



Journal of Umm Al-Qura University for Engineering and Architecture

journal homepage: <https://uqu.edu.sa/en/jea>

An Assessment of the Saudi Community Assimilation of Sustainable Heritage Housing

Mohamed M. Shawky Abou Leila ^{a,b*}, Magdy M. El-Bastawisy ^{a,c}.

^a College of Engineering and Islamic Architecture, Umm Al-Qura University, Makkah, Saudi Arabia.

^b Faculty of Engineering, Mansoura University, Mansoura, Egypt.

^c Department of Architecture & Urban Planning, Faculty of Engineering, Port-Said University, port-said, Egypt.

ARTICLE INFO

Article History:

Submission date: 07/12/2020

Accepted date: 06/03/2021

Keywords:

Saudi community -Sustainable Heritage Housing -Mecca.

ABSTRACT

Undisputedly, the housing sector is by all means a vitally crucial pillar in any country. It is accountable for leading a cordially socially sustainable, economically stable community, resulting in political development and cultural blossoming. Therefore, housing investment is ultimately fruitful in consideration of its causal national income growth and labor-force recruiting. Thus, it is a national treasure and investment motivation equidistantly. Unfortunately, the named sector is recently victimized by the truancy of sensible housing units in the kingdom in general and Mecca along with the Western region. In particular, undoubtedly, housing supply comes first among the priorities of the Saudi government, where both of the housing and urban sectors are contemplated, to be the milestone of cultural development and prosperity of the living conditions of its populace. Likewise, it is directly proportional to providing their citizens with their basic needs. Besides, an important economic sector contributes directly to the growth of the national economy. Nowadays, the world is vulnerable to natural resources scantiness, economic inflation, and demanding environmental development. Coping with the rapid increase of the population and their consequent environmental fallacies, a compatible environment preservation concept must be revolutionized, to safeguard its resources achieving sustainability. Recently, national and international bodies are calling out for an instant decree, to realize the mentioned conception.

The controversy between municipal pattern, housing urban characterization, and identity tag is setting forth all over KSA, by the synchronous climate changes taking over the kingdom. There comes the research problem, to underline the innate capacity of the country, to stand up to the prospect Saudi 2030 Vision; especially those housing concerned ones implemented by the Housing Ministry mindful of the sustainability conception and heritage identity perception; especially in Mecca. Accordingly, these projects are pending, due to the palpable malfunctions that would probably occur. Henceforth, this study investigates the assimilation aptitude of the Saudi community, to comply with the stipulated provisions to get over the housing crisis in the kingdom. Amongst all the Saudi municipalities, Mecca is distinguished for its heritage identity incarnated in its renowned Hijazi architecture that shall not face any infringement. This research is an attempt, to verify and evaluate the competence and demands of the Saudi community regarding the progression of sustainable heritage housing projects. The research aims at issuing conclusions and recommendations that earn the community members' satisfaction in terms of the functionality and urgency of the project, to achieve sustainability, preserving its heritage and architectural identity.

1. Introduction

Recently, municipal sustainable development is a pan-Arab challenge in general and Saudi in particular. Undeniably, sustainability processes have been critical amidst the extant globally sweeping energy crises hand in hand with their ferocious economic counterparts, which stand beyond realizing the Saudi 2030 Vision. Moreover, the study investigates the cachet of the entitled designs in the realm of meeting Saudi users' demands and expectations. The study measures the potential of these projects, to achieve sustainability in the account of the multifarious identities and heritage legacies of each region within the Kingdom.

The study aims at issuing conclusions and recommendations that earn the community members' satisfaction in terms of the functionality and inevitability of the project, to realize sustainability standards, preserving its heritage and architectural identity, and by turn the 2030 Vision of the kingdom. This study assesses the Saudi community assimilation of sustainable heritage housing, by postulating the time-being housing characteristics in its residential parameters; as well as the perspective of its residents. For instance, Mecca; the research case study; has witnessed a gross expansion in its central region. Yet, it thrives to put an end to the consequent housing

crises out of the mass elimination of houses outlining the Al-Haram al-Sharif compartment.

The research proposes a theoretical hypothesis, to elucidate the research methodology, achieving its primary goal and hence its subsidiary ones. The validity of the mentioned hypothesis is to be appraised by the recommendations and conclusions of the research. The hypothesis estimates the acceptance of the Meccan Saudi community, to reach a compromise in terms of preserving the house's heritage identity, and functional sustainability.

The research validity and objectives are authenticated throughout its methodology. The research methodology has adopted the inductive, descriptive, and analytical approaches; as displayed in the theoretical section. This section scrutinizes the demographic, ethnographic, and historical origins of Mecca. Additionally, it has conducted a demographic survey in consideration of the number of housing units in Mecca and KSA, comparing the arithmetic value of the vacant and occupied ones. No mention, the research enlists the resident Saudi families in terms of their housing categories, tenure typologies, and the number of individuals of each.

The theoretical section also lays out the eminence of the housing sector in the Kingdom, and exhibits some theoretical definitions; to name a few, housing, sustainability, sustainable housing,

* Corresponding Author

College of Engineering and Islamic Architecture, Umm Al-Qura University, Makkah, Saudi Arabia.

E-mail address: m_shawky_lila@yahoo.com (Mohamed M. Shawky Abou Leila).

1685-4732 / 1685-4740 © 2021 UQU All rights reserved.

characterization, identity, and heritage. Then the research delineates one of the most pronounced traditional buildings (Al-Hijazi House) in Mecca as an embodiment of sustainable housing. After that, the research addresses the housing program in the Kingdom prospect Vision 2030, and the exerted efforts of the Saudi Ministry of Housing tackling its devoted programs. The research shifts to the analytical study using the specifically plotted questionnaire, to measure the eligibility of the 2030 housing program and the efforts of the Saudi Ministry of Housing through reviewing of a number of programs on the behalf of the Ministry, availing it of the study tools, limitations and the signifying factors of the study. The research employs the mechanisms of the questionnaire, then comes up with the results of the study sample, analysis the conclusions and recommendations.

2. Preface

It is acknowledged that Muslims all over the world are obsessed with the Islamic value and worth of Mecca, which has been reflected in its accelerated population rates. This concurrent increase has resulted in the inaptitude of the housing capacity compared to the numerating flow of families in the late decades. In spite of this insufficiency, private investors and real estate developers opt to establish pilgrims' allotments for a warranted income, rather than founding private housing units, refraining from the dear-priced maintenance processes.

Thence, Mecca stood on the horns of the dilemma, where it encounters multiple challenges rather than the fellow municipalities of the kingdom.

The results of the 2017 Population Survey pinpoints that Saudi Arabia's population in 2017 was about 32552336, persons, exceeding that of the 2016 population; 3,174,308 persons, marking a population growth rate of about 2.52%, where 57.48% were males and 42.52% were females. This illustration includes about 13 geographic administrative regions. Mecca comes first with 26.29% of the kingdom's population density in 2017, and the General Statistics Authority states that the percentage of the owned and occupied houses by Saudi families scored about 49.91% according to the results of a survey the population density in 2017 has been allocated as follows as shown in figure (1-2):

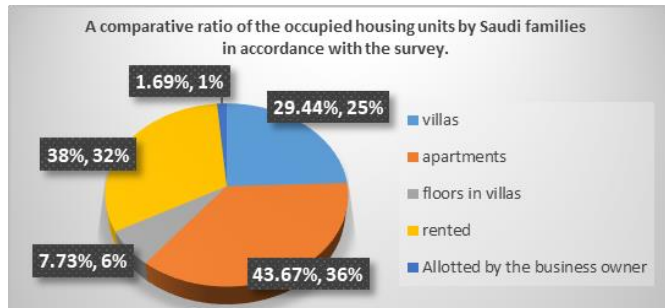


Figure 1: Illustration of the quality of the housing units occupied by the Saudi families, according to the demographic Survey, 2017

2.1. Demographic Statistic of Mecca

According to 2016 Population statistics, Mecca has scored 1920255 persons.



Figure 2: Illustration of the relationship between the municipality of Mecca and Mecca region.

2.2. Historical Documentation on the Population and Housing Census in KSA and the Municipality of Mecca

2.2.1. Demographic Survey of the Population of the Kingdom of Saudi Arabia

Table 1: The number of housing units occupied by Saudi families in the Kingdom of Saudi Arabia in 2016.

		Annual census 2004		Annual census 2011		Annual census 2016		
		Males	Females	Males	Females	Males	Females	
KSA	Total number of Saudis	8,287,370	8,239,970	9,527,173	9,180,403	10,225,650	9,839,320	
		16,527,340		18,707,576		20,064,970		
	The total number of foreigners.	Males	1,881,052	5,932,974	2,496,427	8,8008,314	3,669,024	
Females		6,150,992	8,429,401	11,677,338				
Total		22,678,262 Persons		27,136,977 Persons		31,742,308 Persons		
The Municipality of Mecca.	Total number of Saudis	Males	409,329	405,148	476,459	453,164	2,252,525	2,188,046
		Females	814,477		929,623		4,440,571	
	The total number of foreigners.	Males	355,940	232,527	477,727	277,058	2,479,396	1,405,337
		Females	588,467		754,785		3,884,733	
	Total	1,402,944 Persons		1,684,408 Persons		1,920,225 Persons		
Population growth rate.	6.18%		16%		14.50%			

2.2.2. Number of the Occupied Housing Units by Saudi Families and the Number of Families and Individuals According to their Housing Typologies

Table 2: Number of the Occupied Housing Units by Saudi Families and the Number of Families and Individuals According to their Housing Typologies in 2016.

	Categories	Housing Typologies						Total
		Slums	Villas	A floor in a villa.	A floor in a slum	Apartments.	Others	
KSA	NO of units.	649,523	1,029,593	316,333	57,173	1,363,070	2,096	3,417,788
	NO of families.	649,523	1,029,593	316,333	57,173	1,363,070	2,096	3,417,788
	NO of individuals.	4,137,788	7,856,421	1,913,074	376,695	7,021,950	4,238	21,310,166
Mecca	NO of units.	178,760	139,414	30,177	10,122	498,572	293	857,338
	NO of families.	178,760	139,414	30,177	10,122	498,572	293	857,338
	NO of individuals.	1,015,085	897,998	165,064	54,756	2,579,629	371	4,712,903

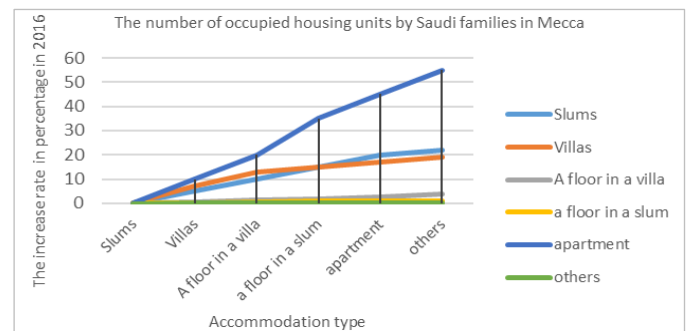


Fig (3): The percentage of occupied housing units by Saudi families in Mecca.

2.2.3. Number of the Occupied Housing Units by Saudi Families According to the Housing Typologies and Tenure Categories

Table 3: Number of the Occupied Housing Units by Saudi Families According to the housing and Tenure Typologies in 2016.

	Category	Housing Typology						Total
		Slums	Villas	A floor in a villa	A floor in a slum	Apartments	Others	
KSA	Ownership	563,191	897,490	197,135	43,830	457,730	0	2,159,376
	Rent	77,927	93,937	112,862	12,327	872,862	1,927	1,171,842
	Allotted by the business owner.	1,588	36,426	4,591	571	20,296	169	63,641
	Others	6,817	1,740	1,745	445	12,182	0	22,929
Mecca Municipality	Ownership	152,842	120,200	22,130	9,634	214,331	0	519,137
	Rent	22,846	8,384	8,047	270	274,837	293	314,677
	Allotted by the business owner.	442	10,524	0	0	4,126	0	15,092
	Others	2,630	306	0	218	5,278	0	8,432

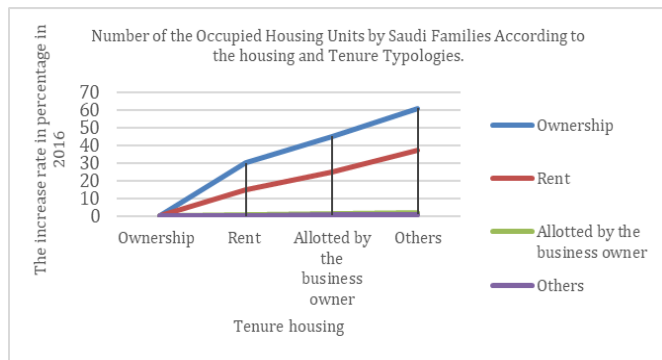


Figure 4: The percentage of the Occupied Housing Units by Saudi Families According to the housing and Tenure categories.

2.3. The Housing Sector as the Economy Mainstay of KSA

This sector; encompassing building, construction, and real estate investments is the main stake of the Saudi economy. It is of a prolific relevance to a wide sum of other economic sectors. Most importantly, it is the pillar of the infrastructure sector. Assuredly, the housing sector could not be developed in the absence of compatible infrastructure services. The contribution of construction activity to GDP is estimated as described from the website of the General Authority for Statistics in the Kingdom as follows as shown in figure (5) and table (4):

Table 4: The contribution of the construction and building activity to the GDP

YEAR	Calculation method: nominal GDP	Calculation method: real GDP
	Categorization by economic activity	Categorization by economic activity
	Building and construction section	Building and construction section
	Units; millions of SAR	Units; millions of SAR
2011	107021.00	99739.00
2012	118513.00	104499.00
2013	134588.00	112617.00
2014	152964.94	120211.38
2015	162974.65	126929.83

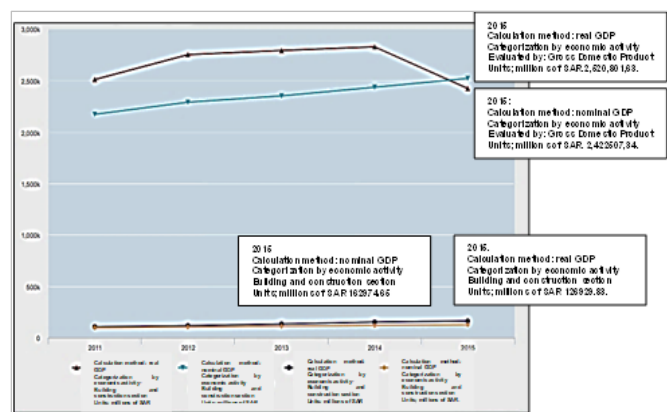


Figure 5: The contribution of the construction activity in the GDP

At the real GDP data calculation method in 2015 AD, the total is about 126929.83 million SAR, or 5.03% of the gross domestic product, as the contribution of housing ownership to the Kingdom's real GDP reached about 52.98 billion SAR.

3. Theoretical Terminologies

3.1. Houses

Houses have been unanimously agreed to be a cardinal logistic urgency in life. Likewise, it is righteous to every individual within the community. It is a loaded lexical item, thanks to its multidirectional development. For instance, the globally strategic definition of a house entails a spacious apartment allocated in circumspect parameters, with an efficient infrastructure, privacy precautions, security services, lighting, ventilation, and the entire requirements for a stable humane

environment. Abiding by civil law, the house is the place where people live whether they are owners or residents or either inhabitance. The comparative law stipulates that a house is a place of private ownership whether its named owners are occupying it, and benefiting from its attachments or leaving it vacant but under their private property (Abou Leila, 2011).

3.2. Sustainability

The term implies safeguarding the balance of resources, preserving, and developing them. It is worth mentioning that sustainability has been defined, coded by a wide interval of international conferences and specialized committees. That is to say, sustainable development is making the utmost advantage of the resources beforehand, ruling out any probable infringement of other resources, to ensure the validity of a certain project (The Executive Body Team for the Renewal of the Islamic and Fatimid Districts of Cairo, 2003). The Portland Commission on Sustainable Development has defined the term as such; "Development must satisfy the two terminals of the equation, where it shoulders meeting the recent generation demands without sacrificing those of their future counterparts." (Definition of the Portland Commission). Ravetz asserts that sustainable development must be grounded on the conception of developmental equity amongst the whole sum of environmental, physical, social, and economic aspects, where the iron fist of the administration should have the upper hand, to actualize and support the targeted urban, social and economic objectives, and follow up their progression and sustainability (Ravetz, 1999).

These definitions and concepts cannot be breached in the realm of urban sustainability. Economically speaking, it must be the evaluation criterion of its projects. Green Architecture and energy-saving urban projects have transfigured the thematic basis of the applied ideology of the witnessed modern urban schools. These sustainability warranty basics are illustrated in figure (6). Further studies have adjoined a thematic sustainability trinity, including the substantial aspects of human life (Abou Leila & Mar'ie, 2010). As follows:

- Economic sustainability:** It denotes scoring the highest economic welfare without parting with the prosperity of future generations. It promises them a fortunate property of natural and environmental resources, to meet their demands.
- Social sustainability:** It is concerned with fair distribution and justice, dissenting their influence on the development policy, societal status, security, and equal opportunities for all categories.
- Environmental sustainability:** It infers the regulation of natural resources consumption on all aspects, provided that it caters for the non-depletion of environmental assets as well as protecting the environment from eradication

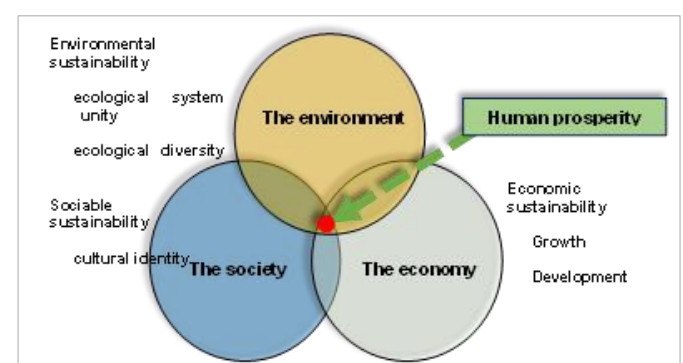


Figure 6: The cardinal sustainability standards.

3.3. Sustainable Houses

The term encapsulates a house that meets the designated sustainability basics in reference to its efficiency in dealing with the available energy resources, materials, water. In addition, the vernacular conformity of the housing-unit to its natural and artificial environment and ethnography while achieving the functional and environmental supreme convenience to its users, yet saving their environment any procrastinated misfortune and putting an eye on the public health precautions. (Howard, 2003).

Abiding by the aforementioned definition, sustainable housing is the homogeneity of energy-saving and environmental convenience coursework in an economically and socially adequate framework.

This compatibility must be validated all over the housing aspects and progression phases including its design, operation, implementation, and maintenance processes. Nowadays, sustainable design is the main requisite of housing development projects and their qualitative standards.

Housing sustainability and global sustainability are two faces of one coin. Thusly, environmentalists and researchers of the concerned field are vigilant towards any threatening phenomenon to the ecological balance and protection. Orderly, houses must meet the quadrilateral design elements; location, climate, technology, and culture of their archetypal community. Sustainability conception is addressed in terms of locality, proficiency, adequacy, and sensitivity. These perquisites aim to sustain ecological balance. Similarly, they maintain the feasible allocation of spaces; the interrelationship between the paths, housing-units, the respective mechanical systems, and construction technology. The historical background of the region and sanctity of the land must be of tangible traits all over the form of the construction, which will show on its usage flexibility. Yet, the well-being of the environment and its residents are priority concerns. Jointly, resources maintenance progression and building performance follow up evaluation serves the validity of sustainable housing. Most sustainable housing units are highly esteemed for their qualitative performance that survives for a longer time span than its traditional counterparts, despite their comparatively maintenance and operation affordability. Besides, it records higher satisfaction rates than traditional buildings. (Abou Liela, et al 2018).

3.4. Characterization, Identity, and Heritage

Characterization denotes the visual and functional attributes of the site parameters; as both factors influence the urban character of a housing-unit out of their physical perception and spatial cognition. (Abou Leila, and Elbastawisy, 2020). It could also entail the complex characteristics that distinguish a certain site. It dictates the signifying features of buildings, architectural elements, site description, climate conditions, and cultural mindset. The architectural character of a building is about its filial relation to its mother environment, opting for architecturally consistent forms to their homing environmental conditions. This prototypical characterization results from cloning the definitive attributes of the surrounding nature, and applying its cultural norms to the novice introduced buildings within.

Identity connotes the consolidated content that reveals its origin. However, other voices cling identity to the ethnographic background of a certain community, regarding their norms, costumes, and traditions in part and the cultural heritage and social convention in the other part. Some scholars hail the role of costumes and traditions in shaping the identity of the community, for these traditions have not been rarified for successive epochs. These traditions have stood stern counter any conquering environmental variable. This solidarity has assured the non-vulnerability to the momentous estrangement waves, to stand out the crowd amongst its hybrid fellows. (Muhammad, 2002).

The preservation manual of the urban heritage decreed by the Ministry of Municipal and Rural Affairs defined the urban heritage in Saudi Arabia; as the embodiment of the cultural heritage. It is an eyewitness to the nation commemorating their historical incidents and events in bygone social, cultural, economic, and environmental conditions. It is a real-life registration to the humane interaction with their environment. Urban heritage cannot be summed up in mere archeological traces and monumental exhibitions in historic cities, but also incorporates the scientific attempts, literary glory, artistry, and all disciplines of arts that have participated in the eternity of the former civilizations. Urban heritage is also worded as the ancient districts within the traditional cities and villages that retain their elements and their main traditional names (Urban Heritage Preservation Manual, 1426 AH).

4. Sustainable House Illustration. Hijazi Traditional House in Mecca

Mecca is distinguished for its urban heritage genuine originality. Therefore, it stands out the other municipalities for its historic architectural urban character, preserving its history, and signifying the inherent character of its residents. Yet, in a stitch of time, this originality has been usurped, due to the unprecedented urban growth

invasion. This uncurbed flow has resulted in estranged architectural profiles to the Meccan environmental givens, and its consequent traditionalism extermination, historical mutation, societal deformation, religious background subordination, and economic deterioration. Consequently, this contemporary urban strategy has breached the concept of sustainable houses, enforcing a modernized urban environment that does not cope with the named spatial conditions, causing a mourned change in the mountainous formative environmental surrounding the Holy Mosque, due to the sheer extermination of its authentic traces and accentuation of new features. Thence, the city lost its originality.

The municipality of Mecca consists of three cities: Mecca (the sacred capital), Medina, and Jeddah. The traditional Hijazi house in the sacred capital zoning in the municipality of Mecca consists of a house with an outdoor courtyard, while in Medina the traditional house consists of a house with a spacious indoor patio circumscribed by rooms, while in Jeddah the houses are void of courtyards.

4.1. Hijazi House Constituents

4.1.1. The Ground Floor

- The entrance leads to the dihliz. This dihliz opens to the Rawshan terrace, where guests are received. It may be also used in sleeping or sitting; as it is attached to a water closet and storage room near the reception.
- The staircase is located in the interior section of the ground floor separated by a corridor and a small transitional room. These stairs are either built of stone or wood (Al-Suwaiyan, 2000).
- The first-floor stairs usually seal the Qabw or a basement. Logically, it is known for its low-height; as it is designed; to complement the style of the previously-built stairs.
- The courtyard or the patio is considered one of the most prominent landmarks of the traditional Hijazi house. It is popular among the houses of Mecca and Medina. Both spaces in their different variations are squared land circumscribed by the building. This space is termed a patio if it is indoor outer space. Lamentably, Jeddah suffers from courtyard deprivation, due to its surrounding fence adding to its humid climate.
- Etymologically speaking, the Rawshan is a Persian loanword infers illumination, yet this architectural structure is introduced, to cast light and shadow, directing the attention to a certain focal point. It is an extension of the room to the outer space of the house; as a recreation facility for the resident family members to move to and from the indoor and outdoor spaces of the house. The Rawshan is a seating piece of furniture at the façade of the house. It is a carved and raised decorated teak wood seats adorned with metal bars of superb quality, and by turn, a dear price entity, deriving pride to its owner. Its allocation perfection and protrusion receive a trilateral breeze from the outdoor space. These aesthetic wooden entities are definitive characteristics of the multi-floored Hijazi house facades. They act as social class markers for the elite. Yet, other alternatives are available for the lower strata out of the costs of covering windows with sprinklers. These alternatives are called shish. They are thin wooden slats that its directions can be controlled and fixed inside the window and do not protrude from them and do not provide places for sitting or sleeping as in the case of the Rawshan (Al-Suwaiyan, 2000).

4.2. The First Floor

- The residential suite is for family gatherings, including a council (reception and living room). It is the most important room for the Hijazi house on its main facade, that is why it is cooler and of the best ventilation within. A small attachment is adjacent to it. Another space is joined to them for preparing food, a place for washing, a bathroom, and a store
- The backside is the second largest room in the house. It lies along one side of the residential suite.
- The dormitory room is opposite to the kitchen or the upper floors of the house and is often connected to the outside or balcony, bathrooms. The kitchen is furnished in moderate and wealthy houses with wardrobes and saharas, to store cooking utensils and equipment, while in modest houses there was no room to prepare food, so the store was used as an alternative to store and cook food.

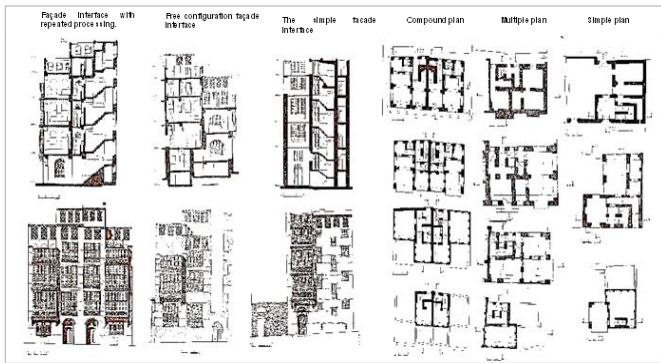


Figure 7: Plans and façades typologies. (Hajj Research Center, 1411 AH).

5. The Saudi 2030 Vision Housing Program

The program seeks to create an abundance of housing units that are apt to meet the Saudi families' demands; owners and beneficiaries; at affordable costs. Besides, it looks forward to improving the living conditions of the recent and upcoming generations. Financial endowment and aids shall be proportional to the increase of housing units supply with decent prices in a short time span. On the same thread, the needy categories would grant attaining their own housing units abiding by a specialized strategic plan to sort out their problem. Developing legislative and jurisprudence binding codes, to audit and observe the housing sector, augments the economic supremacy. This augmentation would grab the attention and interest of the private sector, to establish business and partnerships with the public counterpart. This local content development will create more job vacancies, which empowers the national economic status of the kingdom. The rising demand for housing in different regions of Saudi Arabia is about 1.45 million in 2017 as shown in figure(8). The third rise has launched in a number of cities. Only a housing portal, including 10 cities are in demand reaching 60% of the target in 2020, and excluding about 40% for smaller cities and other regions. Total demand is then allocated in several regions with higher congestion than others are, as shown in the figure below .

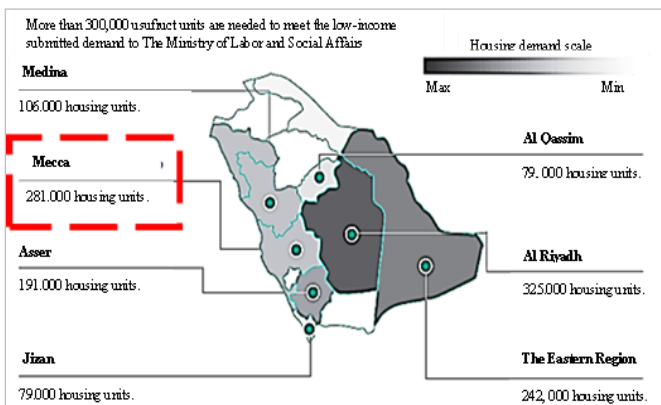


Figure 8: The allocation of the total housing demand in several regions in the Kingdom

6. The Saudi Ministry of Housing Exerted Efforts

The Ministry of Housing prospect proposals relies on establishing a coordinated and facilitated environment on grounds of sustainability and compatibility. The government takes to developing and updating specific programs, to motivate and encourage both the public and private investments, throughout partnerships and cooperation in the regulation, planning, and monitoring phases. Hence, the entire sum of social categories will receive their own housing units at affordable prices and satisfactory quality. This process jets off from two onsets; supporting the demand of the community and providing them with the supply. The two terminals are backed by three givens; regulation, planning and monitoring support, research and dissertation nourishment, and cognitive-communication awareness. This necessitates generous feudal endowments and investments, to support the governmental resources. The ministry has updated and improved the private and public sectors' motivational programs; as in partnerships and corporations in the three implementation phases, to recover from the housing crises. According to the 2030 program

(Vision 2030 web site, 2020), the government is to lease 52% or more for private ownerships by the year 1442 H within the framework of ownership codes financial aids solutions and computability with owners' needs. (Ministry of Housing web site, 2020). The ministry has proposed several initiatives as such;

6.1. SAKANI Program (Sakani web site, 2020)

The ministerial housing projects have been 73 projects with 88,021 housing units, where the total sum of housing units in Mecca has been 24,682 housing units.

6.2. ETMAM Program (Developer Services Center) (Etmam web site, 2020)

The Developer Services Center is one of the initiatives of the Ministry of Housing aimed at accelerating the housing projects progression, to multiply the real-estate investment rates inside and outside the Kingdom. The center is inaugurated in 1437H, to accomplish all real estate development services in one place in cooperation with various public and private sectors.

6.3. EJAR program (Ejar web site, 2020)

It is the dynamo of sustainable development and authentication of the real estate rental sector. It is assigned to regulate and facilitate the real estate rental sector red tape by introducing incentive and neutral systems and activating their mechanisms, to protect the beneficiaries and investors' rights, retain the balance of the sector. It enforces security and adequacy standards. It is totally authorized to document leases contracts, and preserve the rights of all the engaged parties within (tenant, lessor, and real estate broker).

6.4. MULLAK Program. (Mullak web site, 2020)

It aims to legalize the owner-tenant bilateral relationship of mutually-owned housing units. This is realized by stipulating binding monitoring legislations, systems, and mechanisms. In addition, it vows to organize ownership, utilities, and community administrative services. It also shall cater the cultural growth and raising awareness towards Preserving rights and good use and promoting a culture of coexistence.

6.5. Off-plan Sales or Rent (WAFI) Program. (Off-plan Sales or Rent web site, 2020)

The program guarantees the rights of citizens and incubators for real estate sector investments in the Kingdom. It protects the rights of beneficiaries and meeting their expectations, by the regulation and monitoring of the market of sale and leasing on the map to achieve several objectives, including reducing the costs of owning real estate units, to preserve the rights of buyers through the regulations and procedures that ensure this.

6.6. IDLE Lands Tax Program. (Idle lands web site, 2020)

This program opts to create an abundant supply of developed land appropriations, to achieve a balanced demand-supply equation. This strategy puts an end to monopolization and unfair housing market rivalry; where the numeracy of the housing appropriated lands would grant all citizens getting their housing units at decent prices.

6.7. SHRAKAT Program (The partnership with the private sector. (Shrakat web site, 2020)

This program is to reconcile the private companies and the government. The Ministry of Housing would establish a vital partnership with the private sector, to provide solutions and housing products that meet the needs of the citizens at competitive and subsidized prices.

6.8. Saudi Real Estate Institute. (Saudi Real Estate Institute web site, 2020)

It is the fruit of the 2020 national transformation strategy empowered by the Ministry of Housing in the light of the 2030 Vision project. This specialized institute has published the best real estate international practices. It aims at raising the professional standards in the real estate sector in the Kingdom to the highest levels, through the training and qualifying the real estate workforce.

6.9. ESKAN Program (Eskan web site, 2020)

This program regulates the governmental housing support on grounds of financial, social, and health conditions eligibility and priority. The government, to ensure justice and equity among all social strata regarding housing support previously drafts these criteria.

6.10. Developmental Housing. (Developmental Housing web site, 2020)

It is an initiative that integrates with the non-profit sector based on the principles of 2030 Vision regarding raising the contribution of the non-profit sector to non-oil GDP from less than 1% to 5%. It establishes a jurisprudence-compliant investment fund to finance housing cooperatives in the form of Islamic profiting “murabaha” or by issuing resolutions, to finance housing units' projects for housing cooperatives and offering them to the companies of financial institutions and individuals, supporting the success of these options and their economic feasibility for investors.

6.11. Building Technology program. (Building Technology program web site, 2020)

This novice strategy is designated to realize sustainable and smart residential units in terms of construction and ideology development techniques. It aims at untying the housing truancy knot by bridging the gap between cutting down the costs of construction using newfangled technicalities in the kingdom and providing affordable residential units to the beneficiaries.

7. Assessment of the Saudi Community Assimilation of Sustainable Heritage Housing.

7.1. Data Collection Tools

Electronic questionnaires have proved wide authenticity, to diagnose the housing crises in KSA. Therefore, a research proposal has been submitted, to employ it and figure out effective solutions. The questionnaire has hovered randomly all over Mecca and among its citizens via social media platforms. Whereas other data collection tools have been manipulated, to survey all over Mecca from the downtown to its outskirts, seeking diversity. It took about a couple of months for the distribution process until the finale of its statistical analysis, to release the results of the questionnaire.

7.2. Study Limitations

The study is restricted to the citizens living in Mecca.

7.3. The Questionnaire Determinants

The questionnaire is grounded on pentagonal determining factors:

Study Sample Results

- First: General knowledge.

Study results analysis.

- First: The actual housing demand.
- Second: The identity and architectural character of the housing-unit.
- Third: The sustainability of the housing-unit. (Housing units).

- Fourth: Economic affordability of the housing-unit. (Housing units).

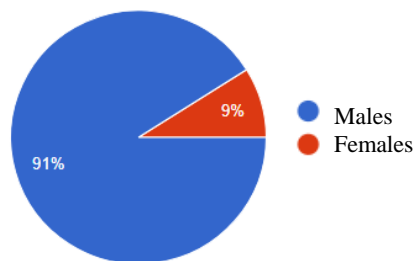
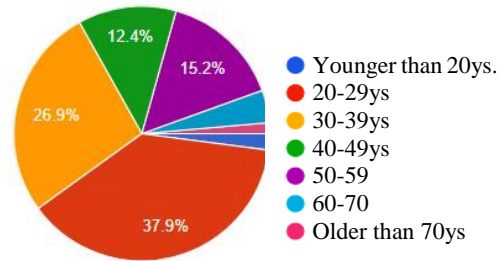
7.4. Mechanisms of the Questionnaire

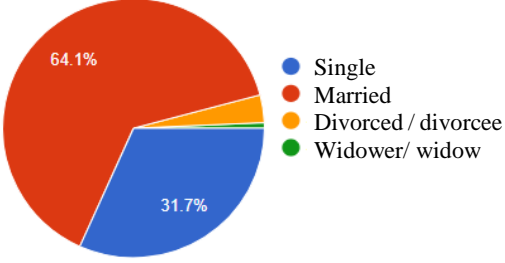
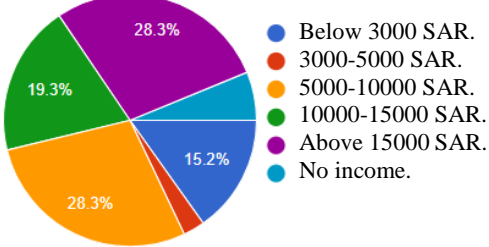
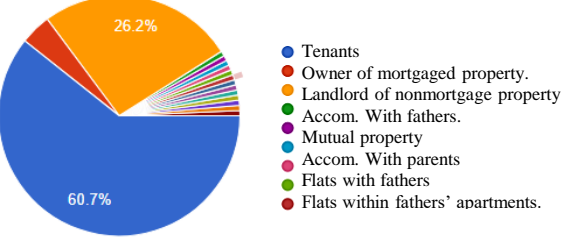
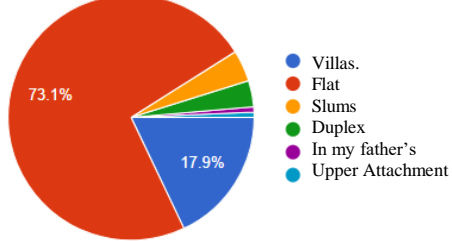
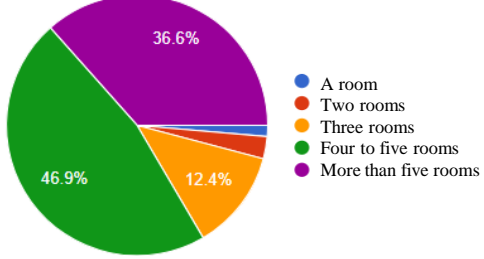
Researchers are assigned to conform to the enlisted instructions to accomplish this questionnaire as follows:

1. **Draft a theoretical framework:** They must demonstrate the review of literature in consideration of the scope of the study
2. **Prepare research questions and study tools:** This requires postulating numerous research questions that must affirm with the research codes. First, the question must address the core of the research topic. Second, the question must be syntactically comprehensible. Third, the questions must semantically unambiguous, to render distinctive answers. Fourth, each question must be of a specific objective. Fifth, the questions should not be constantly vague or uninterpretable including lexical obstacles or terminologies. Sixth, providing various research answers, yet familiar to the targeted samples. According to these criteria, the questions are shortened in an initial form that represented the second phase.
3. **Consult specialists:** The questionnaire is primarily tested by distributing it among a number of citizens and scholars of the discipline, where the resultant answers assume its validity and proportionality to the research scope.
4. **Examine the feedback of the questionnaire:** these tools are adjusted to fit into citizens' recommendations and the scholars' guidelines. Other criteria have been in control. In other words, the questionnaire must start with interesting and grouping questions; for those of mutual background and objectives citizens, to share answers. The adaptation of logical sequence between the questions facilitates the transition from question to another. This formulates an innate conversation between the questionnaire and the user. Mastering these brainstorming techniques has refined the final form of the questionnaire in accordance with the aforementioned criteria.
5. **Application of study tools:** in its modified and final form to the sample of the basic study.
6. **Conducting appropriate statistical analyses:** through which the results of the digital results were reached directly expressing the opinion of the sample to draw conclusions, and to verify the validity of the assumptions.
7. **Discussing the results and justifying them.**
8. **Summarize and Draft the Recommendations and Results.**

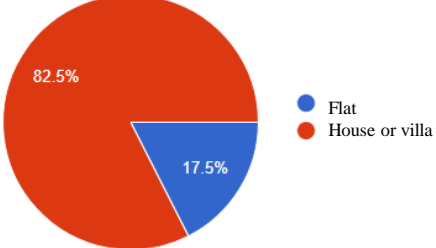
7.5. Study Sample Results

First: General Knowledge	
1	<p>Age</p> <p>The twenties age group (20 -29) are the most enthusiastic group about the questionnaire by about 37.9%, while those in their thirties (30-39) came second, with a percentage of 26.9%, and they represent the targeted youth group. Both groups recorded around 64.8% of the number of beneficiaries from the questionnaire, which represents the urgent demand of this age group. Whereas, the older groups' participation is 26.9%.</p>
2	<p>Gender</p> <p>The masculine response to the questionnaire was about 91%, while the feminine proportion was only about 9%, which represents the urgency and necessity of the male category of Saudi society</p>



<p>3</p>	<p><u>Marital status</u> Married couples have contributed by 64.1%, exceeding those of single marital status, who scored only 32.7%, which reflects the former group’s urgent need for housing.</p>	 <ul style="list-style-type: none"> ● Single ● Married ● Divorced / divorcee ● Widower/ widow
<p>4</p>	<p><u>Average salary</u> The respondent group and the most requested in the questionnaire were two categories: The first category is the one whose monthly income ranges between (5000 -10,000 SAR) by about 28.3%. the second category (whose monthly income is more than 15,000 SAR) with almost the same percentage, followed by the group whose income ranges between (10,000 - 15,000 SAR), at a rate of about 19.3%, then the group that has no income at about 15.2%, which is an indication of the need for accommodation and housing for all income groups in the Kingdom of Saudi Arabia from citizens.</p>	 <ul style="list-style-type: none"> ● Below 3000 SAR. ● 3000-5000 SAR. ● 5000-10000 SAR. ● 10000-15000 SAR. ● Above 15000 SAR. ● No income.
<p>5</p>	<p><u>Tenure Category</u> The most respondent and targeted category in the questionnaire are the tenants reaching 60.7%. The percentage of owners in nonmortgage properties is 26.2%, while the percentage of owners in mortgaged property came third reaching 4.1%. This indicates the escalating urgency of tenants to own their homes, which highlights the concept of housing for the Saudi citizen.</p>	 <ul style="list-style-type: none"> ● Tenants ● Owner of mortgaged property. ● Landlord of nonmortgage property ● Accom. With fathers. ● Mutual property ● Accom. With parents ● Flats with fathers ● Flats within fathers’ apartments.
<p>6</p>	<p><u>Housing Typologies</u> The largest percentage of those who responded to the questionnaire were those who lived in a flat with a percentage of 73.1%, while the percentage of those who lived in a villa was about 17.9%, while those living in slums ranged by 4.1%, and duplexes by 3.4%.</p>	 <ul style="list-style-type: none"> ● Villas. ● Flat ● Slums ● Duplex ● In my father’s ● Upper Attachment
<p>7</p>	<p><u>The number of chambers including Salons and dining rooms</u> The largest percentage lived in houses consisting of (four-five rooms) by about 46.9%, while about 36.6% lived in homes consisting of more than five rooms and about 12.4% in houses consisting of only three rooms. This indicates the true colors of the Saudi residents and the number of its current rooms, with an average of approximately 4-5 rooms in the house .</p>	 <ul style="list-style-type: none"> ● A room ● Two rooms ● Three rooms ● Four to five rooms ● More than five rooms

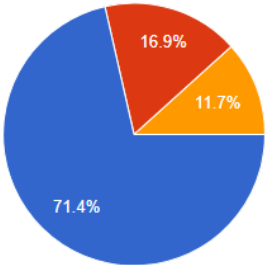
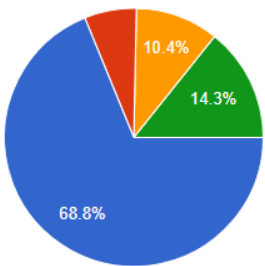
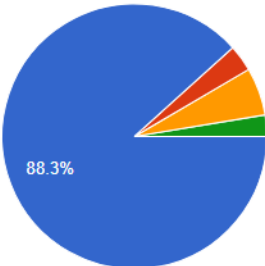
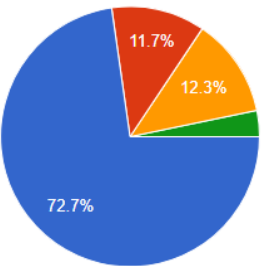
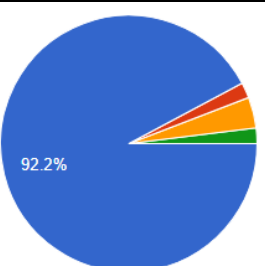
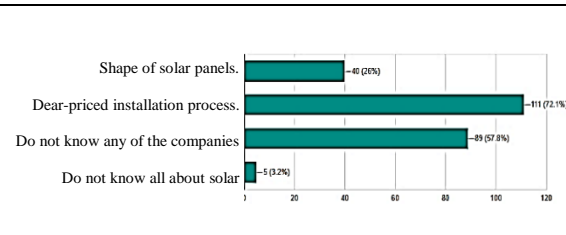
7.6. Study results analysis

<p>First: The actual housing demand</p>		
<p>1</p>	<p><u>Housing typology</u> .82.5% of the respondents are satisfied with owning and living in a house or villa, while about 17.5% are satisfied with living and owning a flat.</p>	 <ul style="list-style-type: none"> ● Flat ● House or villa

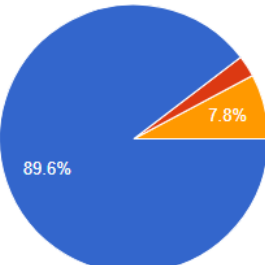
<p>2</p>	<p><u>The favored area of a house in case of ownership</u></p> <p>About 40.7% of citizens prefer housing in an apartment with an area of more than 180 m², while an equal percentage prefers housing in an area of about 180 m². 11, 1% think that housing in an apartment with an area of 160 m² is convenient. 7, 4% goes for housing in 120 m². Yet, no one was satisfied with housing in an area of fewer than 120 m².</p>	<table border="1"> <caption>Favored housing areas</caption> <thead> <tr> <th>Area (m²)</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>100m²</td> <td>0%</td> </tr> <tr> <td>120m²</td> <td>7.4%</td> </tr> <tr> <td>160m²</td> <td>11.1%</td> </tr> <tr> <td>180m²</td> <td>40.7%</td> </tr> <tr> <td>More than 180m²</td> <td>40.7%</td> </tr> </tbody> </table>	Area (m ²)	Percentage	100m ²	0%	120m ²	7.4%	160m ²	11.1%	180m ²	40.7%	More than 180m ²	40.7%
Area (m ²)	Percentage													
100m ²	0%													
120m ²	7.4%													
160m ²	11.1%													
180m ²	40.7%													
More than 180m ²	40.7%													
<p>3</p>	<p><u>The number of the actually needed chambers including the dining room</u></p> <p>33.3% believe that their needs exceed five rooms in the apartment unit. 48.1% are satisfied with five rooms in their own apartment. 7.4% think that they need one room in the apartment. Likewise, the same percentage believes that they need about three rooms in the apartment. 3.7% are satisfied with only two rooms.</p>	<table border="1"> <caption>Number of needed chambers</caption> <thead> <tr> <th>Number of rooms</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Two rooms</td> <td>3.7%</td> </tr> <tr> <td>Three rooms</td> <td>7.4%</td> </tr> <tr> <td>Four rooms</td> <td>0%</td> </tr> <tr> <td>Five rooms</td> <td>48.1%</td> </tr> <tr> <td>More than Five</td> <td>33.3%</td> </tr> </tbody> </table>	Number of rooms	Percentage	Two rooms	3.7%	Three rooms	7.4%	Four rooms	0%	Five rooms	48.1%	More than Five	33.3%
Number of rooms	Percentage													
Two rooms	3.7%													
Three rooms	7.4%													
Four rooms	0%													
Five rooms	48.1%													
More than Five	33.3%													
<p>4</p>	<p><u>The number of dormitory chambers including the main bedroom</u></p> <p>55.6% think that having 3 bedrooms is meets their needs. 18.5% think that three bedrooms in the apartment are less for them. 14.8% are satisfied with only two bedrooms. 11.1% are thankful for having one bedroom.</p>	<table border="1"> <caption>Number of dormitory chambers</caption> <thead> <tr> <th>Number of bedrooms</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>One bedroom</td> <td>11.1%</td> </tr> <tr> <td>Two bedrooms</td> <td>14.8%</td> </tr> <tr> <td>Three bedrooms</td> <td>55.6%</td> </tr> <tr> <td>More than three rooms.</td> <td>18.5%</td> </tr> </tbody> </table>	Number of bedrooms	Percentage	One bedroom	11.1%	Two bedrooms	14.8%	Three bedrooms	55.6%	More than three rooms.	18.5%		
Number of bedrooms	Percentage													
One bedroom	11.1%													
Two bedrooms	14.8%													
Three bedrooms	55.6%													
More than three rooms.	18.5%													
<p>5</p>	<p><u>Villa ownership as a housing unit</u></p> <p>41.7% are clinging to their dream house of 600 m². 32.3% do not approve less than 900 m². 26% believe that an area of 400 m² is the appropriate area for them.</p>	<table border="1"> <caption>Villa ownership preferences</caption> <thead> <tr> <th>Area (m²)</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>400 m²</td> <td>26%</td> </tr> <tr> <td>600 m²</td> <td>41.7%</td> </tr> <tr> <td>900 m²</td> <td>32.3%</td> </tr> </tbody> </table>	Area (m ²)	Percentage	400 m ²	26%	600 m ²	41.7%	900 m ²	32.3%				
Area (m ²)	Percentage													
400 m ²	26%													
600 m ²	41.7%													
900 m ²	32.3%													
<p>6</p>	<p><u>The actual number of needed chambers including the dining room</u></p> <p>64.6%, urge that a villa must consist of more than five rooms. 26.8% of five rooms are convenient. 5.9% see that four rooms are satisfactory</p>	<table border="1"> <caption>Actual number of needed chambers for a villa</caption> <thead> <tr> <th>Number of rooms</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Two rooms</td> <td>0%</td> </tr> <tr> <td>Three rooms</td> <td>0%</td> </tr> <tr> <td>Four rooms</td> <td>5.9%</td> </tr> <tr> <td>Five rooms</td> <td>26.8%</td> </tr> <tr> <td>More than Five</td> <td>64.6%</td> </tr> </tbody> </table>	Number of rooms	Percentage	Two rooms	0%	Three rooms	0%	Four rooms	5.9%	Five rooms	26.8%	More than Five	64.6%
Number of rooms	Percentage													
Two rooms	0%													
Three rooms	0%													
Four rooms	5.9%													
Five rooms	26.8%													
More than Five	64.6%													
<p>7</p>	<p><u>The number of dormitory rooms including the master bedroom</u></p> <p>51.2% preferred having more than three bedrooms, while 39,4% were satisfied with only three bedrooms, and 7,9% were satisfied with two bedrooms.</p>	<table border="1"> <caption>Number of dormitory rooms</caption> <thead> <tr> <th>Number of bedrooms</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>One bedroom</td> <td>0%</td> </tr> <tr> <td>Two bedrooms</td> <td>7.9%</td> </tr> <tr> <td>Three bedrooms</td> <td>39.4%</td> </tr> <tr> <td>More than three rooms.</td> <td>51.2%</td> </tr> </tbody> </table>	Number of bedrooms	Percentage	One bedroom	0%	Two bedrooms	7.9%	Three bedrooms	39.4%	More than three rooms.	51.2%		
Number of bedrooms	Percentage													
One bedroom	0%													
Two bedrooms	7.9%													
Three bedrooms	39.4%													
More than three rooms.	51.2%													

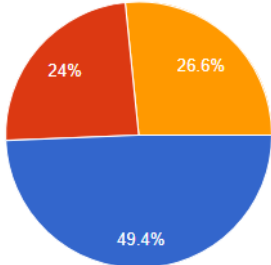
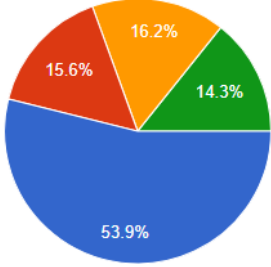
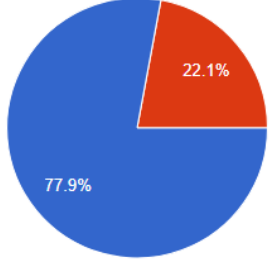
Second: The identity and architectural character of the housing-unit		
1	<p><u>Living in heritage architectural regions versus modern architectural regions</u></p> <p>89.6% of the samples stated that they would like to live in modern architectural regions. 10.4% agreed to live in heritage architectural regions.</p>	<p>Legend: Heritage architectural regions (blue), Modern architectural regions (red).</p>
2	<p><u>The preferred architectural Characterization and Plan in case of ownership</u></p> <p>57.1% go for the hybrid modern-traditional characterization in the plan designs of their house. 37% prefer modern characterization rather than the design of their houses. 2.5% prefer traditional characterization.</p>	<p>Legend: Modern pattern characterization (blue), Tradition pattern characterization (red), Hybrid pattern characterization (orange), Neutral Inclination (green).</p>
3	<p><u>The preferred facades urban Characterization in case of ownership</u></p> <p>48.1% go for the hybrid modern-traditional characterization in the design of the facades of their house. 43.5% prefer modern character rather than the design of their house. 5.5% prefer traditional characterization.</p>	<p>Legend: Modern pattern characterization (blue), Tradition pattern characterization (red), Hybrid pattern characterization (orange), Neutral Inclination (green).</p>
4	<p><u>The essential factors of the housing unit design; facades or plans, to preserve the identity of the region and cling to the Islamic architecture, where one of them does not necessitate excluding the other</u></p> <p>47.4% long to pick more than one choice; indoor patios, divisional portals, benefiting from aerobic grabs as wind focal points, Rawshan, and mashrabiya as the design main stakes. 29.2% want divisional portals, 21.4% use aerobic grabs, while 34.4% prefer using Rawshan and mashrabiya.</p>	<p>Legend: Patios (50.6%), Divisional portals (29.2%), Aerobic grabs (21.4%), Rawshan and Mashrabiya (34.4%), All of the above (47.4%).</p>
Third: The sustainability of the housing-unit (housing units)		
1	<p><u>Affording sustainability</u></p> <p>64.9% of respondents believed that the concept of sustainability is unaffordable, while 35.1% think it is affordable.</p>	<p>Legend: Unaffordable (blue), affordable (red).</p>
2	<p><u>Geological environment for a housing unit</u></p> <p>75.3% prefer to build a house on a plain surface, while 24.7% prefer to build on a mountainous surface.</p>	<p>Legend: Plain surface (blue), Mountainous (red).</p>
3	<p><u>Erosion probabilities of the mountainous surface to build a house</u></p> <p>74% of those who are satisfied with the construction at the foot of the mountain without erosions. 26% would prefer the deconstruction of the mountain clearing it all together.</p>	<p>Legend: Construction at the foot of the mountain without erosions (blue), without erosions (red).</p>

<p>4</p>	<p><u>Preferred building materials</u> 59.7% prefer to use eco-friendly materials while 40.3% prefer to use modern materials no matter their consequent environmental impacts.</p>	<p>Legend: ● Eco-friendly materials ● Modern materials</p>
<p>5</p>	<p><u>The pre-design phase consideration of energy saving oriented houses for natural lighting and ventilation</u> 50.6% see that house designs must be oriented to save more electric energy and depend on natural lighting and ventilation, whereas 35.7% think that housing unit orientation is not important. 13.6% are neither aware of orientation nor take it into consideration.</p>	<p>Legend: ● Yes ● No ● I do not know</p>
<p>6</p>	<p><u>Natural lighting versus illumination</u> 91.6% prefer using natural lighting and resorting to it than using artificial illumination, where only 1.2% prefer the latter while 7.1% think that they are neutral.</p>	<p>Legend: ● Yes ● No ● Neutral</p>
<p>7</p>	<p><u>Electricity consumption rates in the current housing</u> 38.3% assume that the average electricity consumption is around 200-399 SAR per month, while about 30.5% pay 101-199 SAR per month. 13.6% pay around 400-600 SAR per month, while about 13% pay less than 100 SAR per month, while 4.9% pay more than 600 SAR per month for electricity consumption.</p>	<p>Legend: ● Less than 100 SAR ● 101-199 SAR ● 200-399 SAR ● 400-600 SAR ● More than 600 SAR</p>
<p>8</p>	<p><u>Energy-saving strategies, where one choice does not obliterate the other</u> 26.6% believe in the use of separate air conditioners for each room or integrated between every two rooms. Likewise, the use of central heaters for the unit as a whole or each in a room or integrated between the rooms is the utmost energy-saving strategy. 50% believe that the use of separate air conditioners is the utmost energy-saving strategy. 26% believe that the use of built-in air conditioners between two or more rooms is the most effective technique, while 29.2% see the use of central heaters in the units is mostly professional. 31.8% prefer to use separate heaters integrated between two or more rooms as a way to save energy.</p>	<p>Legend: ● Separate ACs ● Integrated ACs ● Central heater ● Separate heaters ● All of the above</p>
<p>9</p>	<p><u>Water consumption rates in the current housing</u> 37% pay around 101-199 SAR per month. 35.1% pay less than 100 SAR per month. 22.1% spend around 200-399 SAR per month, while 4.3% pay around 400-600 SAR per month, 1.2% pay more than 600 SAR per month.</p>	<p>Legend: ● Less than 100 SAR ● 101-199 SAR ● 200-399 SAR ● 400-600 SAR ● More than 600 SAR</p>

<p>10</p>	<p><u>Re-cycling gray water of houses in irrigation and other usages</u> 71.4% preferred to recycle gray water, while 16.9% refused, and 11.7 were neutral.</p>	 <p>Legend: Yes (blue), No (red), Neutral (orange)</p>
<p>11</p>	<p><u>Using thermal comfort facilities as an alternative for electricity</u> 68.8% approved traditional thermal comfort facilities rather than electricity. 6.1% rejected it, while 14.3% did not get the technique, and 10.4% were neutral.</p>	 <p>Legend: Yes (blue), No (red), Neutral (orange), I do not know (green)</p>
<p>12</p>	<p><u>Applying greeneries and green roofs to subdue thermal toughness in the patio</u> 88.3% prefer applying greeneries to subdue the thermal toughness in the patio as well as green roofs. 3.1% refuse, and 2.5% lack any background relevant to the concept. 6.1% are neutral.</p>	 <p>Legend: Yes (blue), No (red), Neutral (orange), I do not know (green)</p>
<p>13</p>	<p><u>Introducing water elements to subdue thermal toughness in the house</u> 72.7% prefer introducing water elements, to subdue the thermal toughness in the house, while 11.7% refuse, and 12.3% were neutral, while 3.7% lack any background relevant to the concept.</p>	 <p>Legend: Yes (blue), No (red), Neutral (orange), I do not know (green)</p>
<p>14</p>	<p><u>Modern electricity, water, and lighting technologies preferences</u> 92.9% approved the use of modern technologies in the house to control lighting, electricity, and water 1.8% refused, and 4.3% were neutral, while 1.8% lack any background relevant to the concept.</p>	 <p>Legend: Yes (blue), No (red), Neutral (orange), I do not know (green)</p>
<p>15</p>	<p><u>Solar energy installation hindrances, where one choice does not obliterate the other</u> 26% believe that the shape of the solar panels stands beyond using solar energy as an alternative to an energy, while 72.1% believe that the dearly-priced installation process is the ground of their hesitance to use solar energy, and 57.8% believe lacking credential companies end the debate. 3.2% lack any background relevant to the concept.</p>	 <p>Legend: Shape of solar panels (26%), Dearly-priced installation process (72.1%), Do not know any of the companies (57.8%), Do not know all about solar (3.2%)</p>

Fourth: Economic affordability of the housing-unit. (housing units)

<p>1</p>	<p><u>Using alternative energy as a futurist fortune consumption strategy</u> 89.6% approve that using alternative energy will save a fortune in the future, while 2.5% reject it being an inefficient energy supplier, and 7.8% lack any background relevant to the concept.</p>	 <p>Legend: Approve (blue), Reject (red), I do not know (orange)</p>
----------	---	--

<p>2</p>	<p><u>The response towards housing cost increase by around 30% to 50%</u></p> <p>49.4% are not bothered about the cost increase of the house in case of adopting alternative energy, while about 24% reject any increase in the cost of the house, and 26.6% are neutral.</p>	 <ul style="list-style-type: none"> ● Approve ● Reject ● I do not know.
<p>3</p>	<p><u>Foreseeing the annual maintenance process costs over 5-10 years amidst the selection of the design materials and style</u></p> <p>53.9% will calculate the annual maintenance costs for the site over 5-10 years when they select the materials and design style, while 15.6% will not, 14.3% do not know anything about the annual maintenance costs, and 16.2% are neutral.</p>	 <ul style="list-style-type: none"> ● Yes ● No ● Neutral ● I do not know
<p>4</p>	<p><u>Comparing the cost and annual consumption of the housing design materials referring to sustainability</u></p> <p>77.9% will compare the cost of the materials used in the duration of the construction process with the rate of annual consumption in reference to sustainability, while 22.1% will not.</p>	 <ul style="list-style-type: none"> ● Yes ● No

7.7. Further Study Recommendations.

Fortunately, the users and citizens have been enthusiastic, to pose several recommendations in consideration of their own perspective of sustainability. Mainly, they cast a light on introducing solar energy use, where the walls and ceiling are thermally insulated. They went further, suggesting using energy-saving lighting systems and insulated glassed windows. No wonder, as a tribally pious community, they conventionally accentuate the importance of privacy. The use of energy-saving materials has also been expanded; as significantly as possible, and ready-made concrete with different designs in gardens, garages, and basements at lower costs have been praised. The beneficiaries suggested that the future of the owner and his family should be considered prior to the sustainability of the building. Although both are conjoined, it is the social orientation of the population that should dictate the course of the physical orientation of the building, not the other way around. Taking into account that the building affects the life inside out the site, jetting off from the normative pattern of the housing-unit to economical materials and breathtaking designs, where the contemporary modernity and splendid originality ally.

One of the logistic recommendations is assigning the Ministry of Housing or one of its concerned authorities, to signalize a unified characterization for all housing-units. This necessitates installing smart construction techniques, to reduce its cost and periodical maintenance affords. These costs are to be recompensed either by cutting them off the national bank or loans. Land appropriation at reasonable prices, in the presence of support from the governmental agencies, is the springboard of alternative and eco-friendly materials usages. Moreover, this entails passing several legislations, which are not liable to adjustments but in rare cases. These procedures would hinder any infringement attempts, to secure the citizens’ privileges and rights against violators, for the latter, are to be sanctioned right after breaching the law trying to parasite on the monitoring absenteeism. Some suggestions have been applicable for they are not oblivious of the municipal reversion on the outskirts of the land, seeking an interior patio.

Therein, other design specific recommendations have included the necessity of the housing-unit orientation. This undoubtedly grants their environmental sustainability. In conjunction with the design prerequisites, the initial total cost is to be issued, provided that these

housing units must secure privacy rights in the presence of outdoor attachments for perfect ventilation. These processes necessities installing readymade buildings, using aesthetic affordable materials, perfect space allocation, providing natural lighting, and ventilation.

Yet futurist annexations must be put into consideration of preserving the sanctity of the Islamic pattern of housing units’ allocation norms, urban characterization, and the jurisprudence-influenced costumes and traditions. These terms do not disapprove of providing these units with spacious greeneries and water elements, to subdue the harsh temperature degrees. The named inhabitants should not be in desolation from the sky view, natural breeze, and sceneries, but only from their neighborhood. The flexibility and perfect space allocation within the design ensure the ease of movement and family communication in the home, taking advantage of voids, and meeting the needs of family members.

There were also proposals on the level of implementation represented in the necessity of having sophisticated specifications and products used in the construction, to achieve qualitative validity and eternity at low prices that suit the economic status of the families using economic building materials yet of high quality.

8. Research Conclusions

The research proposes a transversal section in the realm of housing policies in KSA. It demonstrates an orientation of the Saudi community assimilation of urban heritage sustainable housing in Mecca in the account of the citizens’ demands. On the other hand, it must preserve the identity and architectural characterization of Mecca and KSA.

The study touches upon the sustainable housing approaches; housing, sustainability, identity, heritage, and legacy. Then, it goes further to present the Hijazi construction analytical studies, displaying the governmental efforts in the field. It also enumerated their housing programs under the patronage of the ministry of housing; Housing Program, Accomplishment Program (Developer Services Center), Rental Program, Owners Association Program, National Housing Program, White Land Tax, and Real Estate Units Sorting Program, Off-plan Sales or Rent (Wafi) Program, Developmental Housing, and Technical construction motivation program. Then the researchers reviewed the results of the analytical study of the assessment of the Saudi community assimilation of sustainable heritage housing, by conducting a comprehensive questionnaire tailored, to comply with a

number of ruling elements that were grounded, to study the research hypothesis. The research reached many results, the most important of which are:

1. Satisfying the increasing housing demands in terms of compatibility with their needs in part and the social, economic, and urban givens of the Saudi community in the other part.
2. Directing the industrial construction materials market to innovate low-priced products but of high quality, to cope with the environmental conditions.
3. Preserving the architectural and urban characterization of the Saudi house, yet in contemporary materials, to validate its visual display and Islamic identity using a compilation of historic items jointly with modern architectural patterns.
4. Achieving sustainability by using heritage traditional Hijazi tools and the assimilation of its community in demand of ameliorating them by modern architectural tools.
5. Installing solar energy to houses; since the Saudi citizen is apt to deal with it, but he lacks the means and the method that enables him to use it extensively
6. Accounting for the economic status impact on the quality of housing, where a citizen accepts what they could afford. The outer display of the house reflects its social prestige and strata. The financial status extends, to influence the undergone adjustments to the housing-unit, whether self-made or governmentally supported.

9. Research Recommendations

The housing crisis would never meet its doom neither in Mecca nor in KSA, lest the population growth and housing units increase persist on a monotonous rhythm. Therefore, there must be an innate motif for the members of the community to rally around. The research offers a couple of headline recommendations, to get over these crises.

First: Recommendations in reference to the Ministry of Housing Adapted Policy

1. Supply the housing demand professionally and efficiently. This step compels establishing new housing cities, to create municipal expansions capable of hosting an abundance of housing units. These cities must be of intact housing services, yet not overpriced. This would reflect on its purchase price, to be compatible with the financial conditions of the buyers; especially low-income categories. Hence, it would be an effective solution. No wonder, it may be developed to enclose a variety of social strata.
2. Meeting the current demand without infringing future generations' resources and capabilities. This involves developing all the existent housing districts comprehensively for the public and private good equidistantly. This would fruit in the developmental balance of the entire municipality.
3. No question, the government would spare no effort, to encourage using alternative and ecofriendly materials.

Second: Recommendations in Reference to Achieving Housing Sustainability Policy

1. Proposal for an initiative program, to unify the vernacular character of each region in the Kingdom. This individuality is to ensure compatibility with the character and vernacular architecture of each. The design phase must account for the Saudi norms and demands. These designs must conform to building design principles; no mention they must be of competent strategies to counter the hot climate, by inserting patios or treating the facades, to subdue the heat. Yet, this would interweave with the vernacular character of each region.
2. Indispensable longitudinal annexations and geographical prevalence, to increase the populace of the government housing projects across various regions in KSA in different areal capacities that copes with the project and the resident family members' number.
3. Demonstration of the housing strategy in KSA in the framework of its commitment and aptitude to provide this service according to the resources beforehand in light of Vision 2030.
4. Advantaging from solar energy as in heating water cold zones in winter and work to benefit from it in heating and cooling public buildings and services using an economically available alternative.

References

- [1] Abou Leila, M (2011), *The Environmental Nature of Social Housing Projects within the framework of the National Program for Egypt*. Published research - Journal of Fine Arts for Art and Architecture - January 2011 issue.
- [2] Abou Leila, M& Mar'ie, H. (2010), *Sustainability of Social housing in the Light of the National Program for Egypt in the 3RD millennium - a case study of the Ibni Baitak (build your home on your own.) Project*. published research - the 1st Arab housing conference - building sustainability in the Arab region, especially the desert environment, from 23-26th December 2010.
- [3] Abou Leila, Mohamed Shawky and Elbastawisy, Magdy M. (2020), *Rehabilitation and Exploitation of Heritage Buildings. An Investment Approach. Case Study: Suleiman Palace in Mecca*, published paper in International Conference on Conservation of Architectural Heritage (CAH) 4th Edition (31 Jan – 02 Feb 2020).
- [4] Abou Liela, Mohamed, et al (2018), *the problem of sustainable housing in Mecca between need and identity*, published a paper in the First International Conference on Sustainability: Environmental Efficiency for Human Well Being (EBQL), which held during 13, Dec / 15, Dec 2018 in JW Marriott Hotel Cairo, Egypt, URL <https://press.ierek.com/index.php/Baheth/article/view/414>.
- [5] Al-Suwaiyan, S, Al-Abdullah (2000), *Traditional Culture in the Kingdom of Saudi Arabia*, Dar Al-Dahra Publishing and Documentation, Riyadh.
- [6] *Building Technology program* (2020), URL <https://www.btsi.gov.sa>, (accessed October.12, 2020).
- [7] *Definition of the Portland Commission*. For more information on this committee, refer to the Earth Summit documents held in Rio de Janeiro, where sustainable development was the main concept of the conference.
- [8] *Developmental Housing*(2020), URL <https://www.housing.gov.sa/en/initiative/dh>, (accessed October.12, 2020).
- [9] *EJAR program*(2020), URL https://www.ejar.sa/ar?utm_source=GOOGLE&utm_medium=SEARCH&utm_campaign=OCT, (accessed October.12, 2020).
- [10] *ESKAN program*(2020), URL <https://rep.sakani.housing.sa>, (accessed October.12, 2020).
- [11] *ETMAM program*(2020), URL <https://etmam.housing.gov.sa>, (accessed October.12, 2020).
- [12] Hajj Research Center, (1411 AH), *examples of traditional Mecca buildings*, Hajj Research Center, Umm Al-Qura University, Mecca.
- [13] Howard, Bion (2003), *Green Building (A primer for Builders, Consumers, and Realtors)*(V 5.4), building Environmental Science and Technology (B.E.S.T.), U.S.A.
- [14] *IDLE LAND program*(2020), URL <https://idlelands.housing.gov.sa/ar>, (accessed October.12, 2020).
- [15] *Ministry of Housing*(2020), URL <https://www.housing.gov.sa/en/about-us>, (accessed October.12, 2020).
- [16] Muhammad, T, Abdul Salam (2002), *towards a contemporary identity for desert architecture, a comparative study of the architectural identity in Al-Kindi Square projects in Riyadh and the Intercontinental Hotel in Mecca*. Conference of the Desert Symposium and its construction problems, Ministry of Works, Riyadh, Saudi Arabia.
- [17] *MULLAK program*(2020), URL <https://mullak.housing.gov.sa>, (accessed October.12, 2020).
- [18] *Off-plan Sales or Rent (WAFI) program*(2020), URL <https://wafi.housing.gov.sa>, (accessed October.12, 2020).
- [19] Ravetz J. (1999), *Integrated Planning for a Sustainable Environment*, city-region 2020, London.
- [20] *SAKANI program*(2020), URL <https://sakani.housing.sa>, (accessed October.12, 2020).
- [21] *Saudi Real Estate Institute*(2020), URL <https://srei.sa>, (accessed October.12, 2020).
- [22] *SHRAKAT program*(2020), URL <https://shrakat.housing.sa>, (accessed October.12, 2020).

- [23] The Executive Body Team for the Renewal of the Islamic and Fatimid Districts of Cairo (2003), *Improving Living Conditions through Sustainable Urban Development in Areas of Historical Value*, Arab Regional Conference, General Authority for Urban Planning, Cairo, 15-18th December 2003.
- [24] *Urban Heritage Preservation Manual* (1426 AH), Ministry of Municipal and Rural Affairs, First Edition, p. 4.
- [25] *Vision 2030*(2020), URL <https://vision2030.gov.sa/en/node/311>, (accessed October.12, 2020).