incentives, tax credits, green grants, low credit interest rates, microfinancing, and subsidized mortgage for short- and long-term financing (Tables 1–3). Besides that, financing opportunities have witnessed massive growth in housing delivery in the UK, where affordable homes in London rose from 13% to 30% in 2018 [3] while Spain, which experienced cheap mortgages, underwent a boom in their housing delivery [7]. In developing countries, financing for the GAH concept is not completely established because of a lack of market confidence and severe risk of both construction and end-user finance as compared to developed countries such as the UK, the US, or Australia [8]. However, this study aimed to explore financing strategies that might help South Asian countries provide inexpensive and sustainable housing. To achieve this goal, the study will be split into two primary parts: a thorough investigation of existing financing possibilities for GAH by using content analysis for three selected case studies and an in-depth analysis of case studies from chosen economies in South Asia. The ultimate goal of the project is to close knowledge gaps by

identifying a financing framework that supports the growth of sustainable and affordable housing in South Asia.

2. Literature Review

Affordable housing is characterized by housing expenditure (mortgage or rent payments) that must not exceed 30% of a low-income household's gross monthly income [9]. While GAH, as defined in prior literature, encompasses various components such as affordability, comfort, safety, high value homes, and energy and resource efficiency (Table 1). It is a common perception that "green homes are too expensive to afford". This section of the study comprises an extensive literature review of the housing finance system and proposes financing options that aim to promote affordability, sustainability, and comfort in housing.

Table 1. Components of GAH: Literature Matrix.

Components	Subcomponents	Authors
Income Ratios	House price to income ratio Rental cost to income ratio Residual income	[1,10–13]
Loan and Accommodations	Availability of mortgage and interest rate Rental housing availability Low-cost house ownership products Market value home ownership availability	[1,11,13–15]
Facilities and Services	Availability of employment, public transport services, quality education, health services, shopping facilities, open public green spaces, and social and leisure amenities	[1,3,16]
Safety and Comfort	Safety and absence of environmental issues	[3,16]
Energy, Resource, and Water Efficient	The lifetime of an environmentally friendly and energy and resource efficient building, from conception to design, construction, operation, maintenance, restoration, and demolition.	[1,3,10,15,17]
High Value homes	Lowered bills, lowered default rate and higher resale value	[3,11,18]

Source: Author's compilation from the Literature Survey.

2.1. Evolution of a GAH Finance System

Housing finance systems attempt to give financing to clients who wish to buy a house as well as organizations who undertake significant housing projects [9,19]. Local lenders, primarily depository institutions, provide loans for housing finance. However, with the development of capital markets and mortgage securitization, finance for housing now originates from a much wider range of investors, including foreign investors. According to Malpezzi and Vandell [20,21], the deeper a country's housing finance penetration, the more inexpensive its housing units. Mehta et al. (1991) performed a study, finding correlation with Malpezzi and Vandell's study, and discovered that households will engage in housing improvements if credits are available [22]. However, housing supply may not keep up with demand, causing prices to increase [9]. Therefore, a well-functioning housing finance system is necessary to address these challenges [23,24].

The evolution of housing finance has been a gradual process shaped by economic conditions, financial innovations, and government policies. Prior to the 1930s, short-term, interest-only mortgages were the norm, making homeownership unattainable for many [25]. Moreover, in the 1980s and 1990s, mortgage-backed securities were introduced, and the secondary mortgage market became an essential part of the industry. The contribution of the housing bubble to the 2008 financial crisis prompted a reevaluation of the role

of financial innovators and government regulators [26]. Hence, to address the growing concern about climate change and sustainable development goals, financing options that encourage energy-efficient upgrades to homes have become more prevalent. GAH finance was introduced with energy-efficient mortgages, followed by other types of green home financing, such as green bonds and loans [27]. As demand for sustainable living has increased, these options have become more appealing to homeowners.

The South Asian governments amplified their efforts after the 1997 Asian Financial Crisis and witnessed the rapid increase of private housing and market-based housing finance in recent decades. The proportion of private housing in the primary market has significantly grown [28]. Furthermore, the importance of commercial banks and other private financial institutions in the origination of mortgage loans has increased, and more diversified mortgage products have become available to households. In most Asian nations, mechanisms for mortgage-backed securitization, housing bonds, and green grants have been established in the secondary market, although the green financing market is still evolving [29].

2.2. Identification of Financing Options for GAH

The notion of GAH finance is still evolving, as per the existing literature there are main two beneficiaries homeowners and housing developers that require funding, which is achievable by the effective provision of Government funding for housing projects [30]. A conceptual framework for financing options for GAH is presented in (Figure 2), based on comprehensive literature that covered both developed and developing economies.

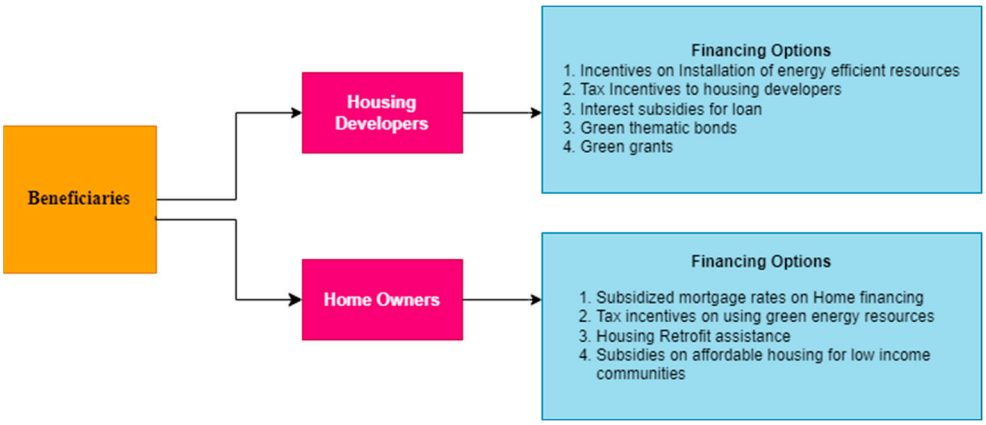


Figure 2. Beneficiaries for GAH finance and financing options.

1. Note: Lower-income households bear a large financial burden from energy and water bills, which can account for up to 40% of their income, compared to 5% for higher-income households (World Bank 2016) Jørgensen, B. H., and Holttinen, H. (2022). IEA Wind TCP Annual Report 2021. IEA.
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Sustainable housing is a fundamental right of every human being and a key driver to the economy, because it employs both skilled and unskilled workers [31]. Sustainable housing is composed of three elements; social, economic, and environment. Housing affordability is a key concern for South Asian economies [20], but green elements to achieve sustainable housing are often overlooked in the housing context. In addition, the supply of home financing offers economic empowerment and drives vitality in the real estate segment of the economy, since a healthy and well-regulated housing market is essential for economic growth. However, numerous studies have focused on the issue of financing affordable housing for south Asian economies [32–34]. Of these, some nations have made significant progress in establishing the housing finance market, while others are still looking for the best financing option [32,35]. Furthermore, few researchers have also investigated the significance of green and cheap housing in terms of health, education, and employment [36–38]. Despite all these efforts, South Asian nations are still having trouble determining the most suitable finance solution for GAH. By exploring the options that are accessible and revealing financing methods, this study will help fill the gap.

This section presents a systematic literature review and provides a summary of potential financing options for proposed financing programs (Tables 2 and 3). These options include housing bonds, tax incentives, interest subsidies for loans, green grants, subsidized mortgage rates, retro financing, and subsidies on home interest rates for both developers and homeowners.

Table 2. GAH Finance Options for Home Developers: Literature Matrix.

	Financing Programs	Description	Financing Developers	Country	Source
Housing Bonds	Australian Affordable Housing Bond based Aggregator (AHBA) loans	Bonds issued to investors to generate funds for housing. Loans and bonds provided to increase supply of housing especially for the low-income community in Australia.	National Housing Finance and Investment Corp. (NHFIC)	Australia	[17]
	Canada Mortgage Bonds	Institutional investors purchase Canadian mortgage bonds to finance projects related to GAH.	Canada Mortgage and Housing Corporations (CMHC)	Canada	[39]
	Green Bonds	These bonds are sold to investors in order to raise funds for initiatives in renewable energy, energy efficiency, sustainable housing, and other environmentally friendly businesses.	• The European Investment Bank • KFW Development Bank • The Swedish National Debt office • African Development Bank	Germany, Sweden, Africa and other EU countries	[40]
	Social Impact Bonds	Social bonds are used to fund eligible projects, and investors receive a fixed return on their investment.	Asian Development Bank	Asia and Pacific	[41]
	Sustainability Bonds	These bonds are similar to social bonds but also include projects that reduce greenhouse gas emissions, promote renewable energy, and support climate adaptation and mitigation. These bonds purchased by institutional investors and other retail investors.	Asian Development Bank	Asia and Pacific	[41]
	SDG Bonds	These bonds are purchased by investors who are interested in supporting sustainable housing projects in Pacific and Asia.	Asian Development Bank	Asia and Pacific	[29]
	Project of Ulaanbaatar GAH and Resilient Urban Renewal Sector	Provide long-lasting and comprehensive solutions to turn Ulaanbaatar City's subpar, climate-vulnerable, and highly polluting localities into habitable eco-districts that are also inexpensive and low carbon. This will help to leverage investments from the private sector.	Asian Development Bank	Mongolia	[42]

Table 2. *Cont.*

	Financing Programs	Description	Financing Developers	Country	Source
Tax Incentives	Low Income housing Tax credit equity	Tax incentives for housing developers and private investors to build resilient houses for low-income groups.	Tax Reform Act of 1986, which was passed by the United States Congress	United States	[20]
	Green Building Housing Tax Incentive	Tax incentives for people and companies who develop green in an attempt to offset high capital expenditures.	US Department of Energy, US Environmental Protection Agency	United States	[43]
Interest Subsidies for loans	Credit Link Subsidy Scheme	Interest free mortgages obtained for the purchase or construction of a resilient and sustainable house.	National Housing Bank, India	India	[44]
	GAH Scheme	Subsidized interest rate on home loans obtained for the purchase or construction of a resilient and sustainable house.	National Housing Bank, India	India	[44]
	Affordable Housing Fund	Interest-free mortgage loans obtained to buy or build a sturdy, environmentally friendly home.	National Housing Bank, India	India	[44]
	The Weatherization Assistance Program	A federal grant program that provides funding to improve the energy efficiency of homes for low-income households.	U.S. Department of Energy	United States	[31]
Green Grants	Community Development Block Grant (CDBG) Programs	The CDBG's mission is to encourage the growth of livable urban areas by increasing economic possibilities, especially for low- and moderate-income homeowners, and by providing acceptable housing and an appropriate living environment.	The U.S. Department of Housing and Urban Development (HUD)	United States	[45]
	The National Housing Co-Investment Fund (NHCF)	Low-cost loans and subsidies to developers to help them construct new affordable housing units, restore existing ones, and make them more resilient.	Canada Mortgage and Housing Corporation (CMHC)	Canada	[46]
	The Affordable Housing Innovation Fund (AHIF)	Provide 50% funding for the development of new affordable housing units and repair and renovation of existing units for vulnerable populations.	Canada Mortgage and Housing Corporation (CMHC)	Canada	[47]
	The Green Municipal Fund	The GMF offers loans, grants, and technical assistance to municipalities to build green efficient buildings and retrofits.	Federation of Canadian Municipalities (FCM)	Canada	[48]
	The Energy Efficient Affordable Housing Program (EEAHP)	Funds for housing developers to support construction of energy efficient affordable housing units.	U.S. Department of Energy	United States of America	[43]
	The Multifamily Affordable Solar Housing (MASH)	Incentives for installation of solar energy systems. Provide incentives to install solar energy systems in low-income communities.	California Public Utilities Commission (CPUC)	United States of America	[49]

Table 3. GAH Finance Options for Homeowners: Literature Matrix.

	Financing Programs	Description	Financing Developers	Country	References
Mortgages	Ginnie Mae Mortgage-Backed Securities (MBS)	Primarily designed to support the government's housing policy by making mortgage loans more affordable for low and moderate-income borrowers.	Federal Housing Administration (FHA)	United States	[50]
Retrofit financing	HUD's Energy Efficient Mortgage (EEM)	Mortgages for homeowner to retrofit energy efficient improvements, spend less on energy costs, 100% energy improvement can be financed and allow consumers to buy more homes.	U.S. Department of Housing and Urban Development (HUD)	United States	[31]
	Building Retrofit Energy Efficiency Financing	Provision of funds to owners of households to retrofit their houses with energy efficient and sustainable features.	U.S. Department of Housing and Urban Development (HUD)	United States	[51]
Subsidies on Home Interest Rate	MY housing Scheme	Provide subsidy to reduce cost of financing and make homes more affordable for low-income families; 3.5% interest rate per annum with maximum 35 years repayment.	Malaysian Government Initiative	Malaysia	[52]
	Markup subsidy on Housing Finance	Markup subsidy for housing finance is a government initiative to provide affordable housing finance to low-income households. The subsidy is in the form of a reduction in the interest rate on home loans, which makes the cost of borrowing lower for eligible borrowers.	State Bank of Pakistan	Pakistan	[53]

Source: Author's compilation from the literature.

3. Materials and Method

3.1. Research Area

Nearly half of the world's poorest population dwell in South Asia [44] and a significant number of them live in inadequate housing, such as urban slums and squatter settlements. Although the home financing market is dynamic in nature, lower-income groups make up the majority of its customers. However, the promising growth rates observed in these areas give reason for hope for the expansion of housing and the financial services that are associated with it to cater to middle-class and low-income families. The deployment of more advanced home financing solutions is necessary since this presents a substantial challenge for South Asian countries. This component of the research focuses on highly populated and urbanized nations, notably India, Pakistan, and Bangladesh, which are facing housing infrastructure shortages and adverse impacts as a result of climate change. These problems not only impede economic development but also have detrimental effects on the current housing stock, driving up yearly housing demand. As seen in Table 4, Pakistan, for example, has a shortage of 11.4 million housing units as of 2021, compared to 10 million and 6 million units, respectively, in India and Bangladesh. As per the World Bank projections, these statistics dramatically climb by 2025, with India predicted to have a new housing demand of 25 million units, Pakistan with 17.2 million units, and Bangladesh with 10.5 million units due to population growth. Addressing financing choices becomes essential in closing the gap in the housing market given the current data and the rising demand for houses. In order to prioritize GAH solutions and to be in line with the Sustainable Development Goals (SDGs), this research intends to investigate the existing funding models and options for housing developments.

Table 4. Housing Statistics.

Dataset	Pakistan	India	Bangladesh
Population	235,824,862	1,420,000,000	171,186,372
Urban Population	88,979,079	508,368,361	67,979,820
Housing Backlog	11.4 million	10 million	6 million
Housing finance as Percentage of GDP	0.25%	11.7%	1.71%

Source: Author's compilation from the dataset of World Bank.

3.2. Research Methods

Two different research techniques were used concurrently in this study. Initially, it examines the financial structure and options for the government's initiative for GAH in Bangladesh, Pakistan, and India, three South Asian nations. Three case studies are chosen to critically evaluate the viability of funding solutions for GAH in each nation in order to accomplish this goal; this case study methodology was endorsed by [54]. The case studies include Ashrayan Project-2 in Bangladesh, Naya Pakistan Housing Program in Pakistan, and PMAY (Pradhan Mantri Awas Yojana) in India. Second, an interview approach is applied to validate the suggested finance choices described in the case studies. This method entails asking experienced practitioners and household owners difficult and follow-up questions in order to extract pertinent information based on their vast knowledge and insights. The interviews cover a wide range of topics, including the study's existing financing choices, the accessibility of these options to families and housing investors, and the viewpoints of financial experts. Additionally, recommendations and shortcomings with the finance structure are also investigated. In order to include a wide variety of people with varying opinions on the study subjects, the research participants for the interviews are chosen using deliberate sampling approaches. A total of ten people are interviewed, including representatives from household owners, household investors, financial analysts, and policy practitioners with a combined experience of 170 years. The interviews are transcribed, and a content analysis approach of qualitative analysis is used

to the transcripts. The number of interviews selected is suitable since it achieves theoretical saturation (see Table 5) [55]. The Interviewee's Information is as follows:

Table 5. Interviewee's Information.

Candidates Information	Profile	Experience (Years)
Interviewee 1	Housing Market Investor	27 years
Interviewee 2	Housing Market Investor	15 Years
Interviewee 3	Financial experts	10 years
Interviewee 4	Financial Experts	13 Years
Interviewee 5	Household owner	10 years
Interviewee 6	Household owner	15 years
Interviewee 7	Household owner	12 years
Interviewee 8	Policy Experts	18 years
Interviewee 9	Policy Experts	23 years
Interviewee 10	Policy Experts	27 years

Source: Author's compilation.

3.3. Cases Profiles

This section has explored government financing projects and schemes for GAH in three South Asian economies: India, Pakistan, and Bangladesh. The research analysis is centered around the following case studies:

Case Study I	Pradhan Mantri Awas Yojana (PMAS)	India
Case Study II	Naya Pakistan Housing Program	Pakistan
Case Study III	Ashrayan Prakalpa: Ashrayan-2	Bangladesh

3.3.1. Case Study I: Pradhan Mantri Awas Yojana (PMAS)

GAH in India

Indian cities are enduring an astonishing transformation as a result of the country's rapid population and urban growth. This has led many people to seek decent housing options that are within their means. However, India has a significant affordable housing difficulty due to the high cost of land and inadequate infrastructure to accommodate low- and middle-income residents. As per the statistics of the Technical Group on Urban Housing Shortage research (2012–2017), There is a shortage of 18.78 million housing units, about 96% of which are owned by families in the Economically Weaker Sections (EWS) and Lower Income Groups (LIG). The construction of sufficient housing alternatives and infrastructure is necessary to create cities that are supportive of the development of all facets of society. Simultaneously, urban sprawl is a serious danger to environmental sustainability; loss of biodiversity, soil erosion, and ecological devastation are all results of urban expansion. As a result, the current circumstance has caused a shift in India's development philosophy, prompting the government to build green, affordable housing developments.

Financing Options for Pradhan Mantri Awas Yojana (PMAY) Scheme

PMAY scheme is the effective initiative of the Indian government that promotes affordable and environment friendly housing. Launched in 2015, the initiative aims to reach eligible beneficiaries from economically marginalized people, low-income groups, and middle-income groups in rural and urban regions by 2022. This project timeline was from 2015 to 2022, but it is anticipated that, after its successful provision of housing, the government of India will increase the budget for the PMAY for both urban and rural areas in FY2023. As per the statistics of the Ministry of Housing and Urban Affairs (MHUA, 2022) [4], 15 million people in India have taken loans under this scheme and around 94% of the beneficiaries who were availed of this loan in the previous three years are successfully repaying their loans (National Housing Bank Report, 2021) [5]. However, PMAY encourages the use of eco-friendly and sustainable building materials and practices which offers multiple financing options to aid eligible beneficiaries in acquiring or

constructing affordable and environmentally sustainable homes which are listed as (see Figure 3):

1. The Credit-Linked Subsidy Scheme (CLSS)-Homeowners: Offers interest subsidies on home loans to eligible beneficiaries who wish to purchase or construct a house. Depending on the income category of the beneficiary and the loan amount, interest subsidies ranging from 2.30% to 6.50% can be obtained. For example, beneficiaries from the LIG and EWS categories can receive interest subsidies of up to 6.50% on loans of up to Rs. 6 lacs, while middle-income group (MIG) beneficiaries can receive interest subsidies of up to 4% on loans of up to Rs. 9 lac or Rs. 12 lacs. As of January 2022, over 2.93 crore beneficiaries have been sanctioned under the PMAY scheme, with more than 1.36 crore of them using the CLSS subsidy [4]. The government has earmarked a total of Rs. 70,000 crores for the CLSS scheme under PMAY, and has disbursed over Rs. 43,000 crores in interest subsidy to beneficiaries. The CLSS scheme has not only made housing more affordable for eligible beneficiaries, but has also facilitated the growth of India's housing sector [5].
2. Affordable Housing in Partnership (AHP)-Housing Developers: The PMAY AHP scheme aims to utilize the current network of public and private sector entities for the effective execution of low-cost housing projects. Eligible entities include central and state government agencies, PSUs, NGOs, cooperative societies, and private builders or developers. The scheme offers a central grant of up to Rs. 1.5 lacs per EWS house and up to Rs. 1.0 lacs per LIG house. Agencies can receive essential assistance of up to Rs. 1.5 lacs per house, while contributing at least 50% of the project cost. The PMAY AHP scheme has successfully provided affordable housing to many beneficiaries, with over 1.5 lacs houses sanctioned and over 1 lac completed and the government has allocated Rs. 8000 crores for the PMAY AHP scheme and has disbursed more than Rs. 4200 crores as central assistance to beneficiaries by January 2022 [1].
3. Beneficiary Led Construction (BLC)-Homeowners: Under this scheme, eligible beneficiaries can avail themselves of financial assistance from the government to construct their own houses. The assistance amount varies depending on the income category of the beneficiary. The beneficiary is expected to contribute a minimum of 10% of the project cost, and the remaining amount can be borrowed from banks or financial institutions. The loan amount can be repaid over a period of 15 years. The funding for the BLC component comes from the central government and is a part of the total allocation for PMAY. The government has allocated Rs. 30,000 crores for PMAY in the financial year 2021−2022, out of which a portion is earmarked for the BLC component [6].
4. Subsidy for Rehabilitation of Existing Slum Dwellers (SRESD)-Homeowners: Under this scheme, eligible beneficiaries living in slums can avail themselves of financial assistance from the government to upgrade their houses. The assistance amount varies depending on the type of construction and the location of the slum. Under the SRESD scheme, eligible beneficiaries are provided with a subsidy of up to Rs. 1 lac for the building of a new house or the improvement of their existing house. The subsidy amount varies depending on the location of the slum and the cost of construction. In addition, beneficiaries are also provided with a bank loan of up to Rs. 70,000 to meet the remaining cost of construction [8]. To be eligible for the SRESD scheme, the beneficiary must be a slum dweller, as per the definition of the Ministry of Housing and Urban Affairs (MoHUA), and must possess a valid Aadhaar card. The beneficiary must also have been a resident of the same slum for the past 1 year or more, and must not own a pucca house [5]. The funding for the SRESD scheme is shared between the central and state governments. The central government offers a subsidy of up to Rs. 1 lac per house, while the state government provides the remaining funds. The state government is also responsible for identifying eligible beneficiaries, providing land for the rehabilitation project, and ensuring the completion of the project within

the stipulated time frame. Figure 3 elaborates the financing framework of PMAY in detail.

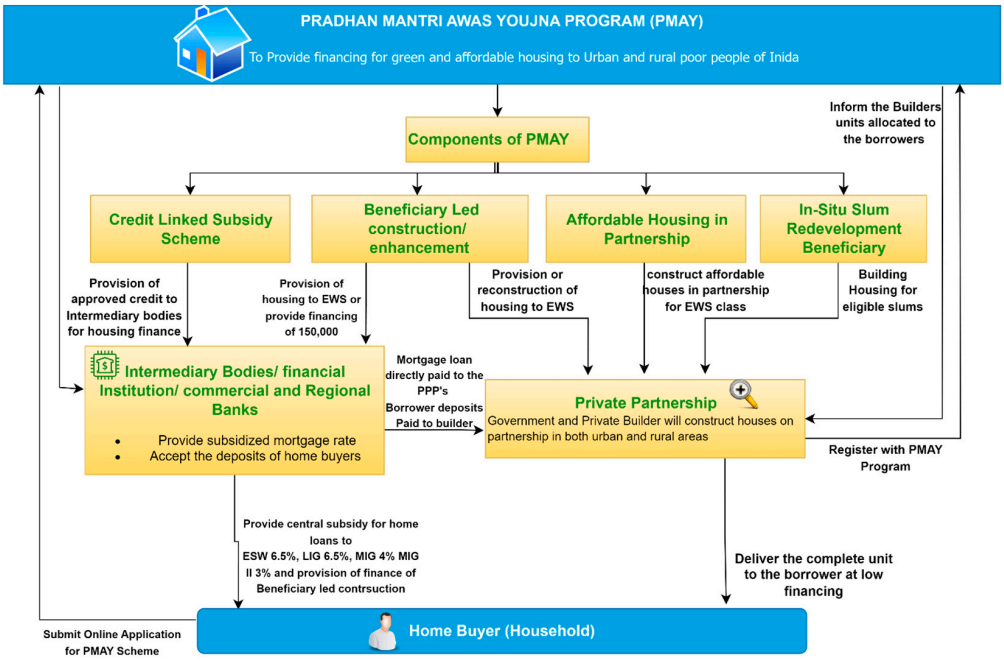

Figure 3. PMAY Financing Framework. Source: Author's compilation.

3.3.2. Case Study II: Naya Pakistan Housing Program (NPHP)

GAH in Pakistan

Adequate and inexpensive housing for low-income individuals has been an enduring challenge in Pakistan. Despite efforts in the public and private sectors, the issue persists due to high land and construction costs. Large-scale urbanization and illegal squatter settlements in major cities like Karachi, Lahore, Rawalpindi, Peshawar, and Quetta further exacerbate the issue [56,57]. Pakistan already has a backlog of nine million housing units, and only 300,000 are built annually [7]. In addition, Pakistan has relatively higher level of associated emissions despite of its lower per capita energy consumption. To address climate change, the National Climate Change Policy of Pakistan provides a framework for sustainable development. Green residents which maximizes natural light, ventilation, and insulation for energy efficiency, are gaining acceptance as a solution to energy demands and environmental degradation [58]. Hence, the high demand for housing and the growing impact of climate change in Pakistan has prompted the government to take action and propose initiatives at the state level. Several programs have been introduced to provide GAH, including the Naya Pakistan Housing Program, Green Housing Project, Eco Housing Project, Prime Minister Green Pakistan Program, and Low-Cost Housing Schemes. This study aims to explore the financing options and opportunities available for the Naya Pakistan Housing Program.

Financing Option for Naya Pakistan Housing Program

The Naya Pakistan Housing Scheme plan was launched in 2018 as an expression of strong commitment of Government to addressing the housing crisis in the country. The initiative seeks to serve as a model for future affordable housing projects and to evaluate the effectiveness of various financing mechanisms, construction technologies, and service delivery models by constructing 5 million housing units within 5 years from 2018 to 2023 through public private partnership [9,27]. To promote developers' participation, the government provides land at reduced rates and tax benefits, and also provides financial aid and subsidies to eligible beneficiaries to make house ownership more accessible. The program

also intends to promote economic growth and job opportunities through manufacturing, engineering, and building. The NPHP is being implemented with the cooperation of the province governments and with financial and technical support from international organizations and other countries. In order to increase the availability of GAH for low- and middle-income households, the Naya Pakistan Housing program offers a number of financial options. These possibilities include housing construction loans, zakat funds, markup subsidy programs, and housing credit guarantee programs (see Figure 4).

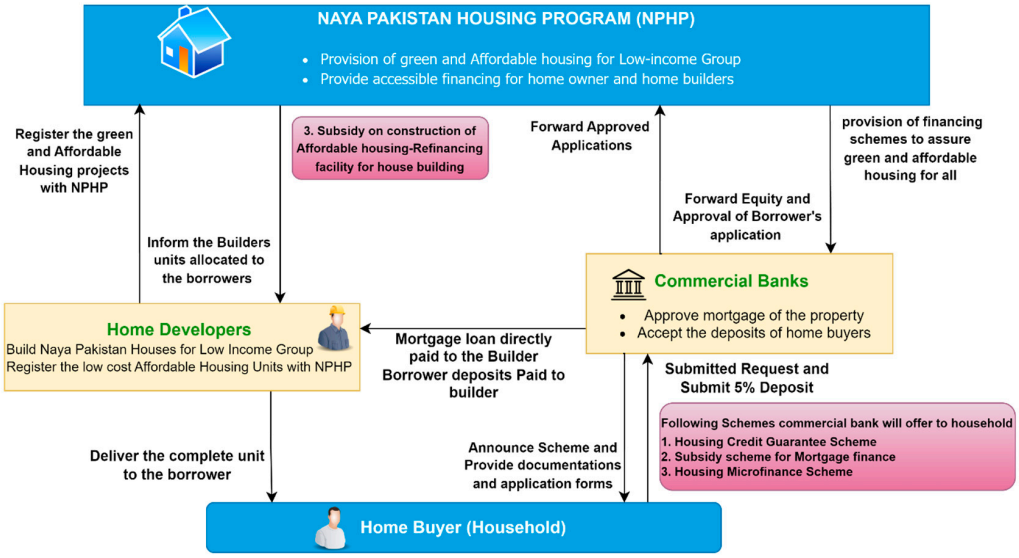

Figure 4. Naya Pakistan Housing Program Financing Framework. Source: Author's creation.

1. Housing Credit Guarantee Scheme-Lenders: A financing program initiated by the State Bank of Pakistan to support the construction of affordable housing in Pakistan. The program provides credit guarantees to banks and other lending institutions that provide loans for the construction or purchase of homes to eligible borrowers. Under the program, the State Bank of Pakistan provides guarantees of up to 40% of the principal amount of a loan, with a maximum guarantee of PKR 2.5 million per unit. The guarantees are provided on loans for the purchase, construction, or renovation of a home, with a maximum repayment period of 20 years [7]. The program's aim is to provide credit guarantees to banks and financial institutions for housing finance extended to low and middle-income borrowers.
2. Subsidy scheme for Mortgage Finance-Homeowners: A financing initiative under the Naya Pakistan Housing Program, aimed at providing affordable housing options to low-income families in Pakistan. The scheme offers subsidized interest rates on home loans, making it easier for individuals to finance the purchase or construction of a new house. The government provides a subsidy on the markup (interest) rate charged by banks on housing loans. The subsidy amount varies based on the size of the house and the borrower's income level. The subsidy can cover up to 90% of the markup rate, which can significantly reduce the overall cost of borrowing for the borrower [19].
3. The Housing Microfinance Scheme-Homeowners: A financing program initiated by the government of Pakistan to provide affordable housing options to low-income individuals who are unable to access traditional mortgage loans. Under this scheme, microfinance institutions provide loans to individuals or families for the construction, purchase or renovation of homes. The loans provided under this scheme are generally small and short term, with a maximum loan amount of up to USD 3100. The loan repayment period is usually between 3 and 7 years, with a maximum interest rate of 12% per annum. To be eligible for the Housing Microfinance Scheme, applicants must have a steady source of income and a good credit history. The loans are provided

without the requirement of collateral, making it easier for low-income individuals to access housing finance.

4. Refinance facility for House Building-Housing developers: A financing program introduced by the State Bank of Pakistan to promote affordable housing in the country. Under this program, banks and other financial institutions can obtain long-term funding at a subsidized markup rate from the State Bank of Pakistan and use it to finance low-cost housing projects. The financing is provided to individuals, builders, and developers who are interested in constructing, renovating, or purchasing a home. The highest loan payback length is 20 years, with loan amounts ranging from PKR 500,000 to PKR 5,000,000. The markup rate charged by the State Bank of Pakistan is currently 5% per annum, which is significantly lower than the market rate. The Refinance Facility for House Building is an important component of the Naya Pakistan Housing Program, which aims to offer affordable housing to the people of Pakistan.

3.3.3. Case Study III: Ashrayan Prakalpa: Ashrayan-2 Project GAH in Bangladesh

The shortage of affordable housing in Bangladesh is an important concern since the demand for urban housing is predicted to exceed 10.5 million units by 2030 as a consequence of increasing standards of living and population growth. A significant percentage of the country's population—roughly 67 million people—lives in metropolitan regions, and by 2030, half of all residents are predicted to reside in big cities [9]. The International Finance Corporation estimates a financing deficit of $59 billion for around 3.5 million residential units and, to satisfy this demand, house loans worth $2.5 billion need be given annually [20]. However, the country has a mortgage penetration rate of just 3%, which is far lower than that of India and wealthy nations [59]. Additionally, Bangladesh's per-capita CO2 emissions increased by 3.4% between 2015 and 2016, demonstrating a link between energy use and environmental deterioration [21]. The Government of Bangladesh has launched a number of initiatives to address these issues, including the Ashrayan Prakalpa, Bangladesh Rural Housing Project, Climate Resilient Elevation Project, and Apartment-Based Housing Project. These initiatives all are focused on addressing the shortage of sustainable and affordable housing (see Figure 5).

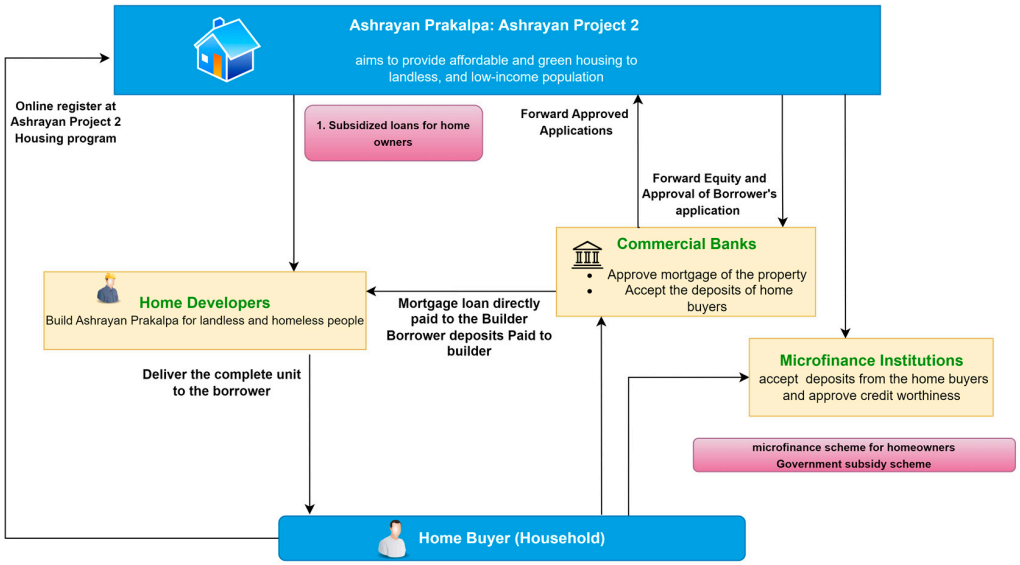

Figure 5. Financing Framework for Ahsrayan Prakalpa: Project 2. Source: Author's creation.

Financing Options for Ashrayan Prakalpa: Ashrayan-2 Project

The Government of Bangladesh has been striving since 1976 to provide housing inclusively to all income groups, particularly in rural regions that are susceptible to natural

catastrophes. The first initiative was launched by Bangladesh's first Prime Minister, Sheikh Mujibur Rehman, through the Ashrayan Prakalpa, which was divided into two phases. This study focused on the second phase, known as Ashrayan-2, aimed to provide affordable and green housing to landless and low-income people. The project was launched in 2019 and plans to provide housing for 5000 families across Bangladesh by 2021 [22]. The project uses several financing options for implementation, which are as follows:

1. Subsidized loans for housing-Homeowners: The project offers two types of loan schemes: (1) Soft loan: This loan is provided to ultra-poor families who cannot afford to repay regular loans. The loan amount is up to BDT 50,000, with a repayment period of 3 years and an interest rate of 2%. (2) Regular loan: This loan is provided to low-income households with a loan amount of up to BDT 100,000, with a repayment period of 5 years and an interest rate of 4%. Both loan schemes are available for the construction of new houses, repair and renovation of existing houses, and installation of necessary facilities like sanitation, water supply, and electricity.
2. Microfinance Schemes-Homeowners: Microfinance provides small loans, savings, and insurance services to low-income individuals or households who do not have access to traditional banking services to support homeowners to get their houses repaired in a timely fashion. Microfinance interest rates are typically lower than other traditional banking finance and in the small ranges, so it is easier for low-income groups to get benefit from these schemes
3. Government subsidy scheme- Ashrayan-2-Homeowners: The government subsidy is available to the beneficiaries of the Ashrayan-2 project who are homeless or landless and do not have the resources to build a house on their own. The government subsidy scheme covers a significant portion of the total cost of each house, typically up to 90% of the cost. The exact amount of the subsidy may vary depending on the location of the house and other factors. This scheme can help to improve the overall living conditions of the beneficiaries and reduce poverty in Bangladesh.

4. Results and Analysis

The case studies analysis revealed notable findings that suggested that, by June 2021, Pakistan had received 119,005 housing loan applications totaling $1.85 billion under the Naya Pakistan housing Program (NPHP). Along with this, 74,496 houses are now being built, 17,314 houses are in the planning stage, and 35,478 houses have previously been built and delivered under the NPHP [26]. NPHP generally uses a subsidy program to finance mortgages, although it has difficulties owing to a lack of funding, high mortgage rates, and banks' unwillingness to lend to borrowers with low incomes because of perceived risk (Interviewer 5). Additionally, LIGs and MIGs have limited accessibility to the program (Interviewer 3). While the project cost and housing stock supply are constrained in the Ashrayan-2 social housing initiative for Bangladesh. The housing program mainly relies on housing subsidies from the government, but mortgage rates are unaffordable for middle-class families (Interviewer 6). The Pradhan Mantri Awas Yojana (PMAY) program in India, on the other hand, has made tremendous progress in establishing a home financing market. The credit-linked subsidy scheme (CLSS) of India's PMAY program, which has been used by almost 4.3 million homebuyers (Ministry of Housing and Urban Affairs, 2022) [4], is one of the key factors contributing to its popularity. As a result of the CLSS's subsidy on mortgage interest, borrowing costs are lower and mortgages are more affordable. Despite these efforts, PMAY still confronts obstacles such as a limited scope, difficulty in determining the eligible beneficiaries, a slow approval process, expensive building expenses, and rising housing costs in some places owing to a shortage of available homes. Thus, the CLSS of PMAY is regarded as the most efficient financing option among the discussed housing programs, however, it might not be sufficient on its own to deliver green and cheap housing throughout South Asia. To solve the noted difficulties and achieve the intended goals, adjustments to the present finance models are required. These findings have been widely endorsed by financial analysts, policy makers, and household owners.

By following the previous results, in this section a financial framework has been proposed by thorough analysis of case studies and including valuable insights from investors, households, decision makers, and financial experts (see Figure 6). Housing market investors (Interviewee 1, 2) emphasize the significance of creating investment instruments that align the risk appetites and preferences of investors in order to attach finance for affordable housing projects. However, in South Asian economies (India, Pakistan, Bangladesh), there is a lack of direct investment tools specifically designed to meet the demand of GAH. While housing finance companies, mutual funds, and real estate investment funds have been established in each country to address housing schemes, a vital element is still lacking that would compel private investors to actively participate in the sizable housing market with profit-oriented housing schemes. Financial experts from Pakistan and India generally focus on the lack of microfinance institutions (Interviewee 3), particularly in rural regions, while financial analysts from Bangladesh (Interviewees 4 and 5) showed concern about the restricted availability of mortgage lending. They contend that the growing housing shortage is a result of the absence of microfinance institutions and the poor creditworthiness of low-income people. In order to attract investors and satisfy housing demand, they (Interviewees 2, 3, and 4) also stress the possible use of mutual equity in private partnerships and recommend that the government should offer insurance coverage for investments and green bonds [54,60]. In addition, households (Interviewees 5, 6, and 7) showed concerns about the high mortgage rates linked to financing green and affordable homes. They also note that green homes typically cost more. Households recommended introducing fixed loan and rent rates for housing as a solution. However, policy experts (Interviewees 8, 9, and 10) typically advocate for the government to implement a more sensible home loan system that is consistent with that of the United States and other developed economies. The only government agency offering housing loans in Bangladesh and Pakistan now levies interest rates of 8–9% in Bangladesh and 5% + KIBOR in Pakistan. However, policy experts suggest fixed-rate mortgages for low- and weaker-income groups, combined with subsidies for green infrastructure and insurance on green bonds for inexpensive, resilient, and green housing. India has some commercial organizations that assist with financing housing.

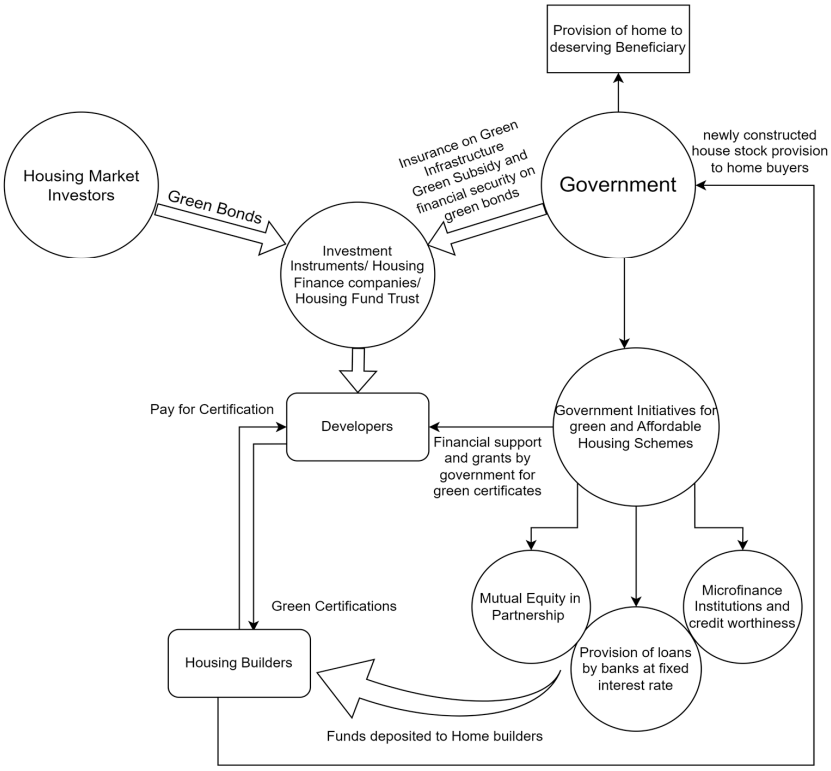

Figure 6. Conceptual financing framework for GAH. Source: Author's creation.

5. Conclusions and Discussion

For three South Asian economies, (India, Pakistan, Bangladesh), this research has conducted a comprehensive examination of financing options for the provision of GAH. This study also conducted interviews with pertinent stakeholders to validate the case studies that have been highlighted. The study's findings indicated that India has made progress towards building a robust home financing sector. In contrast, Pakistan and Bangladesh face the challenges of lack of funding and underdeveloped financial markets. The low-income credit subsidy of PMAY stands out as an effective alternative among the other case studies. However, insights gained from interviews with financial experts, homeowners, and real estate investors shed light on the financing problems involved in achieving GAH in South Asian economies. Particularly, it is noted that these nations lack private investment alternatives for funding GAH. Furthermore, development is hampered by the lack of green infrastructure and insurance for green bonds, regardless of the execution of housing programs under green initiatives. It is advised that, in order to overcome these obstacles, lessons be taken from effective programs like the GB-AHBA affordable housing program in Australia and the Low-Income Tax Credit program in the United States. As a result, the effectiveness of funding plans and solutions differs depending on the particulars of each nation, such as its financial, economic, and social stability. Governments must thus establish policies that are specifically suited to the particular circumstances and requirements of respective countries.

6. Policy Recommendations

- According to the Asian Development Bank (2022), by 2050, the population of developing nations is projected to expand by 100%, and their rising markets are predicted to undergo a construction boom. Despite this, housing shortages are being brought on by resource constraints in urban areas, and climate change is increasingly affecting South Asian economies. Several strategies have been put out to meet the goal of green and cheap housing, including:
- Better data collection and analysis can help policymakers understand the extent of the housing crisis and assess the impact of existing policies.
- Easing supply constraints by providing new developable land at low cost and upgrading public transportation systems can help lower housing prices, making it more affordable for low-income groups.
- Promoting the rental market and encouraging the participation of the private sector through financial incentives for the provision of affordable housing to the low-income group.
- Energy Building codes, green building materials certification, and green building rating systems can upscale sustainability practices in the housing sector.
- Community-based savings and loan schemes for upgrading settlements and the development of sustainable housing solutions.
- Regulatory and fiscal incentives, such as subsidies for green construction and retrofits, upgrading to energy-efficient appliances, and reducing taxes and import duties for green building materials to encourage the adoption of sustainable building practices.
- Expanding the availability of green mortgages for low-income, middle income, and female-headed household segments
- Subsidies on the town's development in rural areas and expansion in microfinancing.

7. Future Research Implications

Pakistan, India, and Bangladesh are among the top ten contributors to scientific research on green housing financing, contributing twice as much as developed countries. Despite this, there is a significant financial gap between the GAH markets that is yet to be bridged. The financial sector's credit is insufficient, and private investors only provided a small amount of finance for investments in green housing. However, governments and central banks must thus actively engage in luring private investors, and cooperation be-

tween big and small enterprises is crucial for addressing the gap in green financing. This study recommends that, low-income credit subsidies, energy-efficient mortgages, the development of microfinancing institutions, and public-private partnerships are all beneficial approaches for financing GAH in South Asian countries. Hence, future investigation is required to apply the empirical approach to validate the proposed financial framework of this study and also address the significance of international programs and their financial sources for other regions to address. The study is limited to the South Asian developing economies and their own housing programs financed by the governments. This study can be further expanded in the context of international program sources in Asia.

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