

# User Engagement in Green Social Housing Design: Comparing Iranian and Australian Communities in Adopting Technology for Resilient and Livable Urban Spaces

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*Abstract* – This project emphasizes the importance of user engagement and technology integration in creating resilient and sustainable social housing. It focuses on involving residents in the design process to ensure that housing solutions meet community needs and enhance livability. The aim of the project is to examine the concept of user-engagement architecture in different communities. To achieve this, the study focuses on green social housing and compares two different contexts: Iranian and Australian communities. By comparing social housing practices in Australia and Iran, the study examines two key projects: Oaklands Green in Australia and Majara Residence in Iran. It reveals that Australia’s advanced use of digital tools in the Oaklands Green project has improved communication and participation among residents, architects, and developers, while Iran’s Majara Residence project relies more on traditional, community-based methods for user engagement, which remain valuable but could benefit from more technology integration. The results show that technology plays a critical role in this project and can shape the concept of user engagement in different contexts. The study’s major findings highlight the need for adaptable design strategies that reflect both technological innovations and local cultural contexts. The combination of a technological framework and culturally informed engagement methods can enhance inclusivity, cultural relevance, and technological efficiency. The project offers practical strategy for enhancing user participation and using technology to improve the sustainability of urban spaces. It provides insights that can guide the development of more inclusive, adaptable, and technology-driven social housing models, leading to improved quality of life for residents and long-term community sustainability.

*Keywords* – User Engagement, Social Housing Design, Liveable Urban Spaces, Digital Tools.

## I. INTRODUCTION

### A. Background and Importance

Sustainable social housing has become a priority in response to the increasing demand for sustainable development, especially in urban areas. Cities today face challenges like rapid population growth, climate change, and resource shortages, making green social housing an important solution (World Green Building Council, 2022). This type of housing aims to provide affordable and liveable homes while addressing environmental concerns. However, creating truly livable green housing is not easy. Issues such as integrating energy-efficient technologies, keeping costs low, and maintaining good design are common challenges (Georgiadou et al., 2019). Additionally, cultural, economic, and policy differences make it even harder, especially in diverse places such as Iran and Australia.

One way to overcome these challenges is through user engagement. When residents are involved in the design and decision-making processes, housing projects are more likely to meet their needs and be successful. User engagement also creates a sense of ownership and helps build stronger communities (Bailey & Buckley,

2020). Technology plays a crucial role in enhancing communication and collaboration between residents and designers, making the design process more inclusive and efficient. By providing digital platforms and interactive tools, technology enables residents to share their ideas, preferences, and concerns in real time, ensuring that their voices are heard throughout development process. Additionally, these tools help designers gather valuable feedback, analyze user needs, and make data-driven decisions to create more user-centered housing solutions. Furthermore, technology facilitates the seamless integration of sustainable practices by offering advanced modeling, simulation, and monitoring capabilities. These features allow designers to assess energy efficiency, material sustainability, and long-term environmental impact, ultimately leading to more resilient and eco-friendly housing solutions.

This article examines the critical role of user engagement in the development of green social housing by comparing experiences in Iran and Australia. It explores how digital tools and emerging technologies can enhance resident participation in the design, construction, and management of sustainable housing projects. By facilitating better communication between residents, architects, and developers, technology can create more inclusive and responsive housing solutions that align with environmental and social sustainability goals. Through a comparative analysis of these two contexts, the article investigates the challenges and opportunities presented by differing cultural, economic, frameworks. By understanding how residents in Iran and Australia engage with technology in the housing sector, this research seeks to identify best practices for fostering meaningful participation.

### *B. Research Scope and Objective*

This research compares Iranian and Australian communities to explore the role of technology in shaping resilient and livable urban spaces through green social housing design. It investigates at how cultural, technological, and environmental differences shape housing outcomes in each country. In Iran, the challenges of developing green social housing are shaped by factors such as rapid urbanization, economic constraints, and limited access to advanced sustainable technologies. The country has experienced significant population growth and urban expansion in recent decades, leading to increased pressure on housing infrastructure and public services. This rapid urbanization has often resulted in the construction of high-density residential developments that may not fully integrate sustainable design principles or prioritize resident participation in the decision-making process. Moreover, institutional barriers further complicate efforts to enhance user engagement in housing projects. Traditional planning and development processes may not always include mechanisms for community involvement, limiting residents' ability to contribute their preferences. Despite these challenges, there is a growing recognition of the need for more inclusive and sustainable approaches to housing design. digital tools and participatory design strategies could bridge the gap, empowering residents to play a more active role in shaping their living environments.

While Australia places a stronger emphasis on sustainability and the integration of advanced technology in s-ocial housing, its approach is shaped by a well-established framework of environmental policies, digital innovation, and resident-centered design strategies. The country has made significant progress in implementing green building standards, energy-efficient housing, and smart technologies to enhance the sustainability of residential developments. In addition, Australia actively promotes the use of digital tools to enhance resident participation in the housing design and management process. Technologies such as augmented reality (AR),

virtual reality (VR), and online platforms allow residents to visualize design options, provide feedback, and engage with architects and developers in real time. This user-centered approach ensures that housing developments align with community needs while promoting a sense of ownership. By analyzing case studies from both regions, the research aims to find the best ways to use technology, address common and unique challenges, and improve social housing design to create better and more livable urban spaces.

The study explores how technology influences social housing outcomes by promoting user engagement. It investigates to how digital tools and technological solutions can enhance residents' active involvement in the housing design process. Technology facilitates collaboration and ongoing feedback, helping to create solutions that reflect the needs and preferences of the community. The study highlights how integrating user engagement approaches with technology can improve housing quality, enhance social inclusion, and create resilient, livable urban spaces. It looks for ways to demonstrate that technology, when used effectively, can bridge gaps between residents and designers, leading to more sustainable and community-centered housing outcomes.

This research examines how cultural and technological factors intersect to influence social housing outcomes in Iranian and Australian communities. In Iran, the rapid urbanization and limited access to advanced technologies present challenges for integrating modern technological solutions into housing design. Meanwhile, Australia's focus on sustainability and the use of advanced technology creates opportunities to enhance housing design and improve social outcomes. By examining how these cultural and technological contexts influence the adoption and effectiveness of housing solutions, the study aims to understand how different cultural perspectives can shape the integration of technology in social housing.

### *C. Brief Overview the Sections to Follow*

The following sections will begin with a Literature Review, which will explore existing research on the intersection of technology, culture, and social housing, with a focus on user engagement in both Iranian and Australian contexts. It will examine how technological advancements shape housing outcomes and the influence of cultural factors on their adoption. Following the review, the Research Methodology will outline the approach for comparing case studies from both countries. The Case Study Analysis will present detailed findings from these case studies, while The Discussion will analyze and explain the results., comparing how cultural and technological factors influence social housing outcomes. Finally, the Conclusion will summarize the key insights, focusing the intersection of technology and culture in social housing design, and suggest directions for future research and practice.

## **II. LITERATURE REVIEW**

### *A. Green Social Housing Design*

Green social housing design integrates sustainable building practices into affordable housing, aiming to reduce environmental impact while enhancing residents' quality of life. This approach incorporates energy-efficient systems, sustainable materials, and designs that promote health and well-being (UN-Habitat, 2022). The goal is to provide housing that is both environmentally responsible and accessible to low-income populations.

Globally, there is a growing recognition of the importance of green social housing. The United States has intr-

-duced policies requiring green building standards for public housing, which has led to more affordable homes that include features like energy efficiency, renewable energy systems, and sustainable materials (U.S. Green Building Council, 2022). In Egypt, the government has initiated green social housing projects to support climate efforts and improve citizens' quality of life. These projects aim to reduce energy consumption and CO<sub>2</sub> emissions, contributing to the country's sustainability goals (Egyptian Ministry of Housing, 2022). In Australia, developers are launching funds to finance sustainable residential developments, including build-to-rent projects that follow strict sustainability guidelines. These initiatives align with national climate emission reduction goals and aim to increase housing supply sustainably (Australian Government, 2023). These global trends highlight the increasing importance of integrating sustainability into affordable housing to address environmental challenges and improve living conditions for residents.

### *B. User Engagement in Housing Design*

User engagement in housing design has emerged as a critical factor in creating sustainable and user-centered residential environments. Engaging residents in the decision-making process ensures that housing solutions align with their needs, preferences, and cultural values (Sanoff, 2000). This participatory approach promotes a sense of ownership and satisfaction among residents while enhancing the functionality and adaptability of housing designs. Decision-making in participatory design often employs structured frameworks, such as the Design Thinking process or Participatory Action Research (PAR), which encourage collaboration between stakeholders (Luck, 2007).

To facilitate this collaboration, various tools and technologies have been developed. Digital platforms, such as Building Information Modeling (BIM) and Geographic Information Systems (GIS), allow residents to visualize and contribute to design options (Jalaei & Jrade, 2015). Virtual reality (VR) and augmented reality (AR) tools provide immersive experiences, enabling users to interact with and modify proposed designs in real-time (Whyte, 2003). Additionally, mobile applications and online surveys have been employed to gather user feedback efficiently, bridging communication gaps and encouraging broader participation (Dameria et al., 2020).

### *C. Technology for Resilient and Liveable Urban Spaces*

The integration of technology into urban design has developed the creation of resilient and livable urban spaces. Digital tools play a vital role in enhancing user engagement by facilitating communication, collaboration, and informed decision-making among stakeholders. These tools enable architects, developers, and residents to co-create urban environments that are adaptive to changing needs while promoting sustainability and inclusivity. For instance, Building Information Modeling (BIM) allows for the visualization of urban projects in three dimensions, offering stakeholders an interactive platform to explore design alternatives and provide feedback (Jalaei & Jrade, 2015).

Geographic Information Systems (GIS) empower planners to analyze spatial data, identifying patterns and optimizing land use based on community needs. Basically, immersive technologies like virtual reality (VR) and augmented reality (AR) provide residents with a powerful understanding of proposed designs, making it easier for them to envision the impact of changes in their surroundings (Whyte, 2003). Mobile apps and digital surveys have also expanded the reach of participatory processes, enabling diverse populations to contribute their insights

regardless of geographic or socioeconomic barriers (Dameria et al., 2020).

By using these technologies, urban designers can ensure that urban spaces are not only functional but also responsive to the needs of their users. This approach develops resilience by incorporating user insights into designs, ensuring adaptability to environmental, social, and economic challenges. At the same time, it enhances livability by promoting inclusivity and a sense of community ownership, reinforcing the role of technology as a cornerstone in building future-proof urban spaces.

#### D. Iranian and Australian Context

User engagement in housing design faces distinct cultural and social challenges in Iran and Australia due to their different traditions, governance systems, and needs. In Iran, participation is limited by centralized planning and a lack of frameworks for involving communities. Cultural factors, like hierarchical decision-making and low public trust in authorities, make it difficult for residents to contribute meaningfully (Azizi et al., 2019). Additionally, rapid urbanization, housing shortages, and a focus on mass-produced housing over user-focused designs create a gap between what residents need and what is built (Habibi & Hourcade, 2015). This often results in housing that does not fully meet the needs of its users.

In Australia, while the participatory design process is supported by a tradition of community engagement and policy frameworks like the *National Housing and Homelessness Agreement* (Australian Government, 2023), challenges are existed. Studies indicate that marginalized groups, including Indigenous communities and low-income residents, are often excluded from decision-making due to systemic inequities and insufficient consultation mechanisms (Peters & Andersen, 2020). Moreover, the increasing demand for affordable and sustainable housing amplifies the need for inclusive user engagement strategies. Rising property prices and housing supply shortages have further underscored the importance of integrating diverse perspectives to create equitable and resilient housing solutions (Dowling et al., 2019).

While the contexts differ, both countries emphasize the importance of bridging communication gaps between designers and residents through culturally informed and technologically enabled participatory practices. In Iran, promoting public awareness and institutional trust is essential for empowering residents, while in Australia, addressing structural challenges and enhancing accessibility to participatory processes remain key priorities. Adopting context-sensitive strategies can lead to housing solutions that reflect community needs and respond effectively to evolving social challenges.

### III. METHODOLOGY

#### A. Research Design

This study adopts a comparative case study approach to examine user engagement in green social housing design within Iranian and Australian communities. This approach allows for a detailed exploration of similarities and differences across diverse socio-cultural and environmental contexts. By analysing specific housing projects from each region, the study seeks to uncover how varying cultural practices, technological advancements, and environmental challenges shape the design and implementation of social housing initiatives. The comparative analysis is structured around three key criteria:

1. Cultural Dynamics: The role of social traditions, community involvement practices, and individual prefere-

-nces in shaping housing designs. In the Iranian context, cultural dynamics often emphasize extended family structures and traditional community interactions, whereas in the Australian context there is a greater focus on supporting independent living arrangements and accommodating diverse cultural backgrounds within urban neighborhoods.

2. **Technological Adoption:** The integration of digital tools and platforms in the participatory design process. In Iran, the focus is on technological limitations to enhance engagement, while in Australia, the challenge is faced on effectively utilizing advanced digital tools to facilitate meaningful participation.
3. **Environmental Sustainability:** The strategies aim to address energy efficiency, resource management, and resilience to climate change. Iranian housing projects often face challenges related to limited resources, while Australian projects focus on addressing climate variability and sustainable urban expansion.

This approach not only highlights the unique attributes of each community but also identifies transferable strategies and solutions that can enhance the resilience of social housing projects. The analysis aims to provide an understanding of how design practices can be adapted to meet the specific needs of diverse communities while contributing to the achievement of global sustainability goals.

### *B. Data Collection*

For this research, data is collected through a comparative case study approach, focusing on urban social housing projects in Iran and Australia. Case studies were selected based on their relevance to green design principles and their emphasis on community engagement in the design and implementation phases. Secondary data from a variety of sources, including project reports, academic literature, government publications, and architectural design documentation, were utilized to gather insights on each project's context, design strategies, and outcomes. This approach enables a comprehensive examination of how different cultural, technological, and environmental factors influence the participatory design process in each location. By analyzing these case studies, the research aims to identify patterns, challenges, and successful strategies that can inform future social housing projects. The case studies also allow for comparison between the two communities, highlighting key differences and similarities that contribute to the design of resilient and sustainable housing solutions.

### *C. Analysis Framework*

To evaluate the effectiveness of green social housing design in promoting resilient and liveable urban spaces, this study adopts an analysis framework based on four key criteria: resilience, liveability, user engagement, and technology adaptation. Resilience is assessed by examining the housing's capacity to adapt to environmental, social, and economic stresses while ensuring long-term sustainability. Liveability is evaluated through factors such as comfort, accessibility, and community well-being, emphasizing the creation of spaces that enhance residents' quality of life. User engagement focuses on the extent to which residents are actively involved in the design, decision-making, and post-occupancy evaluation processes, reflecting their needs and preferences. Lastly, technology adaptation explores the integration and acceptance of digital tools and smart systems, investigating their role in facilitating sustainable practices and fostering a participatory design approach. Together, these criteria provide a comprehensive framework for analysing and comparing case studies in Iran and Australia, enabling a deep understanding of the interplay between cultural, technological, and environmental factors in social housing outcomes.



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#### IV. CASE STUDIES AND ANALYSIS

##### A. Iranian Communities

Majara Residence, located on Hormoz Island, Iran, serves as a prime example of green social housing, integrating sustainable design principles. Designed by ZAV Architects, the project utilizes materials sourced locally, including rammed earth and coral stone, which not only align with the island's natural ecosystem but also substantially cut down on carbon emissions from construction (ZAV Architects, 2020). The modular architecture allows for flexibility and adaptability, addressing the evolving needs of residents (Architectural Review, 2021). Passive cooling strategies, including natural ventilation and shaded courtyards, minimize energy consumption for cooling in the region's hot and humid climate (Energy and Environmental Design Journal, 2022). By promoting traditional craftsmanship and engaging local artisans, the project strengthens community bonds and enhances economic opportunities, contributing to social empowerment (Sustainable Architecture Report, 2021). Majara Residence demonstrates how culturally responsive design can address affordability and sustainability challenges, creating resilient and livable spaces in the context of social housing (Habitat International, 2022).



Majara Residence

User participation in housing design faces significant challenges in Iran, Rooted in cultural, economic, and systemic factors. One primary obstacle is the lack of institutional frameworks that actively promote participatory design processes. Housing policies in Iran often prioritize rapid construction to meet the demands of urbanization, leaving little room for user input (Habitat International, 2020). Moreover, cultural aspect can limit inclusive participation, as decision-making processes are often centralized and dominated by authorities or developers (Iranian Urban Studies Journal, 2019).

Economic challenges significantly worsen the issue of user participation in housing design. A major barrier is the lack of sufficient funding for participatory programs, which makes it difficult to effectively include resident

feedback in the planning and design processes. This issue is particularly pronounced in low-income areas, where financial constraints often take precedence over efforts to engage communities meaningfully (Development and Change, 2021). Additionally, a lack of public awareness further compounds the problem. Many residents are not informed about their rights to participate in housing decisions or the potential benefits of contributing their input. This lack of knowledge prevents them from actively engaging in the design process, leading to housing solutions that may not fully address their needs or priorities (Social Housing Review, 2020). Addressing these economic and educational gaps is essential for promoting more inclusive and effective participatory housing programs.

Technology presents a significant challenge to user participation in housing design. While digital tools have the potential to improve engagement and make the process more inclusive, many underserved areas lack access to these tools. This lack of access creates unequal opportunities for residents to participate and contribute their input, particularly in communities that are already marginalized (Smart Cities and Communities Journal, 2022). Furthermore, the limited collaboration between architects, urban planners, and social scientists adds to the problem. Without effective teamwork and communication among these disciplines, it becomes difficult to develop comprehensive frameworks that allow for meaningful resident engagement in housing projects (Iranian Architectural Research Journal, 2021). Addressing these challenges requires institutional reforms, public education campaigns, and investment in technology and infrastructure to enable inclusive and equitable participation in housing design.

### *B. Australian Communities*

Oaklands Green, located in Oaklands Park, South Australia, is a notable example of green social housing that focuses on sustainability, affordability, and improving community life. This \$135 million redevelopment project replaces outdated public housing with a modern and eco-friendly neighborhood (Renewal SA, 2022). The project includes energy-efficient homes equipped with rooftop solar panels to reduce electricity costs and carbon emissions. Water-saving systems, such as rainwater harvesting and drought-tolerant landscaping, ensure efficient water use and support environmental sustainability (Sustainable Cities Journal, 2023). The development also features green spaces, walking paths, and bike lanes, encouraging residents to adopt healthier and more active lifestyles. These shared areas not only promote physical well-being but also create opportunities for social interactions among neighbors (Urban Planning and Design Review, 2023). Passive design strategies, such as proper building orientation, natural ventilation, and shading, help reduce energy use for heating and cooling, providing year-round comfort in South Australia's climate (Energy Efficiency Journal, 2023).

To accommodate different household needs, Oaklands Green incorporates modular housing designs that are flexible and adaptable over time (Architectural Review, 2023). The project integrates public and private housing to promote a diverse and inclusive community, addressing the negative perceptions often associated with public housing. Extensive community consultation ensured that residents were involved in the planning process, making the development more responsive to their needs (Housing Futures Report, 2022).

By prioritizing sustainable practices and promoting social inclusion, Oaklands Green sets a strong example for future social housing projects across Australia. It demonstrates how thoughtful design and community focused planning can create livable, eco-friendly, and resilient neighborhoods (Sustainable Development Goals Report, 2023).





Oklands Green

User participation in housing design in Australia faces several challenges. One major issue is the lack of support for involving residents in the design process. Housing policies often focus on building quickly and cheaply to meet demand, which limits opportunities for residents to give input (AHURI, 2024). Australia's cultural diversity also makes it hard to create participation strategies that work for everyone, as different communities may need different approaches (Tandfonline, 2023). Additionally, power imbalances between developers and residents can lead to token involvement rather than meaningful participation, especially for marginalized groups (AHURI, 2024).

Technology is a major challenge for user participation in housing design in Australia. While digital tools could improve engagement, many people, especially in low-income or rural areas, don't have access to them. This creates unfair opportunities for some residents to participate and share their ideas, especially in marginalized communities (Smart Cities and Communities Journal, 2022). Additionally, there is often little collaboration between architects, urban planners, and social scientists, making it harder to create effective frameworks for involving residents in housing projects (Australian Urban Planning Journal, 2023).

By improving access to digital tools and developing better collaboration between disciplines, we can ensure more inclusive and equitable participation in housing design. This approach will help create housing solutions that truly reflect the needs of all communities.

### *C. Comparative Analysis*

Both the Majara Residence in Iran and Oaklands Green in Australia are exemplary green social housing projects that focus on sustainability, community well-being, and social integration. However, they achieve these goals within distinct cultural, economic, and regulatory contexts.

Similarities: Both projects emphasize the use of sustainable materials and energy-efficient design. Majara Residence utilizes locally sourced materials like rammed earth and coral stone, while Oaklands Green incorporates rooftop solar panels and water-saving systems to reduce energy consumption and environmental impact. Both projects also feature green spaces and encourage active lifestyles, with Oaklands Green integrating walking paths and bike lanes, and Majara Residence promoting natural ventilation and shaded courtyards to

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enhance residents' connection to nature. Additionally, both projects aim to foster social integration, with Oaklands Green blending public and private housing, and Majara Residence incorporating community involvement through local craftsmanship.

Differences: The cultural and regulatory differences between the two countries shape the approach to user participation and community engagement. Oaklands Green benefits from Australia's strong institutional support for public participation and community consultation in housing development, which helps the project meet the needs of diverse residents (AHURI, 2024). In contrast, Majara Residence in Iran relies more on traditional knowledge and craftsmanship, with less formalized institutional support for community engagement. Furthermore, while Oaklands Green focuses on urban sustainability in the context of a highly urbanized country, Majara Residence addresses sustainability in a more rural setting, where environmental and cultural factors like local material use and climate resilience play a more central role in design decisions.

The impact of cultural, economic, and policy frameworks, as well as the role of technology, plays a critical role in shaping user engagement and the success of social housing projects like Majara Residence in Iran and Oaklands Green in Australia. While both projects focus on sustainability and social integration, the differences in their cultural, economic, and policy contexts highlight the varied approaches to user participation and the influence of technology.

In Iran, Majara Residence benefits from a deep-rooted tradition of craftsmanship and community-based design. The cultural importance of local materials and techniques ensures that the design process involves local artisans, thus enhancing social cohesion within the community. However, traditional decision-making structures can limit broader community engagement, as the process is often centralized by developers or authorities (Iranian Urban Studies Journal, 2019). In contrast, Oaklands Green in Australia adopts a more participatory approach, reflecting Australia's diverse, multicultural population. The design process encourages input from a wide range of residents, which is central to overcoming barriers such as cultural differences and ensuring that the housing meets the needs of all groups within the community (AHURI, 2024).

Economically, both projects face challenges related to funding and affordability. Oaklands Green, with its focus on cost-efficient, energy-saving design features, benefits from strong institutional support, including government funding, to ensure that the project aligns with broader economic goals such as affordability and social housing provision (Sustainable Cities and Communities Journal, 2022). In contrast, Majara Residence addresses the economic challenges of building in rural, underdeveloped areas by using locally sourced materials that reduce construction costs. However, limited economic resources in Iran may reduce the ability to implement large-scale technological solutions that enhance user engagement (Habitat International, 2020).

The policy frameworks in both countries influence the extent to which user participation can be incorporated into housing design. In Australia, government policies actively promote community consultation and participatory design in social housing projects, as evidenced by Oaklands Green. These policies encourage the involvement of residents in shaping the development, ensuring that housing solutions reflect local needs and foster social inclusion (Australian Urban Planning Journal, 2023). On the other hand, Iran's housing policies often prioritize rapid urbanization and the quick delivery of housing over user engagement, which can restrict opportunities for meaningful participation in projects like Majara Residence (Iranian Architectural Research Journal, 2021).

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The policy frameworks in both countries affect how much user participation is included in housing design. In Australia, government policies support community consultation and participatory design in social housing projects, as seen in Oaklands Green. These policies help involve residents in the development process, ensuring that housing meets local needs and promotes social inclusion (Australian Urban Planning Journal, 2023). In contrast, Iran’s housing policies focus more on fast urbanization and quickly providing housing, which limits opportunities for meaningful participation in projects like Majara Residence (Iranian Architectural Research Journal, 2021).

Technology plays an important role in enhancing user engagement, but its impact differs between the two contexts. Oaklands Green benefits from advanced digital tools, such as digital consultation platforms and design software, which allow for more interactive and inclusive participation from residents. These technologies help bridge the gap between residents and developers, especially for those with limited traditional participation opportunities (Smart Cities and Communities Journal, 2022). In Iran, while digital tools have the potential to improve engagement, many underserved areas lack access to technology, which creates barriers to effective participation in projects like Majara Residence. The reliance on traditional methods of communication and craftsmanship in Majara Residence limits the extent to which technology can be used to engage users, particularly in rural areas where infrastructure challenges persist (Iranian Architectural Research Journal, 2021).

In summary, the cultural, economic, and policy frameworks in Australia and Iran shape the degree of user engagement in housing design. While Australia benefits from more institutional support for participatory processes and the integration of technology, Iran faces challenges related to centralization in decision-making and limited technological access in rural areas. Both projects highlight the need for context-sensitive approaches to user participation that consider cultural traditions, economic realities, and technological capabilities.

## **V. DISCUSSION**

### *A. Insights on User Engagement Strategies and Technological Impact*

The comparative analysis of Iranian and Australian case studies provides valuable insights into the diverse approaches to user engagement in social housing. This study explores the fundamental differences and similarities in how residents participate in the design and development process across these two cultural contexts. While Australia has increasingly integrated digital tools to facilitate communication and collaboration among residents, architects, and developers, Iran primarily relies on traditional, community-based engagement methods. By examining these contrasting approaches, the research highlights how technological advancements can enhance participatory practices while also recognizing the importance of culturally embedded engagement strategies.

In Australia, the widespread use of digital tools plays a crucial role in facilitating seamless communication and collaboration among residents, architects, and developers. These tools, including interactive design platforms, virtual reality simulations, and mobile applications, enable residents to engage actively in the decision-making process from the early planning stages to post-occupancy evaluations. By allowing users to visualize design options, provide feedback in real time, and suggest modifications based on their specific needs and preferences, digital technology helps create more responsive and user-centered housing solutions. This participatory approach ensures that social housing developments align with community expectations for

sustainability, accessibility, and long-term adaptability. Moreover, the integration of these technologies fosters a sense of ownership and inclusivity among residents, strengthening social cohesion while promoting environmentally conscious living practices. Through this model, digital engagement not only improves livability but also contributes to the overall resilience and sustainability of urban housing projects.

In Iran, while technological adoption in the housing sector is gradually increasing, user engagement in social housing projects still primarily relies on traditional, community-oriented methods. These methods include local forums, neighborhood meetings, and hands-on workshops, where residents, architects, and planners engage in collective discussions to shape housing developments. Such approaches emphasize cultural sensitivity, social cohesion, and shared decision-making, ensuring that housing solutions reflect local values and community needs. However, despite their benefits, these strategies often face challenges related to inclusivity, as they may inadvertently exclude certain groups, such as younger generations who are more accustomed to digital communication or individuals with mobility limitations who cannot attend in-person meetings.

Technology emerges as a critical enabler of resilience in both contexts. In Australia, smart technologies are increasingly incorporated into housing systems to improve energy efficiency, monitor resource use, and adapt to changing climatic conditions. Such innovations align with global standards for resilient urban spaces and ensure housing remains adaptable to future challenges. Similarly, Iranian social housing projects demonstrate resilience through context-specific strategies, such as passive cooling techniques and locally sourced materials. The integration of digital monitoring systems, although limited, shows promise for enhancing environmental performance and fostering community awareness of sustainable practices.

The findings suggest that combining Australia's advanced technological framework with Iran's culturally grounded engagement methods could result in a blended approach to social housing. This model would prioritize inclusivity, cultural relevance, and technological efficiency, addressing diverse resident needs while enhancing the resilience and livability of urban spaces. Such an approach highlights the potential for cross-cultural learning in designing future housing solutions that are both sustainable and equitable.

### *B. Implications for Practice*

The findings of this study provide valuable lessons for architects, urban planners, and policymakers in enhancing user participation and integrating technology into social housing projects.

For architects, the results of this study emphasize the critical role of designing adaptable, inclusive, and user-centered spaces that reach to the diverse needs and preferences of residents. Social housing developments must accommodate various demographic groups, including families, elderly individuals, and low-income communities, necessitating flexible design solutions that enhance both functionality and livability. A key takeaway from this research is the potential of digital tools to transform the architectural design process by fostering deeper engagement between residents and design professionals. The integration of participatory design platforms, virtual reality simulations, and interactive mobile applications can bridge communication gaps, allowing residents to visualize design options, provide feedback in real time, and contribute to decision-making processes at different project stages. These technologies enable an iterative feedback loop, where architectural plans can be continuously refined based on user input, leading to housing solutions that better align with community needs.

Urban planners can draw on the comparative analysis to recognize the value of blending advanced technologies with context-specific cultural practices to create more effective and inclusive urban spaces. In Australia, the use of smart systems has significantly contributed to improving energy efficiency, sustainability, and resilience in social housing developments. These technologies, such as automated climate control, renewable energy systems, and energy-efficient infrastructure, have proven to be highly effective in reducing environmental footprints and enhancing the long-term sustainability of urban spaces. On the other hand, in Iran, traditional methods deeply rooted in community collaboration and participatory planning remain a critical asset. These approaches emphasize face-to-face interaction, collective decision-making, and a strong sense of cultural identity, which have long been fundamental in shaping the social fabric of neighborhoods. Despite the growing use of technology, these traditional methods still provide a vital foundation for ensuring social cohesion and community engagement.

For policymakers, the study highlights the critical need for supportive frameworks that prioritize inclusivity and technology-driven solutions in the development of urban spaces, particularly in the realm of social housing. As the integration of advanced technologies becomes increasingly important in enhancing the sustainability, resilience, and livability of housing projects, it is essential that policies be designed to reduce barriers to technology access, especially in underserved or disadvantaged communities. Ensuring that residents have equal opportunities to access and engage with digital tools is crucial for achieving participatory design and fostering social equity. Policymakers should focus on creating initiatives that promote digital literacy and education, equipping individuals with the necessary skills to navigate and actively contribute to the technological aspects of housing design.

To enhance user participation, it is recommended that all stakeholders adopt a multidisciplinary approach, developing collaboration between designers, technologists, and community representatives. Establishing participatory design workshops, complemented by interactive digital platforms, can create more transparent and effective engagement processes. Additionally, integrating monitoring and evaluation tools into housing projects will ensure continuous improvement and adaptation to evolving resident needs. By embracing these lessons and recommendations, architects, planners, and policymakers can create social housing solutions that are not only resilient and sustainable but also deeply reflective of the communities they serve.

### *C. Challenges and Limitations*

Although technology integration in social housing shows great promise, several challenges limit its widespread use. These include a lack of access to digital tools for marginalized communities, low digital literacy, and the high costs of smart technologies. Addressing these barriers requires practical steps such as providing community training, offering subsidies for technology upgrades, and creating affordable, easy-to-use digital platforms. These actions can help close the digital gap, promote fairness, and increase the use of technology-based solutions in both Iran and Australia.

This study shows that technological solutions need to be adapted to local cultural and environmental conditions. A single approach may not work for all communities, highlighting the importance of flexible and context-specific designs. However, the research has some limitations. First, it analysed only a few case studies, which might not represent the full range of social housing practices in Iran and Australia. Future research could include more examples, especially from rural and peri-urban areas.



Second, the study relied mainly on qualitative methods like interviews and document analysis, which can be subjective. Adding quantitative methods, such as surveys or performance data analysis, could provide stronger results. By tackling these challenges and expanding on the limitations, future research can offer a deeper understanding of how technology and user involvement shape social housing design.

## VI. CONCLUSION

### A. Summary of Key Points

In summary, this study underscores the critical role of user engagement in shaping successful and sustainable social housing solutions. Active involvement of residents in the design process not only empowers communities but also ensures that housing solutions align more closely with the real needs, preferences, and aspirations of those who will live in them. By placing residents at the center of the decision-making process, architects and planners can create environments that are more adaptable, functional, and livable, enhancing the overall quality of life for occupants. The comparative analysis between Iran and Australia offers valuable insights into the diverse challenges and opportunities associated with user engagement in different cultural and environmental contexts. In Australia, the widespread adoption of digital tools has revolutionized communication between residents, architects, and developers, enabling real-time feedback, interactive design, and greater transparency throughout the design and construction phases, fostering a user-centered approach. The integration of technologies such as virtual platforms, mobile applications, and smart systems has enhanced the efficiency of engagement, creating more inclusive and accessible channels for participation, especially for younger generations and tech-savvy individuals. In contrast, Iran's engagement strategies remain deeply rooted in traditional, community-based methods such as local forums, workshops, and neighborhood meetings, which emphasize face-to-face interaction and collective decision-making, central to fostering a strong sense of community and cultural identity. While these traditional methods have proven effective in maintaining social cohesion, they often face limitations when it comes to reaching a broader demographic and incorporating the diverse voices of all community members. Incorporating more technology into Iran's engagement strategies could help bridge these gaps, enabling more widespread participation and enhancing the efficiency of the design process. Both countries highlight the importance of resident engagement strategies and technological solutions to the unique cultural, social, and environmental contexts in which they operate. Understanding the specific needs of the community, the technological infrastructure available, and the cultural values that shape social dynamics is crucial to developing effective and inclusive engagement practices. Moving forward, a hybrid approach that combines the strengths of both digital and traditional methods could lead to more resilient and adaptable social housing designs, ensuring that the voices of all community members are heard while also leveraging technology to enhance participation, improve the design process, and foster sustainable living environments. Such an integrated approach could create social housing solutions that are not only more inclusive but also better equipped to meet the evolving needs of diverse communities in a rapidly changing world.

### B. Policy and Design Recommendation

To effectively integrate user feedback into housing design, it is essential to establish continuous channels for communication between residents, architects, and developers. Practical strategies include conducting regular



participatory workshops, using digital platforms for real-time feedback, and implementing co-design processes where residents are actively involved in decision-making. These methods not only ensure that housing designs reflect the needs and preferences of the community but also promote a sense of ownership and belonging among residents.

The role of technology can be further enhanced by incorporating smart systems for monitoring energy use, waste management, and environmental performance, contributing to the resilience of urban spaces. In addition, using data analytics and AI tools can allow for adaptive design processes, where designs can evolve based on real-time feedback and changing environmental conditions.

By combining user-centered engagement with advanced technologies, urban spaces can be designed to be more resilient, sustainable, and responsive to the dynamic needs of the community. These strategies will contribute to building urban environments that are both comfortable to live in and resilient to future challenges, promoting long-term sustainability and improving the quality of life for residents.

### *C. Introduction of Subsequent Work*

Future research in user engagement and technology in social housing holds immense potential. Studies could explore how emerging technologies like artificial intelligence (AI) and blockchain can enhance housing design, sustainability, and resident participation. Understanding which digital tools are most effective for engaging diverse groups, particularly marginalized communities, is essential for ensuring inclusivity in the design process. Expanding research to rural and peri-urban areas will provide valuable insights into the unique challenges these regions face in adopting technology-driven participatory methods. Additionally, studying the long-term effects of participatory design on community well-being could offer a deeper understanding of how ongoing involvement impacts the success and adaptability of housing projects. By addressing these research gaps, we can create more inclusive, resilient, and tech-driven social housing solutions that meet the evolving needs of all communities.

## **REFERENCES**

- [1] World Green Building Council. (2022). Global Status Report 2022: Towards Sustainable Built Environments. Retrieved from <https://www.worldgbc.org>.
- [2] Georgiadou, M., et al. (2019). Challenges in integrating energy-efficient technologies into Affordable Housing Design: Lessons from Green Building Practices. *Journal of Sustainable Building Design*, 13(2), 123-137.
- [3] Bailey, A., & Buckley, R. (2020). The role of user engagement in housing design: Enhancing communities through participatory design practices. *Journal of Architectural Practice and Design*, 45(1), 98-112.12. Australian Government. (2023). National Housing and Homelessness Agreement.
- [4] UN-Habitat. (2022). Green Social Housing and Sustainable Urban Development: A Global Perspective. United Nations Human Settlements Programme. Retrieved from <https://unhabitat.org>.
- [5] U.S. Green Building Council. (2022). Green building standards for public housing: A step toward sustainable communities. Retrieved from <https://www.usgbc.org>.
- [6] Egyptian Ministry of Housing. (2022). Egypt's Green Social Housing Initiatives: Reducing Energy Consumption and Supporting Climate Goals. Retrieved from <http://www.mh.gov.eg>.
- [7] Australian Government. (2023). Financing Sustainable Residential Developments: Australia's Efforts to Meet Climate Emission Reduction Goals. Retrieved from <https://www.australia.gov.au>.
- [8] Sanoff, H. (2000). *Community Participation Methods in Design and Planning*. Wiley.
- [9] Luck, R. (2007). Participatory Design: A Framework for Collaboration. *Journal of Architectural Education*, 60(1), 44-52..
- [10] Jalaei, F., & Jrade, A. (2015). Building Information Modeling (BIM) and its role in enhancing user engagement in residential design. *Journal of Building Performance*, 6(2), 56-64.
- [11] Whyte, W. H. (2003). *The Social Life of Small Urban Spaces*. Project for Public Spaces.
- [12] Dameria, N., et al. (2020). Digital Tools for Enhancing User Feedback in Housing Design: Mobile Apps and Online Surveys. *Journal of Urban Design and Planning*, 17(3), 238-245.22.
- [13] Azizi, M., et al. (2019). Cultural and Social Factors in Housing Design Participation in Iran: Challenges and Opportunities. *Journal of Urban Studies*, 45(2), 130-145.23.
- [14] Habibi, F., & Hourcade, J.P. (2015). Urbanization and Housing Development in Iran: A Shift Towards Mass Housing. *Urban Policy and Research*, 33(4), 399-412.
- [15] Australian Government (2023). National housing and homelessness agreement. Australian Government Department of Social Services.

- [16] Peters, D., & Andersen, H. (2020). Marginalized Communities in Australian Housing Policy: The Exclusion of Indigenous and Low-Income Groups. *Journal of Australian Housing Studies*, 27(3), 180-195.
- [17] Dowling, R., et al. (2019). Affordable Housing and the Role of User Engagement in Creating Resilient Communities. *Housing Studies*, 34(2), 165-182.
- [18] ZAV Architects. (2020). Majara Residence: Sustainable Housing on Hormoz Island. ZAV Architects.
- [19] Architectural Review. (2021). Modular Architecture in Green Social Housing: The Case of Majara Residence. *Architectural Review*, 48(3), 212-219.
- [20] Energy and Environmental Design Journal. (2022). Passive Cooling Strategies in Hot and Humid Climates: The Majara Residence Example. *Energy and Environmental Design Journal*, 25(4), 101-112.
- [21] Sustainable Architecture Report. (2021). Community Engagement in Sustainable Housing Projects: Majara Residence. *Sustainable Architecture Report*, 34(2), 89-96.
- [22] Habitat International. (2022). Resilient and Livable Spaces in Social Housing: Lessons from Majara Residence. *Habitat International*, 58, 45-56.
- [23] Habitat International. (2020). The Impact of Rapid Housing Construction on Participatory Processes in Iran. *Habitat International*, 44(2), 132-140.
- [24] Iranian Urban Studies Journal. (2019). Cultural Barriers to Participatory Housing Design in Iran. *Iranian Urban Studies Journal*, 15(4), 204-212.
- [25] Development and Change. (2021). Economic Challenges in Implementing Participatory Housing Design in Iran. *Development and Change*, 52(1), 77-89.
- [26] Social Housing Review. (2020). Public Awareness and Education Gaps in Housing Participation in Iran. *Social Housing Review*, 11(3), 145-153.
- [27] Smart Cities and Communities Journal. (2022). Digital Tools and the Barriers to Inclusive Participation in Iranian Housing Design. *Smart Cities and Communities Journal*, 9(4), 118-126.
- [28] Iranian Architectural Research Journal. (2021). Collaboration challenges in participatory housing design in Iran. *Iranian Architectural Research Journal*, 23(2), 90-98.
- [29] Renewal SA. (2022). Oaklands Green Redevelopment Project Overview. *Renewal SA*, 15(1), 22-30.
- [30] Sustainable Cities Journal. (2023). Sustainable Water and Energy Systems at Oaklands Green. *Sustainable Cities Journal*, 5(2), 101-112.
- [31] Urban Planning and Design Review. (2023). The Role of Green Spaces in Oaklands Green Redevelopment. *Urban Planning and Design Review*, 13(4), 63-75.
- [32] Energy Efficiency Journal. (2023). Passive Design Strategies at Oaklands Green. *Energy Efficiency Journal*, 8(1), 45-58.
- [33] Architectural Review. (2023). Modular Housing Designs at Oaklands Green. *Architectural Review*, 18(3), 112-120.
- [34] Housing Futures Report. (2022). Community Consultation in Oaklands Green Redevelopment. *Housing Futures Report*, 9(1), 40-52.
- [35] Sustainable Development Goals Report. (2023). Oaklands Green: A Model for Sustainable Social Housing. *Sustainable Development Goals Report*, 3(2), 80-92.
- [36] AHURI. (2024). User Participation in Housing Design: Challenges and Opportunities in Australia. *Australian Housing and Urban Research Institute (AHURI)*, 17(3), 56-72.
- [37] Tandfonline. (2023). Cultural Diversity and User Participation in Housing Design. *Journal of Urban Development*, 15(2), 134-148.
- [38] Smart Cities and Communities Journal. (2022). Digital Tools and Inequities in User Participation. *Smart Cities and Communities Journal*, 6(1), 88-101.
- [39] Australian Urban Planning Journal. (2023). Collaboration Challenges in Urban Housing Design. *Australian Urban Planning Journal*, 12(4), 90-105.
- [40] Majara Residence. *Architettura come manifesto sociale (Architecture as a social manifesto): il (The) Majara Residence in Iran*. (2023).
- [41] Oaklands Green. [Oaklandsgreen.com.au](http://Oaklandsgreen.com.au)

## AUTHOR'S PROFILE



**Morteza Khajehahsani**, I am an architect with extensive experience in professional practice and research, specializing in sustainable and community-focused design. I have worked with renowned architects such as Mohammad Varasteh and Matteo Arnone as a team manager and 3D designer (both in my home country and in Italy), utilizing advanced tools like BIM and VR. In research, I collaborated with Professors Pandolfi and Contin on projects such as protocol mapping for Bolivia (South America) and designing sustainable social housing in Toronto (Canada) to empower marginalized communities by using the sustainable governmental strategy. With a deep passion for sustainable social housing and community-focused design, I am committed to research that bridges the gap between sustainable architecture, social housing, and community empowerment. My work is driven by the belief that architecture should not only provide shelter but also foster inclusivity, resilience, and social well-being.