

A PROPOSED THEORETICAL MODEL FOR AN INTEGRATED AFFORDABLE HOUSING STRATEGY FOR LOW-INCOME GROUPS AND ITS APPLICABILITY IN EGYPT

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ABSTRACT

This research aims to explore and develop an integrated strategic model for affordable housing for low-income groups, by collecting and classifying successful global experiences and analyzing their applicability within the Egyptian situation. International experiences were studied and their impacts evaluated, leading to the development of a multi-dimensional model encompassing four key pillars: the economic dimension, the social dimension, the planning and design dimension, and the governmental policy dimension. The study adopted a qualitative analytical methodology through literature review, official and international reports, as well as brainstorming sessions with experts, real estate developers, and academics. A proposed model was formulated comprising over 146 global alternatives, categorized according to impact, applicability, responsible stakeholders, implementation mechanisms, and timeframe (short-, medium-, and long-term). The discussion focused on adapting these alternatives to the Egyptian context by analyzing the prevailing economic, social, urban, and institutional challenges. The study proposes a flexible and inclusive strategy built on principles of community participation, social equity, multi-stakeholder partnerships, and both environmental and economic sustainability.

KEYWORDS: Affordability - Affordable Housing Strategy - Low-Income Groups

نموذج نظري مقترح لاستراتيجية متكاملة للإسكان الميسر لفئات الدخل المنخفض وإمكانية تطبيقه في مصر

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الملخص

يهدف هذا البحث إلى استكشاف وتطوير نموذج استراتيجي متكامل للإسكان الميسر لفئات محدودة الدخل، من خلال جمع وتصنيف البدائل العالمية الناجحة، وتحليل مدى إمكانية تطبيقها في السياق المصري. تمت دراسة التجارب الدولية وتقييم أثرها، ثم تطوير نموذج متعدد المحاور يشمل أربعة أبعاد رئيسية: البعد الاقتصادي، البعد الاجتماعي، البعد التخطيطي والتصميم، وبعد السياسات الحكومية. اعتمد البحث على منهج نوعي تحليلي، من خلال مراجعة الأدبيات،

والتقارير الرسمية والدولية، بالإضافة إلى عقد جلسات عصف ذهني مع خبراء ومطورين عقاريين وأكاديميين. وتم إعداد نموذج مقترح تضمن ١٤٦ بديل عالمي، مصنف حسب الأثر، وقابلية التطبيق، والفاعلين المعنيين، وآلية التنفيذ والجدول الزمني (قصير، متوسط، طويل المدى). ركزت المناقشة على تكييف هذه البدائل مع الواقع المصري، من خلال تحليل التحديات الاقتصادية، والاجتماعية، والعمرانية، والمؤسسية، وتقديم تصور لاستراتيجية قابلة للتنفيذ تتسم بالمرونة والشمول، وترتكز على المشاركة المجتمعية والعدالة الاجتماعية، وتفعيل الشراكات المتعددة، وتحقيق الاستدامة البيئية والاقتصادية.

الكلمات المفتاحية : القدرة على تحمل التكاليف، استراتيجية الإسكان الميسور التكلفة، الفئات ذات الدخل المنخفض.

1. INTRODUCTION

Housing is a fundamental element in achieving a decent standard of living, as it provides safety and contributes to social development and community stability. With the rapid transformations occurring in cities—driven by population growth and internal migration—the affordable housing crisis has emerged as one of the most pressing challenges in developing countries, including Egypt. Providing adequate housing for low- and middle-income groups is essential to achieving social equity and urban sustainability [1].

International experiences have demonstrated that the success of affordable housing is not limited to the mere construction of housing units, but it requires a comprehensive approach encompassing economic, social, institutional, and planning dimensions. These requirements need effective partnerships between the public and private sectors, civil society, and financial institutions, all within a strategic framework based on understanding of the local context [2].

In Egypt, many efforts have been made over the past decades to provide housing for eligible groups, most notably through the “Social Housing” program. Despite these achievements, challenges remain due to the gap between supply and demand, rising construction costs, limited purchasing power, and the absence of comprehensive urban policies that support affordable housing in line with global standards [3].

Like many other developing countries, Egypt faces challenges in providing affordable housing, caused by rapid population growth, rising construction costs, and a shortage of land allocated for housing. This research aims to develop an integrated theoretical model to enhance the effectiveness of affordable housing strategies through the analysis of economic, social, planning, and governmental policy dimensions.

Most housing initiatives suffer from the absence of an integrated strategic framework that accounts for local specificities and balances economic, social, and environmental dimensions. Housing policies also face challenges such as fragmented responsibilities, weak coordination, and a lack of financing tools and governance mechanisms. Therefore, there is a pressing need for a comprehensive strategic model that draws on successful international experiences and adapts them to the Egyptian context.

This research aims to identify appropriate strategies for providing affordable housing for low-income groups by analyzing relevant literature and successful international experiences, then exploring their applicability in Egypt. It represents an academic contribution based on a critical analytical approach that highlights key issues such as housing finance, infrastructure development, the role of the private sector, and governmental policies. Finally proposing implementation scenarios that support a practical and integrated model.

2. METHODOLOGY AND LIMITATIONS.

This research adopts a qualitative analytical methodology aimed at proposing an integrated strategic model for affordable housing targeting low-income groups, and exploring its applicability within the Egyptian context. A combination of methodological approaches was employed, including the following:

- Model formulation:

- **Content Analysis of Literature and International Experiences:** An extensive review was conducted of plans, policies, and reports issued by international organizations (such as the United Nations, the World Bank, among others), in addition to academic literature, to

identify the most prominent strategic alternatives globally used to support affordable housing.

- **Delphi Method:** This method was applied through a structured questionnaire addressed to a selected panel of experts in housing, urban planning, and public policy. Its goal was to filter and classify the alternatives most associated with Egypt's local needs. The process was conducted over two rounds to achieve consensus on the most effective and possible alternatives.
- **Brainstorming:** to propose a methodology for implementing affordable housing strategies, starting with linking them to the local context by identifying the possibilities for implementation within each of the four axes of the proposed model.

-Model analysis:

- **SWOT Analysis:** Strengths, Weaknesses, Opportunities, and Threats were assessed to evaluate the proposed strategic model and to identify success opportunities and potential implementation challenges in Egypt.
- **Scenario Analysis:** A set of time-based scenarios (short-, medium-, and long-term) was developed to assess the flexibility and resilience of the proposed alternatives under expected economic and social changes in Egypt.
- **Stakeholder Analysis:** Key actors—including governmental entities, private sector players, and civil society organizations—were identified, and their potential roles and collaboration challenges in implementing the strategy were analyzed.

- **The Implementation Strategy phase:** represents the transition from model analysis to practical application. It outlines context-specific scenarios, stakeholder roles, and actionable steps for phased execution of the proposed housing strategy in Egypt.

- **The Evaluation & Adaptation phase:** ensures continuous assessment of the strategy's performance through defined KPIs. It enables feedback-driven refinement and policy adjustments to enhance long-term effectiveness and contextual responsiveness.

These tools were combined to develop a comprehensive model that reflects the real dynamics of Egypt's housing sector, while taking into account local economic, social, and planning conditions. As illustrated in **Fig. 1**, the methodology applied in this research follows a structured multi-phase approach. It begins with model formulation through literature review, Delphi-based expert validation, and brainstorming sessions. This is followed by a model analysis phase that includes SWOT analysis, stakeholder evaluation, scenario building, and KPI definition. These steps collectively guide the transition into strategy implementation, ensuring that the proposed model is evidence-based, context-sensitive, and adaptable to evolving housing challenges in Egypt.

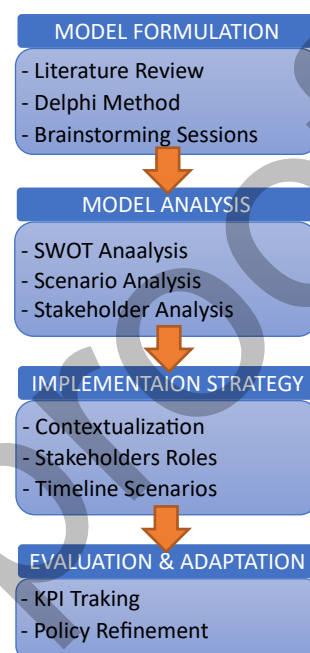


Fig. 1 Steps of research methodology

3. LITERATURE AND TECHNIQUES.

3.1. Affordable Housing and its Challenges

The conceptual framework for affordable housing in this research is based on a multidimensional perspective that links economic, social, and environmental aspects. It is based on the principle of the “right to adequate housing” as recommended by sustainable development charters [4]. The concept affordability of housing cost, while meeting standards of quality, location, and sustainability.

Affordable housing is one of the most pressing urban challenges in developing countries. It is defined as the provision of housing units at a cost appropriate for low- and middle-income groups, without any effect on standards of quality and essential services [5]. Although the definition

varies across contexts, it is globally recognized as a key instrument for achieving social equity and urban sustainability [6].

Developing countries, including Egypt, face challenges in preserve affordable housing due to many difficulties include rising land and construction material costs, limited financing, and bureaucratic complexities [7]. In addition, rapid population growth and unplanned urban expansion further expand the gap between housing supply and demand, worsening the housing crisis [8].

Additionally, the lack of integration between housing policies and local development strategies, along with the limited involvement of the private sector and civil society in providing innovative solutions, reinforces reliance on traditional government-led models, which often fail to meet the needs of the targeted population groups [9].

In Egypt, there is an urgent need for a comprehensive affordable housing strategy based on principles of sustainability and community participation, considering local characteristics and enhancing collaboration between governmental and non-governmental actors. This requires aligning housing policies with financial and tax systems to address implementation shortcomings.

Globally, affordable housing strategies have varied according to each country's economic, social, financial, and institutional capacities. Financing remains one of the major challenges, particularly in developing economies, where funding models differ based on the state's ability to bear costs and share risks with the private sector. While such policies offer benefits such as improving quality of life and reducing economic disparities, some models continue fighting to achieve financial sustainability and providing the necessary infrastructure.

International experiences reflect the diversity of affordable housing policies, formed by varying economic and institutional contexts. In Brazil, the "Minha Casa Minha Vida" program achieved success by incentivizing the private sector through tax benefits and providing subsidized land [10]. In South Africa, the approach relied on government support and community participation to promote housing equity [11]. In Germany, the focus was on supporting housing cooperatives, regulating the rental market, and promoting cooperative housing finance [12, 13].

The comparison of international experiences highlights the importance of adopting an integrated strategy that includes economic incentives, regulatory frameworks, innovative financing mechanisms, and sustainable planning. This highlights the need to adapt global models to the specific characteristics of the Egyptian context—such as high population growth, a large youth demographic, and the gap between housing supply and demand.

In this context, the research proposes a flexible applied framework that categorizes possible policies and alternatives, aligning them with Egypt's development priorities. The model emphasizes the engagement of multiple stakeholders and the enhancement of governance mechanisms to ensure the sustainability of implementation.

3.2. Global Strategies for Affordable Housing

This section adopts a synthetic rather than selective approach, aiming to extract applicable strategic alternatives from a wide range of global experiences. Rather than focusing on a few countries, the analysis identifies recurring patterns and successful practices across multiple contexts to build a robust and inclusive framework suitable for Egypt's unique challenges.

Supporting and promoting local products contributes to economic development by improving product quality and increasing competitiveness both locally and globally [14]. "Habitat for Humanity" provides grant programs to support the construction of affordable housing worldwide.

Non-integrated planning aims to separate residential areas from service and industrial uses in order to create an organized living environment, particularly in rural areas and small towns [15].

Social planning, on the other hand, focuses on enhancing community interaction by designing neighborhoods that include public spaces and social facilities [16]. Non-governmental organizations also play a vital role in housing support through financial assistance and advisory services [17].

3.2.1. Asian and Australian Experiences

In Bangladesh, the "Grameen Bank" program is considered one of the most successful models in support small and medium enterprises (SME Support). It has provided microloans to women to start small businesses, contributing to improved household income and enhancing women's financial empowerment [18].

In India, economically, the "Skill India" program supported youth through professional and technical training, while the "Pradhan Mantri Awas Yojana" provided direct grants and subsidized loans to low-income households [19].

From a planning perspective, Phased Development Planning was implemented to perform housing projects in stages, and the "Smart Cities Mission" introduced Participatory Planning by involving citizens in the planning process. The government also adopted a Full Ownership model to promote housing security, along with a Long-term Lease system under the "Affordable Rental Housing Complexes" program, enabling the use of properties while ensuring renter rights [20].

The "Green Building Materials" initiative focused on using sustainable materials such as fly ash to promote low-cost construction, along with the adoption of Prefabricated Panel Construction to reduce time and waste in housing projects. Financially, Financial Inclusion was promoted through the "Pradhan Mantri Jan Dhan Yojana" program to expand access to financial services. Additionally, Subsidized Housing Savings Programs, such as the "Sustainable Savings Scheme", were activated to support low-income families [21].

Socially, the Artisan Training strategy helped train workers and increase their employability in the housing sector. Furthermore, Subsidized Land Pricing provided symbolic land prices to developers committed to building low-income housing under the "Pradhan Mantri Awas Yojana".

At the policy level, the real estate market was regulated through Open Data for Real Estate Market initiatives, including digital platforms that enhanced market transparency [22].

In China, the government has successfully reduced construction costs by adopting Modular Construction and modern technologies in public projects. From a planning perspective, High-Density Planning Strategy was implemented in Hong Kong to increase population density, alongside Centralized Planning to ensure alignment with national policies. Technologies such as 3D printing, Off-site Construction, and Prefabricated Panel Construction were employed to enhance efficiency. In densely populated areas, Hong Kong adopted Micro-Housing Design through the "Micro Apartments" model to optimize space utilization [23,24].

In South Korea, the government supported affordable housing economically by providing subsidized land and direct funding through targeted programs aimed at constructing housing units for low-income populations. From a planning perspective, Smart Housing Design was implemented through the use of smart home technologies and modern applications to reduce energy consumption and enhance quality of life [25].

In Japan, Densification in Tokyo has contributed to the promotion of affordable housing, alongside the adoption of Transit-Oriented Development (TOD) to connect neighborhoods with public transportation networks. The "Share Houses" model is used as a form of Shared Housing, aimed at reducing costs and fostering social interaction. Flexible Housing Design was implemented to adapt living spaces to the changing needs of residents. Additionally, the government adopted Housing Security policies to provide legal protection and disaster insurance programs [26, 27].

In Singapore, underutilized land was converted into affordable housing projects, accompanied by the implementation of Smart Neighborhood Planning to develop residential communities using modern technologies. Smart Management systems were also applied, providing real-time analytics to enhance the efficiency of public utilities. Development efforts included the Digitalization of Transport Systems, through the use of digital payment methods and advanced booking platforms. At the policy level, E-permitting Systems were adopted via the "CORENET" platform to streamline licensing procedures and reduce administrative corruption [28].

In the United Arab Emirates, Smart Security and Access Systems were implemented in Dubai to enhance the safety of residential communities. 3D Printing Construction was also utilized to reduce construction costs and accelerate project delivery. At the governmental policy level,

Simplified Property Registration was adopted through the "Tasjeel Centers" model, which integrates property registration and administrative services in a single location to minimize bureaucracy [29].

In Australia, Ecological Planning was implemented by integrating environmental standards into neighborhood design and enhancing green spaces within urban areas. The government adopted Outsourced Management by contracting private companies to improve the efficiency of housing project administration. Modular Construction was also used to deliver affordable housing units quickly and efficiently. Socially, Social Infrastructure Development was encouraged through the creation of community facilities to improve quality of life. At the policy level, the government provided Direct Financial Subsidies for Housing Projects through public funding mechanisms [30].

3.2.2. African Experiences.

In several African cities, Legal Land Tenure strategies were implemented through land registration to promote social and economic stability. Local Capacity Building also played a key role in empowering communities to manage housing projects and achieve effective local development. To reduce costs, Customs Exemptions for Building Material were introduced through tariff exemptions aimed at supporting affordable housing initiatives [31, 32].

In Nigeria, the "Nigerian Financial Inclusion Strategy" aims to promote Financial Inclusion by expanding access to financial services for women and low-income groups in rural areas [33].

In South Africa, the skills training program contributed to improving employment opportunities for vulnerable groups. Local Security Committees supported community sharing in promoting public safety, while Community Partnership initiatives focused on enhancing housing development and social services. The Local Economic Development and Cooperative strategy was implemented through the "Local Enterprise Development" program, empowering communities through small businesses and cooperatives. Additionally, Community Education and Capacity Building supported the development of community skills in housing and development issues, complemented by Vocational Training programs that improved employment prospects and increased the capacity to own or rent housing [34, 35].

In Kenya, low-income households were supported through Housing Savings Funds under the "Housing Finance Group" system, alongside the use of Blended Finance to develop affordable housing projects. From a planning perspective, compressed earth blocks made from local soil were utilized to reduce construction costs and carbon emissions. Additionally, Community Participation in Planning was implemented to ensure that housing solutions meet residents' needs and promote inclusivity [36, 37].

In Ethiopia, Planned Urban Expansion was successfully implemented in cities such as Addis Ababa [38]. In Rwanda, the government adopted Transparent Land Allocation through a digital registration system that allows residents and investors to register and track property ownership electronically. This enhanced investor confidence and reduced land-related disputes [39].

3.2.3. European Experiences.

In some European regions, Long-Term Leasing was implemented to enable families to access affordable housing through extended lease agreements [40]. Community Land Trusts were also adopted to manage shared properties and maintain affordable housing prices. In Scandinavian countries, governments directly oversee housing projects through Direct Government Management to ensure fair housing distribution [41].

Sustainability strategies included Shared Mobility to reduce environmental impact and Inclusive Education to ensure access to education for all social groups [42]. Policies also emphasized Digital Inclusion by expanding internet access for underserved populations, and Organizing Community Events to strengthen social cohesion. Moreover, Social Support Programs were introduced to provide financial assistance and services, while Education and Awareness Programs aimed to raise awareness of housing rights and resource management [43].

The United Kingdom has implemented various models of Public-Private Partnership to support affordable housing programs. These include the construction and allocation of subsidized housing units for low-income groups through government-led partnerships. Local Planning has

been adopted in some rural areas, allowing local communities to make decisions related to neighborhood planning, thereby reinforcing local identity and priorities. Shared Ownership Systems have been used to reduce housing ownership costs through shared equity between individuals and government or private entities. Under the Shared Ownership model, individuals own a portion of the property while the remaining share is retained by another entity, reducing the financial burden of full ownership. The Public Housing system is also in place to offer subsidized rental units owned by the government and managed by local councils under the "Council Housing" framework [44,45].

Digitalization of Transport Systems was implemented through the "Oyster" card system, which integrates various modes of transportation under a unified electronic payment platform. Access to Public Services was strengthened to promote social equity and ensure all citizens can benefit from essential services. Community Partnership initiatives, such as "Community Development Trusts", empowered residents to actively participate in the development of their neighborhoods.

The Housing Associations Establishment played a central role in managing and maintaining residential properties. In addition, Public-Private Partnership Incentives and the Development of Incentive Policies were introduced to encourage private sector involvement in affordable housing projects. Governance and Oversight Mechanisms were applied through independent bodies like "Homes England", which monitors policy implementation and ensures compliance with national standards [46].

In Germany, the government provides indirect financing mechanisms to support homeownership and rental housing. Participatory Planning is employed to engage residents in urban planning decisions and strengthen their sense of community. Affordable Rental is a key tool for offering low-cost housing units, either through direct government subsidies or long-term lease agreements. Energy-Efficient Design has also been adopted, utilizing insulation technologies and smart heating systems to reduce energy consumption and improve living comfort. In Berlin, policies for Protecting Tenants from Rent Increase were enforced to shield low-income households from volatile rent prices [13, 47].

In Denmark, the Mixed-Use Planning model was adopted in Copenhagen, integrating residential, commercial, and public spaces within cohesive urban environments. Active Transportation Promotion was also advanced through the enhancement of infrastructure for walking and cycling [48].

In Spain, the city of Barcelona adopted the Superblocks model, which integrates housing with public facilities and services within a unified urban block to enhance social life and reduce car dependency.

The city also implemented Improve Old Neighborhoods strategies to increase property value and foster social integration, along with Support for Families Facing Eviction through legal and financial programs designed to protect vulnerable households from the consequences of economic crises [49, 50].

In Sweden, Sustainable Neighborhood Planning and Ecological Planning Strategy were adopted to develop environmentally conscious neighborhoods that minimize ecological impact, as exemplified in Stockholm. Cooperative Ownership was implemented through shared ownership models among residents, alongside Flexible Housing Design using movable partitions and Sustainable Housing Design incorporating eco-friendly materials and technologies. Public Transportation Development was also advanced to integrate seamlessly with residential areas, while Avoiding Social Segregation was prioritized by offering diverse housing options to promote social interaction. Policy measures further included Income Redistribution through tax relief and subsidies, in addition to Community Education and Capacity Building programs such as the "Adult Education Initiative" to enhance civic participation and employment opportunities [51, 52].

In Norway, the Cooperative Housing system is widely adopted, whereby housing units are collectively owned and managed within cooperatives. This structure grants members shared control over property decisions, strengthens social cohesion, and helps reduce housing costs. Additionally, Electric Mobility systems have been promoted to reduce carbon emissions, alongside the

implementation of Tax Incentives for Eco-Friendly Vehicles, offering tax reductions and other incentives to encourage the shift toward sustainable transportation [53].

In Italy, the Adaptive Reuse and Retrofitting approach was adopted to convert old buildings into affordable housing units, thereby promoting sustainability. Additionally, the strategy of Cultural Heritage and Identity Preservation was implemented to strengthen cultural belonging within residential communities [54].

In France, Incorporating Green Spaces into residential neighborhoods has been a key strategy to improve quality of life and enhance environmental sustainability. Efforts have also been directed toward the Legal Framework Improvement for Social Housing, aimed at ensuring transparency and long-term sustainability in the implementation of social housing projects [55].

In Finland, Providing Social Services was facilitated through “One-Stop-Shop” centers located within residential neighborhoods, improving access to healthcare, education, and social services [56].

In the Netherlands, a Public Transport Incentive was implemented by reducing ticket prices, offering tax incentives, and enhancing service quality. Additionally, Protecting Tenants from Rent Increase measures were applied in Amsterdam to regulate rent prices and ensure housing affordability [47].

3.2.4. Latin American experiences.

In Brazil, Financial Incentives and Tax Reductions were implemented under the "Minha Casa, Minha Vida" program, providing exemptions and financial facilitation for developers to construct affordable housing units. The program also utilized Housing Bonds as a financing mechanism. The "Bolsa Família" program was successful in reducing poverty through conditional cash transfers linked to education and healthcare. From a planning perspective, Local Planning and Self-Built Housing Projects were applied in the "Favela Upgrading" initiative, involving local municipalities and communities. Additionally, Participatory Community Management was adopted to foster a sense of ownership and responsibility among residents [57, 58].

Community Development was activated through sustainable programs aimed at improving living and economic conditions. Community Participation in Decision-Making was also adopted to strengthen transparency and social cohesion. The Supporting Vulnerable Groups strategy was introduced to ensure access to affordable housing and essential services. Additionally, Community Empowerment and Participation was promoted through "Participatory Budgeting," enabling communities to influence local development decisions. The implementation of Local Economic Development and Cooperative strategies encouraged grassroots partnerships, while Cash Assistance Programs provided direct financial support to low-income families to help cover housing costs and improve their economic conditions [59].

In Mexico, Housing Bonds were introduced to improve housing infrastructure. Self-Help Housing was implemented with support from the government and non-governmental organizations to reduce costs and promote self-empowerment. A 3D-printed social housing project was executed by ICON and New Story, delivering low-cost homes at high speed. Additionally, Self-Build Training programs were offered to equip individuals with the skills needed to construct their own homes, thereby reducing costs and enhancing personal autonomy (SBHI, 2021).

In Colombia, the Urban Renewal strategy was adopted to improve infrastructure and services while preserving the cultural and architectural character of neighborhoods. Community Monitoring Committees were also activated to oversee the implementation of housing projects and ensure transparency and efficiency [60].

3.2.5. North American Experiences.

In the United States, the "Federal Housing Administration" facilitates financing by providing guarantees for mortgage loans on affordable housing. Crowdfunding Platforms, such as "Fundrise", are also used to finance community housing projects in low-income areas [61]. The U.S. Department of Housing and Urban Development implements multiple rental support programs, while Community Policing has been adopted to strengthen neighborhood safety through collaboration between law enforcement and residents. Crime Prevention through Environmental

Design (CPTED) strategies have been implemented by improving public lighting and reducing abandoned spaces. The Rent-to-Own model was also introduced to offer renters the option to purchase their housing units over time. Furthermore, Public-Private Partnership Housing initiatives, such as the "Partnerships for Affordable Housing" program, enable the provision of affordable units through shared resources and risk distribution [62].

In many residential communities across the United States, Self-Management has been implemented through "Homeowners Associations (HOA)", where residents take responsibility for maintenance and security, thereby strengthening community cohesion. Modular Construction has been used to deliver affordable housing with high cost-efficiency, while Shared Mobility options, such as Uber and Lyft, have been promoted to reduce urban congestion. Fair Housing policies were adopted to ensure equal housing rights for all citizens, alongside initiatives to promote Urban Diversity in residential areas. Moreover, Community Initiatives Support has been provided through the funding of local programs such as the "Nextdoor" platform, which facilitates neighborhood communication and community participation [63].

In the United States, Financial Counseling is offered to help families manage their budgets and secure appropriate housing. This is complemented by Financial Literacy Programs, which educate individuals on financial planning and improve financial capability, particularly among low-income groups. Tax Incentives for Developers, such as the "Low-Income Housing Tax Credit (LIHTC)", are granted in exchange for the construction of affordable housing units. Additionally, Incentivizing Development of Underutilized Land is promoted through programs like "Rehabilitate and Redevelop", which encourage the transformation of abandoned buildings and underutilized land into affordable housing projects with financial support [64].

In Canada, the "Canada Mortgage and Housing Corporation" provides subsidized loans to support low-income households. Flexible Neighborhood Planning has been adopted to adapt to the changing needs of residents and promote sustainable development. Public-Private Partnership Management is also utilized to ensure efficient administration of housing projects, along with Diverse Housing Design, which offers varied options in size and layout to promote social equity. Integrated Transport Systems were implemented to streamline mobility through a unified card system covering all modes of public transportation. Additionally, Providing Social Services within residential neighborhoods enhances quality of life by improving access to essential services [65].

Community Consultation has been institutionalized in housing and public policy decisions through public sessions and workshops that foster transparency and social inclusion. Income Redistribution is implemented through progressive taxation on high-income earners, with revenues redirected to support affordable housing for low-income populations. Policy efforts focus on ensuring Inclusive Housing that accommodates all segments of society, particularly vulnerable groups and minorities. Cultural and Linguistic Inclusion is promoted to provide an inclusive educational and community environment.

Additionally, Local Leadership Training aims to empower local leaders to actively engage in housing development projects and strengthen community-based governance [66].

3.3. Key Cross-Learned Lessons from Global Experiences

Although the strategic alternatives in this research were derived from a broad set of international experiences rather than a limited number of case studies, several cross-cutting lessons emerged through comparative analysis. These insights contributed to refining the proposed model and aligning it with the specific socio-economic and institutional realities of Egypt. The key lessons can be summarized as follows:

No single model fits all: Each country developed its affordable housing strategy based on its unique urban, economic, and institutional contexts. This highlights the necessity of customizing strategies for Egypt rather than replicating models wholesale.

Integration is critical: Successful programs—whether in Brazil, India, or Germany—demonstrated that housing policies are most effective when integrated with employment, transportation, education, and health policies, emphasizing a multi-sectoral approach.

Community participation enhances sustainability: Initiatives that incorporated community engagement mechanisms, such as participatory planning, monitoring

committees, and co-operative housing models, achieved greater long-term social cohesion and local ownership.

Public-private partnerships (PPPs) are essential but require strong governance: While PPPs can mobilize financing and innovation, their success depends on **clear** legal frameworks, land allocation mechanisms, and incentive systems—as seen in Singapore, Mexico, and South Africa.

Technological innovation supports cost-efficiency but requires contextual readiness: Countries adopting modular construction or 3D printing achieved cost reductions, yet successful deployment depends on local technical capacity, skilled labor, and infrastructure readiness.

These distilled lessons have been systematically incorporated into the structure and implementation scenarios of the proposed model, ensuring that it is not only theoretically sound but also practically responsive to Egypt’s housing needs.

4. PROPOSED MODEL

To validate and structure the proposed model, a two-round Delphi process was conducted with a panel of 12 experts, including academic researchers (4), public sector housing specialists (4), and private sector developers and consultants (4). Experts were selected based on their experience in housing policy, urban planning, and development economics.

In Round 1, experts evaluated a preliminary list of 170 strategic alternatives drawn from global practices, assessing them based on relevance to Egypt, feasibility, and expected impact. Each alternative was scored on a Likert scale (1 to 5). Alternatives that received consistently low scores (below a mean threshold of 2.5) or were considered infeasible within the local institutional context were excluded.



Fig. 2 Main four pillars of the proposed model

In Round 2, experts reached consensus on the classification of the remaining 146 alternatives under four main pillars and 25 sub-pillars **Fig. 2** shows the four main pillars. The final structure presented in **Table 1** reflects this consensus and was cross-validated with findings from brainstorming sessions and stakeholder consultations.

Table 1. The structure of the proposed model

1. Economic Pillar		
A. Economic Empowerment	B. Supporting Housing Production	C. Poverty Reduction
-SME Support -Vocational and Technical Training -Develop local product programs -Financial Inclusion Strategy	-Financial and Tax Incentives -Public-Private Partnership -Direct Government Support -Subsidized Loan -Cost Reduction Strategy -Subsidized Land	-Cash Transfer Programs -Employment -Skills Development
D. Financing		
-Housing Savings Funds -Crowdfunding -Housing Bonds -Subsidized Mortgage Loans -Direct Government Funding -Indirect Government Funding -Government Rental Assistance -Affordable housing units -NGO Grants -Blended Finance		
2. Planning and Design Pillar		
E. Safety and Security	F. Planning Orientation	G. Planning Mechanisms
- Electronic Security Systems -Community Police System -Crime Prevention through Environmental Design - CPTED)	-Urban Renewal -Densification -Providing new vacant land -Unused urban land -Planned Urban Expansion	-Participatory Planning -Centralized Planning -Local Planning
H. Land Tenure	I. Housing Delivery Systems	J. Housing Tenure
-Legal Land Tenure -Long-Term Leasing -Shared Ownership Systems	-Public Housing -Cooperative Housing -Self-help housing -Shared Housing -Public-Private Partnership Housing -NGO-Driven Housing Support	-Full Ownership -Affordable Rental -Rent-to-Own -Long-term Lease -Shared Ownership -Community Land Trust -Cooperative Ownership
K. Neighborhood Planning Approaches	L. Housing Design	M. Enhancing Quality of Life
-Mixed-Use Planning -Unmixed-Use Planning -Sustainable Neighborhood Planning -Flexible Neighborhood Planning Strategy -High-Density Planning Strategy -Smart Neighborhood Planning -Ecological Planning -Ecological Planning Strategy -Transit-Oriented Development – TOD -Phased Development Planning -Social Planning	-Flexible Housing Design -Fixed Design -Diverse Housing Design -Sustainable Housing Design -Micro-Housing Design -Smart Housing Design -Adaptive Reuse and Retrofitting -Energy-Efficient Design	-Incorporating Green Spaces -Providing Social Services -Improve old neighborhoods -Community Development -Public Transport Incentives -Digitalization of Transport Systems -Shared Mobility -Tax Incentives for Eco-Friendly Vehicles
N. Management and Operation	O. Sustainable Mobility and Transportation	P. Construction Technologies
-Direct Government Management -Outsourced Management -Self-Management -Smart Management -Public-Private Partnership Management -Participatory Community Management	-Public Transportation Development -Active Transportation Promotion -Electric Mobility Transportation -Integrated Transport Systems	-Sustainable Materials Construction -Modern Construction Techniques -Local Materials Utilization -3D Printing Construction -Modular Construction -Prefabricated Panel Construction
3. Social Pillar		
Q. Community Participation	R. Promoting Social Justice	S. social security
-Community Participation in Decision-Making -Community Participation in Planning -Community Monitoring Committees -Community Consultation -Local Security Committees	-Fair Housing -Avoiding Social Segregation -Protecting Tenants from Rent Increases -Income Redistribution -Access to Public Services	-Housing Security -Support for Families Facing Eviction -Social Support Programs
T. Social Inclusion	U. Community Building	V. Strengthening Community Training
-Supporting Vulnerable Groups -Inclusive Housing -Social Inclusion -Urban Diversity -Financial Inclusion -Inclusive Education -Cultural and Linguistic Inclusion -Community Partnership -Digital Inclusion	-Community Empowerment and Participation -Social Infrastructure Development -Local Economic Development and Cooperative -Community Education and Capacity Building -Cultural Heritage and Identity Preservation -Community Initiatives Support -Housing Associations Establishment -Organizing Community Events	-Vocational Training -Artisan Training -Local Leadership Training -Self-Build Training -Local Capacity Building -Financial Literacy Programs -Education and Awareness Programs

Table 1 (cont)- The structure of the proposed model

W. Social Protection	
-Cash Assistance	
-Financial Counseling	
-Subsidized Housing Savings Programs	
4. Government Policy Pillar	
X. Government Incentives	Y. Regulatory Practice Improvement
-Tax Incentives for Developers	-Legal Framework Improvement for Social Housing
-Public-Private Partnership Incentives	-Development of Incentive Policies
-Subsidized Land Pricing	-E-permitting Systems
-Direct Financial Subsidies for Housing Projects	-Transparent Land Allocation
-Customs Exemptions for Building Materials	-Simplified Property Registration
	-Incentivizing Development of Underutilized Land
	-Governance and Oversight Mechanisms
	-Open Data for Real Estate Market

4.1. Results Analysis

4.1.1. Effectiveness of the Theoretical Model

The proposed model demonstrates the potential for achieving strategic integration across the four main pillars economic, planning and design, social, and governmental policy.

The model's effectiveness is further enhanced by conducting field studies to evaluate the impact of these pillars in targeted urban areas, thus increasing the model's credibility and applicability in real-world contexts

4.1.2. Evaluation of Alternative Success Based on Global Experiences

Globally Successful Alternatives: These include approaches such as Transit-Oriented Development (TOD), financial and tax incentives for real estate developers, government-supported social housing in partnership with the private sector, and sustainable urban development initiatives. These strategies have shown broad effectiveness in enhancing affordability and urban integration.

Alternatives Facing Implementation Challenges: Some approaches face limitations in specific contexts, such as Self-Help Housing, which often faces difficulties due to lack of funding and logistical support; Shared Ownership, which can be prevented by complex legal frameworks; and Shared Housing, which may not align with cultural norms in certain societies.

4.1.3. Linking Alternatives to Local and Global Experiences

- **Economic Pillar:** While public-private financing is considered an ideal approach, experience has shown that the lack of adequate financial incentives for developers may slow down project implementation. Therefore, new incentive policies, such as tax exemptions and subsidized loans, are needed to encourage private sector participation.
- **Planning and Design Pillar:** Urban planning for affordable housing requires a balance between population density and infrastructure capacity. However, previous studies reveal that many affordable housing projects suffer from geographical isolation from employment centers and essential services. Strategies based on the concept of "integrated cities" should be adopted to address this gap.
- **Social Pillar:** Affordable housing is not just about providing low-cost units, it must also promote social cohesion. Nevertheless, this aspect is often overlooked, leading to weak community integration. Cooperative housing models and community-based planning should be strengthened to enhance social inclusion.
- **Government Policy Pillar:** Despite the central role governments play in providing affordable housing, excessive bureaucracy in countries like Egypt significantly delays implementation. Simplifying government procedures through digital service platforms and adopting flexible urban planning systems can greatly improve execution efficiency.

4.1.4. Challenges Associated with the Model

While the proposed model emphasizes the importance of integrating the four pillars, practical implementation requires a clear temporal sequencing to ensure effectiveness. For example, the economic pillar faces obstacles such as high financing costs, whereas the social pillar demands proactive measures to address social cohesion challenges in newly developed areas.

4.1.5. Importance of Socio-Technical Integration

One of the model’s core strengths lies in incorporating advanced technologies, such as 3D printing and artificial intelligence, to design flexible, low-cost housing units. However, the success of these innovations remains contingent upon the availability of proper infrastructure and training programs that enable their effective deployment.

4.1.6. Key Extracted Indicators

Based on the analysis of global experiences reviewed in this study, success rates of key performance indicators can be estimated to assess the effectiveness of the implemented strategies.

These indicators provide a quantitative basis for comparing international practices and identifying best-performing approaches, as summarized in the following **Table 2**:

Table 2. Indicators and success rates global experiences

Indicator	Value (%)	Calculation Method
Success Rate of Economic Empowerment Programs	72	Analysis of Success Rates of Loan and Economic Support Programs in Target Countries
Impact of Housing Production Support on Real Estate Prices	58	Comparison of Real Estate Prices Before and After the Implementation of Housing Production Support Policies
Poverty Reduction Rate Attributable to Housing Programs	65	Measuring the Reduction in Poverty Rates Following the Implementation of Affordable Housing Programs
Effectiveness of Financing Systems in Increasing Homeownership	74	Comparison of Homeownership Rates Before and After the Implementation of Mortgage Finance Programs
Improvement of Quality of Life as a Result of Sustainable Planning	80	Analysis of Resident Satisfaction in Areas with Sustainable Planning Implementation
Impact of Government Incentives on Real Estate Investment	66	Comparison of Real Estate Investment Flows Before and After the Implementation of Government Incentives
Rate of Achieving Social Justice in Housing Allocation	70	Measuring the Equity of Housing Allocation Based on Social Group Distribution
Extent of Social Inclusion Achieved Through Housing Programs	68	Analysis of Social Group Integration in Residential Communities Following Program Implementation

4.1.7. Methodology for Implementing the Affordable Housing Strategy

This methodology based on expert brainstorming sessions focused on international experiences, analytical findings, and the proposed model, a practical methodology was developed for the implementation of affordable housing strategies. The methodology begins by aligning the strategy with the local context, through assessing the applicability of each of the four proposed pillars (economic, planning and design, social, and government policy), identifying potential challenges, and mapping future opportunities.

The next step involves constructing short-, medium-, and long-term implementation scenarios, designed for different policy and development stages. Subsequently, the methodology identifies the roles of the main stakeholders necessary for the strategy's success namely: the government, the private sector, and civil society organizations. Finally, the methodology calls for a structured evaluation of key indicators, including the economic, social, environmental, and institutional dimensions to ensure continuous monitoring and policy adaptation. **Fig. 3** shows the stages and mechanisms of the proposed implementation methodology

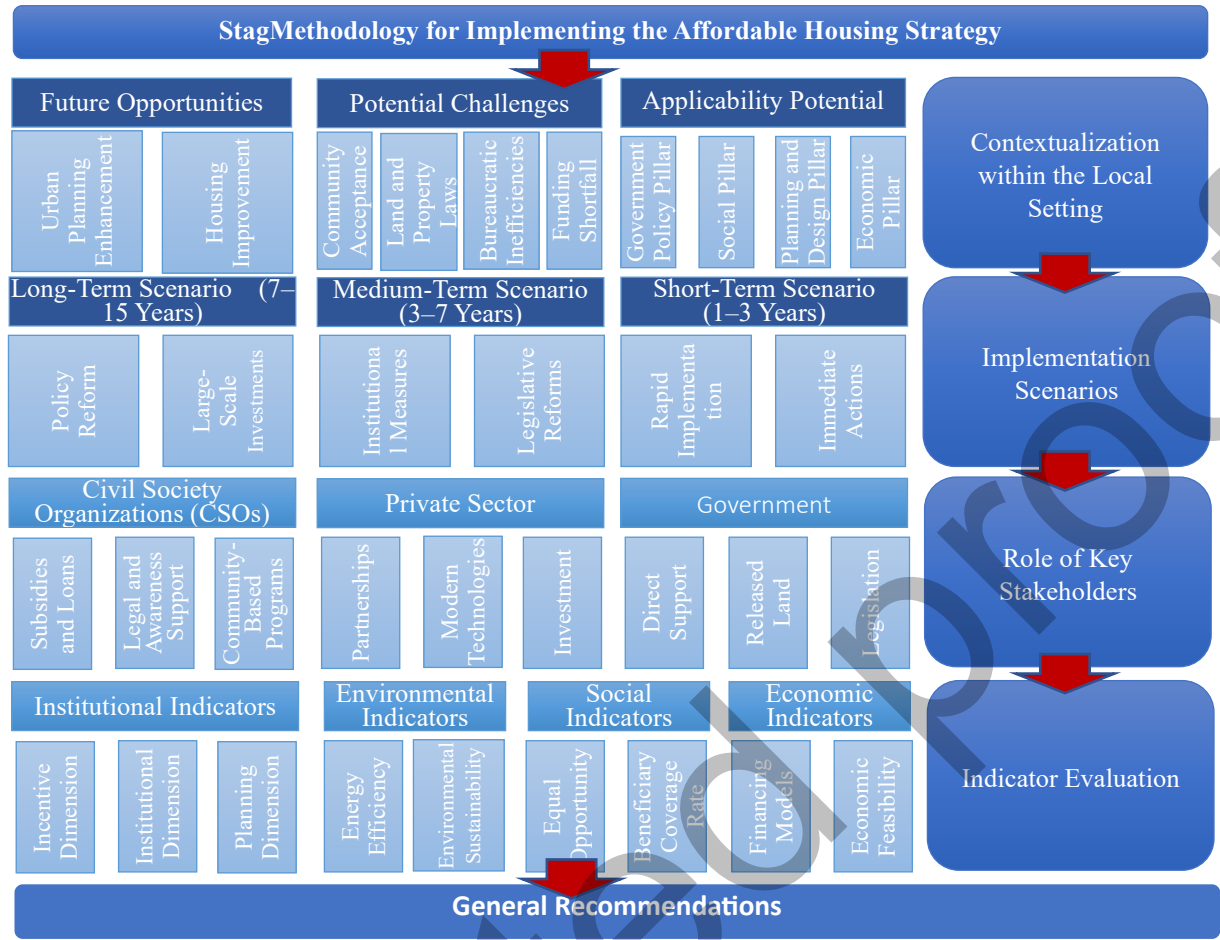


Fig. 3: Stages of Methodology for Implementing the Affordable Housing Strategy

4.2. Discussion

4.2.1. Emerging Technologies and Their Impact on Housing

The adoption of modern construction technologies can be a pivotal tool for reducing housing costs and accelerating delivery timelines. International experiences from countries such as Singapore and India demonstrate the successful integration of these technologies into affordable housing frameworks. However, their effectiveness is depends on supportive policy measures, including reduced customs duties on technical equipment and developing the local skills base to operate and maintain such technologies.

4.2.2. Social Dimensions and the Role of Planning

neighborhoods that offer access to education, healthcare, and community services. Models of cooperative housing in countries like Germany and Austria provide valuable insights into how planning can enhance social cohesion, resident empowerment, and long-term community stability

4.2.3. Government Policies as a Foundation for Success

Government policy serves as the primary driver for the implementation of affordable housing models. In the Egyptian context, a more flexible and innovative policy framework is essential. This includes allocating public land at symbolic prices, and repurposing unused or vacant plots to meet the exceeded demand for affordable housing. Such policy reforms can significantly improve project feasibility and accelerate implementation.

4.2.4. Continuous Evaluation and Model Development

Proposing a theoretical model alone is insufficient; it must be supported by strong mechanisms for continuous evaluation and adaptive improvement. Establishing a clear framework based on Key Performance Indicators (KPIs), such as number of housing units delivered, and levels of social and economic satisfaction of beneficiaries, is critical for tracking progress and making evidence-based adjustments to enhance model effectiveness over time.

4.2.5. Implementation Scenarios

The implementation of affordable housing strategies can follow multiple temporal scenarios, depending on the requirements of each proposed alternative and the country's financial and institutional capacity. These scenarios can be structured as follows:

a. Short-Term Scenario (1–3 years):

Focuses on the development of new regulatory frameworks to support affordable housing initiatives and incentivize low-cost real estate investments. It includes immediate institutional reforms and enabling policies to create a conducive environment for initial implementation.

b. Medium-Term Scenario (3–7 years):

Emphasizes the adoption of modern construction technologies, such as 3D printing, and the promotion of public-private partnerships (PPPs) to deliver subsidized housing units. This phase also includes capacity-building programs and integration of sustainability principles into housing design.

c. Long-Term Scenario (7–15 years):

Involves the formulation of comprehensive urban development policies that incorporate environmental, social, and economic dimensions. This scenario also proposes the establishment of sustainable financing mechanisms, such as dedicated investment funds for affordable housing, to ensure long-term scalability and resilience of housing strategies.

4.2.6. Applicability in the Egyptian Context

The proposed model presents a solid starting point; however, its implementation requires adaptation to local realities and contextual challenges. A successful strategy must include actionable steps to overcome economic barriers—such as the scarcity of land designated for affordable housing—and strengthen genuine partnerships between the public and private sectors. Existing initiatives, like the Social Housing Program, can serve as a foundational platform to be enhanced with more efficient technologies and planning approaches. A contextualized implementation methodology can be structured as follows:

a. Localization of Strategy

Application feasibility must align with the specific characteristics and resources of each selected region. Challenges and future opportunities can be summarized as:

Local Challenges Analysis: High costs of building materials, Inefficiencies in urban planning and permitting systems, Disparities in purchasing power among target groups, Lack of sustainable financing mechanisms, Widening demand-supply gap in urban centers

Emerging Opportunities: Adoption of smart housing models to resource efficiency, Leveraging tax incentives to stimulate the supply of affordable housing, Promotion of co-housing and cooperative housing schemes to enhance social solidarity and resilience, Mainstreaming sustainable construction as a core pillar of national housing policy.

In light of the analysis of global alternatives and their contextual discussion, the SWOT analysis was conducted after the initial formulation of the strategic model as a validation tool to assess its contextual feasibility and implementation challenges. Its purpose was to refine, not to generate, the strategic framework.

A SWOT analysis was developed to assess the Strengths, Weaknesses, Opportunities, and Threats associated with the implementation of the proposed strategic model for affordable housing in Egypt, **Fig. 4**. This tool aims to provide a comprehensive and structured evaluation, supporting evidence-based policy formulation and the development of appropriate recommendations for national adaptation and implementation.

Building on the SWOT analysis, the proposed implementation framework should align with national capabilities, institutional dynamics, and socio-economic conditions. This includes a phased application of strategies and a clearly defined role for stakeholders.

b. Implementation Scenarios in Egypt

- Short-Term Alternatives (Immediate Actions / Rapid Implementation):
- These include supporting affordable rental schemes, incentivizing the development of underutilized land, enabling community participation in planning, and offering tax exemptions for developers to stimulate supply.

- Medium-Term Alternatives (Requiring Legal or Institutional Adjustments):
- Examples include formalizing legal land tenure, enhancing shared and sustainable transport systems, improving financing mechanisms through housing bonds and blended finance, and increasing urban density in major cities through strategic urban expansion policies.
- Long-Term Alternatives (Requiring Major Investment and Policy Reform):
- These involve the integration of smart and sustainable building systems, establishing public-private partnerships (PPPs) for affordable housing production, transitioning toward cooperative and shared housing models, and developing digital permitting systems to improve transparency in land and property management.

c. Analysis of Key Stakeholders' Roles

- **Government:**
Plays a central role in enacting affordable housing legislation, allocating subsidized land for development, and providing direct financial support for housing projects. The government also coordinates cross-sectoral policies and ensures regulatory oversight.
- **Private Sector:**
- Contributes by investing in affordable housing developments, adopting modern construction technologies such as modular construction and 3D printing, and forming long-term partnerships with the government and civil society to enhance project delivery and innovation.

STRENGTHS	WEAKNESSES
• Strong political will to support affordable housing initiatives. • Existence of prior local programs and experience. • Available international financing from partnerships	• Weak coordination among housing-related authorities. • Limited self-financing capacity. • Absence of accurate housing data.
OPPORTUNITIES	THREATS
• Expansion of new urban communities. • Rising investment opportunities in housing • International support for sustainable urban development	• Economic changes and inflation. • Rising prices of materials. • Weak investor confidence. • Resistance to change.

Fig. 4: SWOT analysis for proposed framework

- **Civil Society and Non-Governmental Organizations (NGOs):**
- Supports community-based housing programs, provides legal and awareness support to vulnerable populations, and facilitates affordable lending schemes or direct financial aid for disadvantaged groups. These actors play a vital role in advocacy, capacity building, and social integration

4.2.7. The most important indicators

a. Economic Indicators

It is projected that modern construction technologies can reduce housing costs by 15–30%. Land prices may decline by up to 20% when supported by government incentive policies. Tax revenues from affordable housing projects are expected to increase by up to 10% within five years as the sector expands.

b. Social Indicators

Quality of life in underserved neighborhoods is anticipated to improve through urban renewal policies. Rates of homelessness and urban poverty may decrease with the implementation of rental and financial support programs. Homeownership opportunities for vulnerable groups are expected to rise through affordable financing mechanisms.

c. Institutional Indicators

Planning Measures: Adoption of phased and flexible planning strategies, and repurposing underutilized land for affordable housing projects. **Regulatory Measures:** Acceleration of permitting procedures through digital platforms, and updating rental and housing subsidy laws.

Incentive-Based Measures: Introduction of tax exemptions for developers, allocation of subsidized land, facilitation of affordable mortgage schemes, and promotion of rent-to-own models.

CONCLUSION

This research aims to develop a comprehensive theoretical model for an affordable housing strategy in Egypt, based on a critical analysis of four core pillars: economic empowerment, urban planning and design, government policy, and social dimensions. The study examined over 160 strategic alternatives, drawing from diverse international experiences and contextualizing them within the local Egyptian setting to propose a realistic and applicable framework

Results reveal that certain strategies—such as public-private partnerships, smart design, modern construction technologies, and blended financing mechanisms—serve as highly effective solutions for delivering affordable housing. These alternatives demonstrate economic efficiency, accelerated implementation timelines, and adaptability to the needs of target groups. With consideration bundling them into integrated clusters, aligned with phased implementation scenarios.

The study also emphasized the importance of adopting digital and modern construction technologies to reduce overall costs and promote environmental and social sustainability. It emphasized the necessity of integrating social dimensions into urban planning processes which inspired from successful models. At the policy level, the research highlighted the pivotal role of government in establishing an enabling legislative and regulatory environment for encouraging private sector, apply institutional governance, oversight to ensure transparency, performance monitoring, and equitable distribution of housing opportunities.

RECOMMENDATIONS

The study concludes with several key recommendations:

- The formulation of a flexible and comprehensive strategy for affordable housing that responds to evolving economic and social dynamics, and is implemented based on clearly defined temporal priorities.
- Encouraging institutional partnerships among the public sector, private developers, and civil society organizations to ensure effective role distribution and operational integration.
- Establishing a system of periodic performance indicators, including:

- Homeownership rates
- Quality of life indices
- Equitable access to services
- Economic feasibility of strategic alternatives
- Utilization of underused land resources
- Promoting the development of open digital databases to enhance decision-making and urban planning efficiency.
- Mainstreaming sustainable construction technologies and smart design into national housing policies, while offering vocational training programs to strengthen the local labor force and support implementation.

CONFLICT OF INTEREST

The authors have no financial interest to declare in relation to the content of this article.

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