

Aspects and Dimensions of the Concept of Housing in Contemporary Research Approaches Worldwide

Anahita Shahpari¹, Ramin Madani², Bahram Saleh Sedghpour³

¹Art University of Isfahan, Department of Architecture, Ostandari St., Isfahan, Iran

²Faculty of Architecture and Urban Design, Art University of Isfahan, Isfahan, Iran

³Faculty of Humanities, Shahid Rajaee Teacher Training University, Tehran, Iran.

ABSTRACT: This paper explores definitions and approaches to housing and residence. Many universities and labs have identified effective strategies for improving housing quality. Despite extensive studies on housing quality improvement, a comprehensive overview integrating various dimensions and methodologies across different contexts is lacking.

To investigate housing issues, we reviewed definitions and research from top universities. Our analysis focused on the objectives and methodologies of various departments regarding research policies. We examined the missions, visions, and curricula of 15 universities from the QS Rankings in Architecture and the Built Environment related to housing challenges. Using Shannon entropy, we identified higher values indicating the lower significance of certain attributes, which highlighted uncertainty in our findings. We then created a decision matrix and applied a weighting method to assess the importance of each approach. The results indicate that future research will uncover new dimensions of housing on international and national scales, rules, regulations, and theoretical approaches. Key concepts such as resident needs and quality of life highlight their importance in the housing sector. This paper provides a comprehensive perspective on housing challenges and approaches. By highlighting commonalities, it can assist researchers and designers in creating effective solutions for the future.

KEYWORDS: Housing, approaches, definition, vision, mission, strategy, Shannon entropy method, weighting techniques.

I. INTRODUCTION

Housing is a multifaceted issue shaped by diverse cultural, geographical, economic, and demographic factors. On a global scale, there is an urgent need to ensure that the housing supply is both environmentally sustainable and appealing to its residents. Achieving this objective necessitates a profound comprehension of the interplay between residential preferences and the attributes of dwellings (Pagani and Binder 2023). Achieving sustainable development for the next generation is contingent upon addressing housing issues. Moreover, the right to adequate housing has been a longstanding priority (Habitat 2021).

“Adequate housing means more than a roof over one’s head. It also means adequate privacy; adequate space; physical accessibility; adequate security; security of tenure; structural stability and durability; adequate lighting, heating, and ventilation; adequate basic infrastructure, such as water supply, sanitation, and waste-management facilities; suitable environmental quality and health-related factors; and adequate and accessible location with regard to work and basic facilities: all of which should be available at an affordable cost” (UN-Habitat 2022). According to projections by UN-Habitat, by the year 2030, approximately 3 billion individuals, constituting approximately 40% of the global population, will require access to adequate housing. This

translates to a daily demand for 96,000 new affordable and accessible housing units. To effectively address the existing housing challenges, it is essential that all levels of government prioritize housing within urban policies, ensuring that people and human rights are central to sustainable urban development (UN-Habitat 2024).

Universities have been identified as playing a critical role in housing research and policy development, providing both theoretical insights and practical solutions to address global challenges. They engage in multidisciplinary research that informs housing strategies and urban planning. The Penn IUR policy brief underscores the significance of university-led initiatives in addressing affordable housing concerns. A range of models have been implemented by institutions such as Duke, Harvard, Marquette, the University of Pittsburgh, USC, UVA, and UPenn. These models are characterized by a focus on research-driven approaches and community involvement. Through initiatives such as the Anchor Institution Roundtable, universities exert influence over housing policies and apply their research to real-world contexts. This collaborative effort underscores the vital role universities play in promoting sustainable and inclusive housing solutions that resonate within the broader global housing discourse (Ehlenz 2023). Universities are pivotal in advancing housing research and fostering innovation. In

Spain, from 2012 to 2016, the university sector—comprised of both public and private institutions—contributed an impressive 61% of the country's scientific output, as recorded in the Web of Science (WoS) database. This figure significantly surpasses the contributions of the healthcare sector, which contributed 28%, and the CSIC, which contributed 16%. This finding underscores the pivotal function of universities as primary knowledge generators. Their pioneering research not only accelerates progress across diverse disciplines but also fosters advancements in housing policies, thereby positioning them as vital catalysts in addressing global housing challenges (Bautista Puig, Mauleón, and Casado 2019). It is evident that institutions of higher learning, such as Harvard, illustrate the pivotal role of universities and emphasize the necessity of incorporating a comprehensive perspective into their curriculum, both domestically and internationally. Students examine the diverse approaches to housing, cross-cultural, political, and economic contexts (Harvard Graduate School of Design 2025).

The diversity of perspectives and practices in this domain underscores the need for a comprehensive framework that consolidates existing knowledge and guides future research. Without such a unified approach, housing studies risk fragmentation, limiting their potential to address critical challenges and drive innovative solutions. While many universities and research labs have identified effective strategies for improving housing quality—a fundamental human need—there remains a lack of a comprehensive overview that integrates diverse dimensions and approaches to housing across different contexts.

By adopting a holistic perspective, this study offers a roadmap for both researchers and policymakers. For researchers, it provides a structured understanding of existing work, enabling systematic and impactful inquiries. For policymakers, it serves as a foundation for informed decision-making on housing strategies at a broader scale. Ultimately, this paper aims to foster innovative and effective solutions to address global housing challenges, ensuring that housing meets the needs of evolving populations while promoting accessibility and social equity.

The present paper makes a contribution to the extant literature on housing by addressing significant gaps in understanding housing policies, research, and education across various global contexts. Firstly, it enriches the discourse on housing frameworks by consolidating a diverse array of definitions, methodologies, and approaches from prominent academic institutions. By systematically evaluating the contributions of prominent universities and research organizations, this study offers a comprehensive analysis of the structure and impact of housing research on policy and practice. Secondly, the study contributes to the

extant literature on housing adequacy by examining its various dimensions, including accessibility, sustainability, and socio-economic impacts. While numerous studies have focused on specific housing types or historical perspectives, a comprehensive framework that summarizes global housing strategies remains to be developed. This paper utilizes an integrated approach, incorporating diverse research methodologies, to underscore the pivotal role of academic institutions in shaping housing policies and devising solutions that address contemporary urban and social challenges. Furthermore, the present study contributes to the extant literature by employing a structured methodology, incorporating Shannon entropy and a decision matrix, to assess the significance of various research attributes. This methodological approach enables a comparative analysis of housing-related academic programs, thereby facilitating a more profound comprehension of how research priorities are established in diverse geographical regions. y employing a structured analytical approach, this research aims to bridge the gap between theory and practice, providing a roadmap for future studies in the housing sector.

II.METHODOLOGY

In an attempt to find approaches, top universities in the world were explored. The exploration of universities for different perspectives on housing can be helpful in order to have a comprehensive perspective on housing. The QS 1world ranking by subject 2024 for architecture and built environment is used in order to study the best university [1]. The success of this research depends on the quality of the sample selection.

It plays a decisive role in the validity of the research. For this reason, it is crucial to explain the method used for selecting the samples before dealing with them. The most significant criterion in this process is the university's success rate. Some popular rating systems are QS, URAP [2], Forbes [3], and U.S. News Rankings [4]. The QS system is particularly valuable as it independently evaluates architecture programs, which is why we chose it for our study.

The QS ranking evaluates universities based on nine factors: academic reputation (30%), employer reputation (15%), faculty-student ratio (10%), citations per faculty (20%), international faculty ratio (5%), international student ratio (5%), international research network (5%), employment outcomes (5%), and sustainability (5%) [5]. The top 20 universities were studied. Among these universities, 13 are leading the way in including housing in their curricula. Furthermore, the two universities of Melbourne and McGill have taken a distinctive approach to the field of housing in their research and investigations.

Table I- LIST OF STUDIED UNIVERSITIES

Rank	Continent	University
1	Europe	UCL University
2	North Amerika	Massachusetts Institute of Technology
3	Europe	Delft University of Technology
4	Europe	ETH Zurich University
=5	Europe	Manchester School of Architecture
5	Asia	National University of Singapore
6	North Amerika	Harvard University
7	Europe	Polytechnic di Milano
8	Asia	Tsinghua University
9	North Amerika	University of California, Berkeley
11	Europe	EPFL University
12	Asia	The University of Hong Kong
16	North Amerika	Columbia University
=24	Australia	The university of Melbourne
51-100	Montreal	McGill University

To understand the missions, visions, strategic plans, and curricula of these 15 universities, we studied them in-depth and recorded the main approaches of each. These approaches were based on the main idea that housing and its challenges must be taken into account.

Shannon entropy is a multiple attribute decision-making method that can weight attributes to make a decision. This method is widely used in various fields of science [6]. The concept of Shannon's entropy has an important role in information theory and is used to refer to a general measure of uncertainty. Thus, the measure of entropy can show the randomness of attributes. The greater the measure of entropy corresponding to an attribute, the smaller the attribute weight. The weight of an attribute can show the uncertainty importance of that attribute. Since the weight obtained by the entropy method expresses the uncertainty of a continuous probability distribution, the higher the weight of an index, the lower the certainty of that index (attribute).

First, the data from the review was turned into a decision matrix that is needed Shannon entropy-based weighting method. In this matrix, each approach was regarded as an attribute, whose significance was to be calculated, and each university used as an alternative showing the importance of a composition of attributes. If a value was studied in a university, that value would get a score of 1 for the university. The matrix created in this way based on Table II Guidelines and rules are among the documents that significantly impact the housing sector.

Second, the analysis of the Shannon entropy-based weighting method was used to measure the significance of each approach. These methods original procedure can expressed in a series of steps.

In step 1, the decision matrix has to be normalized using the equation below.

$$P_{ij} = \frac{x_{ij}}{\sum_{j=1}^m x_{ij}}, J=1, \dots, m, i=1, \dots, n$$

In step 2, the entropy of each approach is calculated using the equation below.

$$h_i = -h_0 \sum_{j=1}^m P_{ij} \cdot \ln p_{ij}, i=1, \dots, n, h_0 = (\ln m)^{-1}$$

In step 3, d_i that denotes the degree of diversification, has to be calculated using the equation below.

$$d_i = 1 - h_i, i=1, \dots, n$$

In step 4, w_i as the weight of approach, can be calculated using the equation below:

$$w_i = \frac{d_i}{\sum_{s=1}^n d_s}$$

At last, a chart can be made of the frequency of each value and their calculated significances. This chart can help deeply analyze the values [7].

III. DEFINITIONS AND RESEARCH APPROACHES RELATED TO HOUSING AROUND THE WORLD

A. University College London (UCL)

This university's unique approach to research, education, and innovation inspires our community to transform understanding of the world and tackle global challenges. They aim to educate students in creative thinking and innovative methods, enhancing the human experience and improving environmental conditions while addressing the critical challenges of history and technology (UCL Bartlett School of Architecture, 2024).

The University's mission is to discover innovative solutions through interdisciplinary approaches, prioritizing values like freedom, equality, integrity, and human diversity. Housing is recognized as a fundamental need, making the provision of high-quality, well-located housing a priority. Ideal housing should tackle environmental challenges and promote sustainability, social equity, affordability, and accessibility [8]. To achieve this, the University combines considerations of energy, cultural values, family, history, and both traditional and contemporary techniques [9] [10]. This interdisciplinary focus highlights the significance of human dignity and the essential role of housing in fulfilling human needs while ensuring quality living environments.

B. Massachusetts Institute of Technology (MIT)

The primary mission of MIT University is to advance knowledge and educate students in the fields of technology, design, planning, and policy to improve the quality of life locally and globally.² By creating and developing knowledge and protecting it, it can actively address the challenges of the 21st century in collaboration with other related universities. Architecture and Urbanism,

Building Technology, Computation, History, Theory and Criticism of Architecture and Art, Art, Culture and Technology programs are areas of study and research in this university. It shows its perspective among the architecture subject [11]. Exploring the built environment to find and create a better future, committed to the culture of experimentation in expanding the field of architecture and creating change in the world, focusing on raising critical questions while solving problems, and facing the built environment as a cultural, technological, social and environmental situation. Cultivating individual creativity within a framework of values with social, human and environmental responsibility is the main approach and vision of the University [12].

The University aims to explore housing courses and develop effective solutions through an interdisciplinary approach. By merging urban and technological design, they address future challenges to create livable environments. Key focuses include identifying adaptive biological entities, zero-energy architecture, environmental concerns, work-life balance, neighborhood dynamics, and economic factors. [13] [14]. Cities of the future must accelerate housing delivery to keep up with rising demand. Key challenges include speeding up construction and reducing labor costs [15] [16]. prioritizing the development of sustainable and cost-effective materials and delivery methods [17] [18] [19] [20]. The collaboration between architecture and the real estate sector is another aspect of the University's view to provide housing based on economic factors, particularly for poor and low-income groups. Along with infrastructure, improving quality of life and livability is a priority in the development of these homes. [21].

In conclusion, the University identifies two main approaches to interdisciplinary collaboration focused on housing supply in relation to population growth and demand. This comprehensive view emphasizes both qualitative and quantitative aspects, recognizing that housing is more than just shelter. [22] [23].

C. Delft University of Technology

The university focuses on preparing students to tackle global challenges by training socially responsible engineers familiar with the latest scientific developments. Its mission emphasizes problem-solving, teamwork, and personal growth, aiming to address global crises and contribute to a better society. [24]. The Faculty of Architecture promotes open communication and innovation, establishing a global reputation by addressing national and international challenges. It redefines architecture as the science and art of design, focusing on the relationship between form, structure, and function. The primary goal of architectural research is to develop theories foundational to architecture, reflecting society's quest for future-oriented and cultural values in buildings [25]. The university aims to offer new perspectives in design and construction, clarify the role

of architects, strengthen ties with the business community and other institutions, and educate future architects.

The Housing Research Institute focuses on creating diverse, sustainable housing by integrating various functions and research methods. It evaluates the quality of living spaces and the dynamics between public and private areas, addressing housing challenges both in the Netherlands and globally. The aim is to provide affordable and responsive housing solutions to improve quality of life amid population growth. Future housing developments will consider cultural, social, and ecological changes, along with technological advancements. [26] [27] [28]. Like MIT, the quality of living environments is a key focus. The "One Million Homes" project emphasizes that "living space is not just the provision of more buildings," highlighting a broader view of living space. [29]. Researchers at this university engage with social, economic, and geographical fields to address housing challenges. Their interests include green housing, promoting health and comfort, creating accessible housing for all ages, developing sustainable and low-cost options, and emphasizing the social context. They also study traditional and contemporary design methods, focusing on working and living conditions and the reuse of post-war houses to tackle economic, demographic, and environmental issues. These topics are significant for both students and researchers. [30] [31].

The study of housing considers cultural and contextual factors in the Netherlands and globally. It emphasizes a social perspective and a future-oriented approach. To better understand housing needs, the university collaborates with housing providers to balance demand and availability. Housing is viewed as a qualitative aspect of the research, rooted in social principles. [32].

D. ETH Zurich

The university's mission, "Paving the way in a complex world," focuses on preparing the next generation of critical and innovative thinkers. By fostering skills such as analysis, decision-making, and creative thinking, the university aims to positively impact public welfare and the environment. Through research and collaboration with other institutions, the university addresses societal and economic challenges while promoting sustainability. Its core areas of emphasis include education, health, materials, and responsible design and production [33] [34].

This university, like Delft University, embraces a futurist approach on national and global levels. Its mission is to educate critical and creative professionals dedicated to preserving public interests, social welfare, natural resources, and the environment. The university focuses on research that fosters new knowledge and technology. In response to the United Nations' emphasis on social sustainability since 2015, the university is refining its strategies to address digital knowledge, climate change, an aging population, and megacities. An approach called the Diversity of Challenges, recognizes housing shortages, global warming, migration,

and displacement as key contemporary challenges, with housing being a crucial factor in well-being. [35]. Through the emergence of the placement of these bodies in housing studies, the connection between the field of housing, and urban and landscape design is highlighted. As the largest consumer of energy, housing must explore cutting-edge technologies and low-consumption options. The "collective housing" approach addresses urban design, construction technologies, and housing theories. A key mission of this university is to create solutions for vibrant cities and affordable housing. [36]. Housing is examined through socio-economic, cultural, and political challenges within urban contexts. Architects, urban planners, and civil engineers will focus on diverse cultural perspectives to address the needs and well-being of individuals. Key topics include improving the livability and sustainability of neighborhoods, providing housing for vulnerable populations like the elderly, refugees, and those living in poverty, as well as addressing settlement issues after disasters and solutions for homelessness. Sustainability will be a central theme in the study of housing and will be explored in collaborative efforts.

E. Manchester School of Architecture

University research aims to define the essence of the house in its context and identify solutions for its provision. The university emphasizes responsive and affordable housing, focusing on workers and vulnerable populations. This underscores the role of social studies in its mission. Housing projects explore social, cultural, and biological factors, as well as the unique characteristics of various complex housing types and individual units. [37] [38]. URBED+ is a research institute within this faculty that focuses on innovative, interdisciplinary studies. Its topics include settlement patterns, building retrofitting, energy performance, transportation, community participation, master planning, landscape design, and public space development. [39]. In 2019, this group collaborated with builders to create rules and guidelines to address the growing demand for quality housing. [40]. This university's research on elderly housing examines the impact of design, climate, and social factors. It addresses the challenges faced by the elderly and aims to reduce energy consumption in England's cold climate. [41]. Rightsizing and Right Place are research projects examining housing options. They focus on factors such as room size, social background, neighborhood characteristics, sense of place, and the importance of emotions in shaping housing experiences. [42].

F. National University of Singapore (NUS)

The National University of Singapore aspires to be a leading center for energy and sustainability in tropical built environments, focusing on research and innovation in sustainable buildings and energy efficiency to enhance livability. [43]. This group aims to shape the future by developing talents, creating innovative solutions, and advancing society amid global challenges. [44]. The Department of Architecture aims to nurture creative global

designers and critical thinkers to shape the future of Asia and the world. The university fosters interdisciplinary collaboration between engineering and design to address complex societal needs. Its mission is to educate international designers who enhance social outcomes through innovative content and the use of digital tools and emerging technologies.

The humanistic approach at the university focuses on social interactions within the academic community. All methods used are geared toward achieving social goals, with an emphasis on providing ethical solutions to environmental and social challenges. As Singapore's first interdisciplinary university, it champions "Asian Architecture," guiding architects in studying and developing appropriate solutions for Asia and tropical regions, particularly the equatorial zone. [45]. Researchers assert that a home is a space for people to live and work together. In many cases, the house is seen as the basic unit of society. As a result, universities view the city as a setting that accommodates these social, economic, and cultural units. [46]. This university studies housing in its geographical context, emphasizing the household and family model to develop spatial systems and design approaches that prioritize socioeconomic needs. [47]. Energy-efficient housing in Singapore emphasizes optimizing energy use and improving resident satisfaction through intelligent and human-centered systems. [48]. In conclusion, the university focuses on Singapore, examining housing from a cultural perspective and the household model. It also explores related issues such as energy, social, cultural, and economic factors.

G. Harvard University

Harvard University is committed to educating future leaders for a just and equitable world. It focuses on training citizens with a strong emphasis on the transformative power of education in sciences and arts. Students engage with new ideas in a diverse environment, enhancing their intellectual growth and fostering social transformation. The School of Architecture is a distinctive community that reflects these principles. [49]. The University offers a diverse and collaborative environment with numerous educational opportunities in design. Students will explore innovative methods and benefit from the university's global reputation in architecture. They will gain a solid understanding of architectural principles and address contemporary challenges using insights from around the world. Focus areas include infrastructure, health, housing, and climate change, emphasizing the need for collaboration across various sectors. The university is committed to providing responsive housing solutions that meet evolving needs. [50]. Housing priorities are constantly evolving, making it a key issue to address. Various factors—international, cultural, demographic, psychological, and environmental—must be considered to develop effective responses. Ultimately, research aims to enhance human life through design. [51].

The Joint Center for Housing Studies focuses on the study of housing challenges, problems, and policies.

Identifying the needs of cities and communities for government, business, and construction is one of the Center's interpretations of housing in modern society and the age of modernity is another focus area of this collection. Issues such as globalization, cultural imagery, and mass production need to be addressed, as well as the importance of local and Indigenous features and elements in the context of globalization. [52]. Housing is a crucial part of infrastructure that needs in-depth analysis. Additionally, the connection between modern housing and the city is explored on a larger scale. [53]. The infrastructure of housing necessitates an examination of its economic and governance aspects. The University's focus on local and global perspectives makes it a key institution for housing studies. [54].

H. University of California, Berkeley (UCB)

The university focuses on its mission to serve society by acting as a hub of knowledge, sharing insights, and exploring new frontiers in education. [55].

The UC Berkeley Department of Architecture is based on core principles of design, interdisciplinary collaboration, and real-world experience. As part of the Department of Environmental Design, it emphasizes social, cultural, and environmental values in education, research, and design. Committed to sustainability and futurism, researchers prioritize sustainability, health, and equitable futures [56]. Sustainability and equality are vital for tackling climate change and its impact on human life. Thus, the faculty's mission focuses on environmental and social issues. [57]. This University explores affordable housing, urban housing regulations, and market improvements. One key solution proposed is accessory dwelling units, which enhance housing capacity by adding extra units to existing properties. [58] [59]. Also, Housing and urban policy includes laws, market dynamics, natural disasters, social challenges, public policies, current issues, and social housing [60].

I. Tsinghua University

This university focuses on training specialists and designers in construction practices in China. Its mission centers on three key components of human settlements, addressing local development needs while integrating theory and practice in architecture [61]. Social studies and contemporary housing are key educational and research approaches at the university [62].

J. Politecnico di Milano

The Politecnico di Milano is a scientific and technological institution that trains engineers, architects, and industrial designers. It emphasizes quality education and research through experimentation and collaboration with industry. Understanding the labor market is crucial for shaping educational programs and research initiatives, enabling the university to address the needs of industry and public administration effectively [63]. The university emphasizes the importance of addressing societal needs and is committed to sustainability across social, economic, and

environmental dimensions. It focuses on the integration of culture, technology, planning, and design in an interdisciplinary context, while also enhancing students' cultural and technical skills. Core values include freedom, human dignity, and cultural diversity. The university recognizes the significance of cultural and historical contexts, as well as societal infrastructure, to provide comprehensive solutions. It aims to improve the quality of life for all members of society and balances project costs with overall quality [64]. The School of Architecture and Urbanism focuses on developing skills in theory, sociology, anthropology, and art rooted in Italian culture and contemporary urban forms. A key solution for the future of the field is affordable housing, which examines the economic, physical, and architectural aspects together [65]. Social housing is one of the other topics in which social integration is mentioned. Social housing is a key aspect of social integration, merging architectural and socio-economic factors. Research at this university focuses on vulnerable populations, such as the elderly and immigrants, while seeking innovative large-scale housing solutions in contemporary cities [66]. Additionally, contemporary housing and new forms of settlement are also being explored. Also, the historical context of settlement patterns is studied to develop new urban living approaches. The university employs an interdisciplinary strategy, encompassing various subjects related to housing [67].

K. EPFL

Change in today's society is driven by science, technology, and innovation. As a public institution, the university is essential in preparing future leaders and advancing knowledge in underserved areas. They aim to align education with societal needs, strengthen research capabilities, promote open education, and foster communication with Swiss society while ensuring economic stability [68]. The Faculty of Architecture focuses on sustainability challenges in both artificial and natural environments. Its mission includes addressing climate issues like global warming, advancing digital architecture for better quality and management of spaces, and urban development concerns such as population growth and megacities. The School of Architecture, Civil, and Environmental Engineering addresses the challenges of climate change, digitalization, and urbanization, focusing on sustainability in both built and natural environments. [69]. The School of Architecture, Civil, and Environmental Engineering addresses the challenges of climate change, digitalization, and urbanization, focusing on sustainability in both built and natural environments. Research in housing emphasizes social perspectives, lifestyle, and spatial quality, incorporating gender and feminist viewpoints. [70] [71]. The school is committed to exploring various dimensions of sustainability in housing and its relationship to the housing market.

L. The University of Hong Kong

The University of Hong Kong, known as Asia's global university, focuses on internationalization, innovation, and interdisciplinarity to create an impact. It excels in research, teaching, and knowledge exchange, contributing positively to society both globally and within China [72].

Rural architecture is significant in adapting to changing residential patterns in Hong Kong. This involves finding innovative ways to improve living spaces, enhancing the lives of shared-house residents, and addressing the housing needs of vulnerable and homeless populations. [73] [74] [75] [76].

M. Columbia University

Columbia University, one of the world's leading research centers, connects its research and teaching with the resources of a major metropolis to address global issues [77]. The university focuses on how form, space, programs, materials, and media impact human life and thought. Its Housing Lab merges architecture, planning, and conservation to develop affordable and sustainable housing solutions. The Eco House initiative promotes sustainable development amid poverty and climate change in the developing world. Through these efforts, Columbia aims to tackle global housing challenges [78].

Below is a brief review of some universities with opinions on housing that were not included in the top 20 of the QS ranking.

N. McGill University

The Department of Architecture and Urban Planning at this university provides an interdisciplinary education that connects students with society, industry, and various communities. It remains committed to its core responsibilities in architecture, adapting to changing cultural, social, and technological conditions [79]. The university emphasizes sustainability in urban planning and housing, developing innovative solutions like modular and affordable housing. The relationship between housing and urban design is a significant focus, as it addresses socio-economic challenges and promotes livable spaces. Additionally, the affordable housing department explores the impact of poverty on disadvantaged populations [80]. This issue is crucial for national development, and the department also focuses on immigrant settlement as part of its research and educational initiatives [81].

O. The university of Melbourne

Researchers believe their findings will effectively address pressing environmental, economic, and social challenges linked to the interconnectedness of global societies [82].

This University focuses on population growth, affordable housing, and related mental and physical health issues. It presents a metric to assess factors influencing the viability of residential projects, analyzing types of residences, bedroom counts, and economic considerations. Topics also include the sales market and design innovation. A key area of

focus is the impact of affordable housing on health, education, and sustainability [83].

The research also evaluates non-affordable housing's effects and explores innovations aimed at improving health and well-being. In doing so, it examines historical context, residential development patterns, and the influence of social and cultural values on housing markets [84].

IV.RESULTS AND DISCUSSION

The analysis of university curricula identified 22 distinct approaches to housing research, categorized into key themes. Housing and city research explores the integration of residential units within urban contexts, emphasizing accessibility, sustainability, and economic influences [13] [14] [15] [16] [36] [80].

The development of new materials and techniques aims to address rising housing demands through innovative and sustainable construction methods [9] [13] [14] [36] [34] [85].

Future housing research incorporates cultural, social, and technological factors, aligning with interdisciplinary approaches to meet evolving challenges [28].

Livability and housing studies focus on enhancing residential experiences by balancing private and public spaces [13] [21].

Flexibility and adaptability in design are crucial for meeting future spatial needs, ensuring that housing solutions accommodate shifting demographics [13].

Work is a fundamental aspect of human existence. To develop a comprehensive understanding, it is crucial to examine the relationship between work environments and living spaces, as well as how these environments influence each other [86].

Neighborhood sustainability is vital, with social interaction at its core. Homes should be viewed within the broader context of residential blocks [42].

Housing markets underscore the economic importance of housing, necessitating a focus on the relationship between housing design and market pricing [8] [83].

Considering the pressing issue of climate change, sustainability is vital in housing design, addressing environmental, social, and economic aspects [26] [28] [35].

"Affordable housing" refers to dwellings deemed affordable for those with household incomes at or below the median, as established by government standards. Ensuring a sufficient supply of suitable housing for all residents is essential [84] [87] [15].

Vulnerable populations, including the elderly and immigrants, are a primary focus of housing studies. Initiatives must address their specific housing needs, including those facing homelessness [21] [42] [66]. Similar to the Massachusetts Institute of Technology (MIT), many

universities are dedicated to enhancing the quality of life both locally and globally. The quality of life for all members of society is of utmost importance, while the achievement of personal goals is considered secondary [26] [35].

The qualitative dimension focuses on social principles and housing quality, prompting universities to research living environment evaluations [42].

Quantitative factors, like house size and the number of rooms, are essential alongside qualitative factors in defining a perfect home. Projects such as Rightsizing and Right Place emphasize the importance of both [42].

To develop appropriate solutions for the complex future of housing, it is necessary to implement a national strategy and pay adequate attention to the specific context. Many universities are actively engaged in research at the national level to address these challenges [28] [52].

Many universities address housing issues on an international scale, seeking solutions that can be applied globally [28]

Responsive Housing emphasizes affordable housing by considering human needs and how housing can support sustainable solutions [8].

Various studies, including the 1Million Homes Project, argue that a house is not just a physical structure but a place where individuals can build community. This perspective challenges the conventional view of housing as merely shelter and highlights the broader social and cultural significance of a home [29] [8].

Universities like the National University of Singapore highlight the importance of family models and lifestyles in housing design.

Many universities view housing as essential for city development and a critical aspect of human life, making its design a key responsibility of architects.

One way to define and study housing is by developing theories that underpin it. Research suggests that integrating various theories can enhance our understanding of the housing concept [47].

Regulations significantly impact housing quality and quantity, leading universities to revise existing guidelines for improvement [40] [51].

Table II- Housing approach based on the universities perspective

	Housing and cities	New materials and	Future and housing	Liveability and housing	Flexibility and adaptive	Work-living	Neighbourhood	Housing and Economy	Sustainability	Affordable housing	Vulnerable residence	Quality of life and	Qualitative dimension	Quantitative dimension	National housing	International housing	Responsive housing	Housing as Home more	Social context and	Social responsibility	Housing theories	Rules and regulation
UCL	*	*							*	*		*	*	*		*	*	*	*	*		
MIT	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
Delft		*	*		*			*	*	*	*	*	*	*	*	*	*	*	*	*		

	Housing and cities	New materials and	Future and housing	Liveability and housing	Flexibility and adaptive	Work-living	Neighbourhood	Housing and Economy	Sustainability	Affordable housing	Vulnerable residence	Quality of life and	Qualitative dimension	Quantitative dimension	National housing	International housing	Responsive housing	Housing as Home more	Social context and	Social responsibility	Housing theories	Rules and regulation
ETH	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Manchester School of Architecture		*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
National University of Singapore	*	*		*			*	*	*		*	*			*	*	*	*	*	*	*	*
Harvard	*						*	*	*		*	*	*	*	*	*	*	*	*	*	*	*
Politecnico di Milano	*	*							*									*	*	*	*	*
Tsinghua	*									*								*	*	*	*	*
Berkley	*	*		*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
EPFL	*	*						*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
The University of Hong Kong									*	*	*	*	*	*	*	*	*	*	*	*	*	*
Columbia	*			*				*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
The university of Melbourne		*					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
McGill	*		*																			

The subsequent step was to categorize these approaches based on their definitions and shared characteristics. The study of housing and cities, as well as the relationship between housing and work, can be broadly categorized under the umbrella term of “urban design and housing”. When considering the quality of residents' lives, all four approaches to quality of life and wellbeing—qualitative dimension, housing as home, and more than shelter—can be labeled as “housing and quality of life”. The subsequent four

categories of Vulnerable Residence, Responsive Housing, Flexibility, and Adaptive and Social Responsibility all examine the human needs and strive to create a suitable context for all types of residences over time and can be labeled as “housing and residence need”. With regard to the neighborhood relationships and social context and factors, these approaches study the social aspect, which can be labeled as “Housing and Social Aspect.”

The next step involved categorizing these approaches based on their definitions and common characteristics. The investigation of housing and urban settings, as well as the interplay between housing and work, can be broadly classified under the term “urban design and housing.” When evaluating the quality of life for residents, all four approaches to quality of life and well-being—qualitative dimensions, housing as home, and the concept of more than shelter—can be grouped under the heading “housing and quality of life.” The subsequent four categories—Vulnerable Residence, Responsive Housing, Flexibility, and Adaptive and Social Responsibility—examine human needs and aim to establish a suitable context for all types of residences over time, collectively labeled as “housing and residence need.” Concerning neighborhood relationships and social context, these approaches explore the social dimensions and can be referred to as “Housing and Social Aspect.” The final approaches are illustrated in Table III as there are no other comparable methodologies.

Table III- Housing approach based on similarities

	Main approach	Approach	Amount
1	Urban design and housing	Housing and cities	12
		Work-living relationship	
2	Housing and Quality of life	Quality of life and wellbeing	19
		Qualitative dimension	
		Housing as Home, mor than shelter	
		Livability and housing	
3	Housing and residence need	Vulnerable residence	20
		Responsive housing	
		Flexibility and adaptive	
		Social responsibility	
4	Housing and social aspects	Neighborhood relationships	15
		Social context and factors	
5	Material and techniques	New materials and techniques method	12
6	Sustainability	Sustainability	10

	Main approach	Approach	Amount
7	Affordable housing	Affordable housing	9
8	Economy	Housing and Economy	7
9	Quantitative dimension	Quantitative dimension	7
10	International scale	International housing	4
11	Future and housing	Future and housing	3
12	National scale	National housing	3
13	Rules and regulation	Rules and regulation	3
14	Theoretical	Housing theories	3

Based on Table III, a quantitative analysis of the frequency with which various types of housing are discussed in the curricula of leading international universities is presented below.

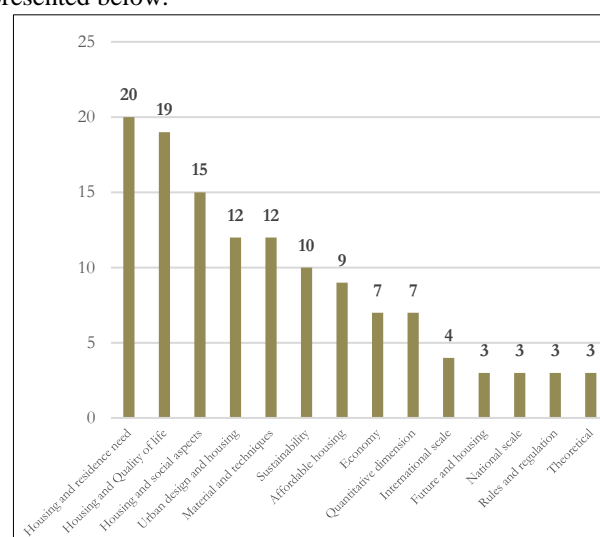


Figure 1- The frequency of housing approaches and definitions in the world’s top universities

Figure 1 presents the results of a review of universities, focusing on the frequency of their housing approaches. It highlights which strategies are most emphasized among world-class universities.

‘Housing and Residence needs’ is the most frequently addressed, covering vulnerable residence, responsive housing, flexibility and adaptive housing, as well as social responsibility. This approach focusing primarily on the diverse and evolving needs for different types of residences over time. It emphasizes the importance of considering all forms of housing with varying needs and attributes. Proper planning for housing must accommodate these changing requirements to support long-term residency. Additionally, the needs of vulnerable residents, such as individuals with disabilities or the elderly, must be taken into account in all aspects and types of housing.

Then, the concept of "Housing and Quality of Life" encompasses four main ideas: quality of life and wellbeing, the qualitative dimension, housing as home, and livability and housing. These ideas have been discussed in depth on numerous occasions, with the livability aspect being the second most frequently addressed. This approach represents a significant area of study within the broader field of housing, focusing on essential components such as housing, residence life, and the fundamental role of the house as the primary structure conducive to residence and well-being. Many universities aim to achieve these goals through various methods of discussion and study.

In third place, the category of "Housing and Social Aspects" covers relationships between neighborhoods and the social context surrounding housing. This category emphasizes the importance of understanding how housing units interact with each other and with the surrounding environment. Fostering social relationships among residents is crucial, as these ties are a fundamental aspect of human life.

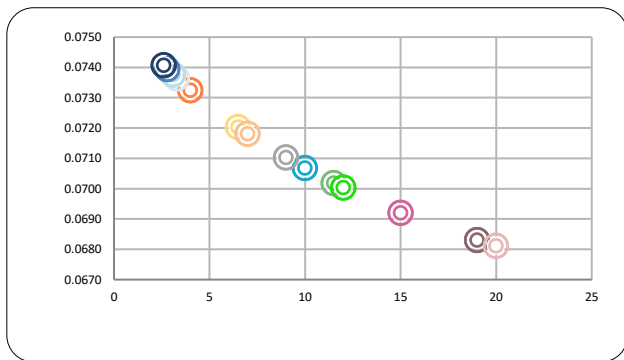


Figure 2- Shannon weighting and frequency of housing definition and approaches

Shannon entropy weighting was applied following the steps outlined in the research methods section. The results indicate that the weighting for definitions and approaches that have received less attention has increased, suggesting a higher potential for uncovering new aspects in future research. Conversely, the weighting for the approaches that have been extensively researched has decreased, indicating a lower potential for discovering new insights in those areas. It is anticipated that future research will uncover new aspects on an international scale, Future and housing, national scale, Rules and regulation, and Theoretical approaches (which present a challenging value). In terms of housing, the concepts of residence needs and quality of life have the highest certainty levels, with weights of 0.0681 and 0.683, respectively, reflecting their non-challenging value.

Table IIV- Classification of definition and approaches of housing among top universities

<i>Amount of certainty</i>	<i>Approach</i>	<i>Weight</i>	<i>Weight diversification</i>	<i>Frequency</i>
Very high certainty (15-20)	Housing and residence need	0.12	0.0681	20
	Housing and Quality of life	0.12	0.0683	19
	Housing and social aspects	0.10	0.0692	15
High certainty (10-15)	Urban design and housing	0.09	0.0700	12
	Material and techniques	0.09	0.0700	12
Moderate certainty (5-10)	Sustainability	0.08	0.0707	10
	Affordable housing	0.08	0.0710	9
	Quantitative dimension	0.07	0.0718	7
	Economy	0.07	0.0718	7
Low certainty (0-5)	International scale	0.04	0.0733	4
	Future and housing	0.04	0.0738	3
	National scale	0.04	0.0738	3
	Rules and regulation	0.03	0.0738	3
	Theoretical	0.03	0.0738	3

V.CONCLUSION

This study highlights the fragmented nature of housing research and the need for an integrated global framework. By consolidating diverse academic approaches, this research provides a foundation for future studies aimed at enhancing housing policies and design strategies. Future work should focus on developing interdisciplinary frameworks that incorporate socio-economic, environmental, and technological considerations to create holistic housing solutions.

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