



Assessment of the Treatment Strategies of Random housing in Ramadi City from the perspective of Sustainable Transport by Using (AHP&GIS)

Assistance professor Dr. Thaer Shakir Mahmood^a , Engineer Arwa Hazim Ibraheem^b

^aManager of Strategic studies Centre ,university of Anbar,Iraq ,drthaersh@uoanbar.edu.iq

^bFallujah Education Department of Planning and School buildings, Iraq, enarwahazim@gmail.com

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ABSTRACT

The phenomenon of random housing in Ramadi city is one of the important planning challenges facing the city, especially after rapid growth rates of urban and population growth in the city, hence the importance of research is to prove that sustainable transport planning has a prominent role in addressing this problem and producing many social economic and environmental problems. This study aims to determine the role and importance of transport and sustainability planning criteria for the proposed strategies to address the informal housing spread in the city neighborhoods and sectors within and outside the boundaries of the master plan of the city.

The use of Analytic hierarchy process (AHP), which combines descriptive and quantitative analysis, will depend on the available data for city at the present time ; as well as, on the expertise of specialists and persons concerned in the subject through a questionnaire to reach the most important factors that affecting random housing from the point of sustainable transport on one hand and in addition to prioritizing treatment according to the proposed strategies presented to planners and local authorities in the city.

The research encountered a number of difficulties and obstacles, the most important of which is the scarcity of data and information available in the subject, which led to personally analyze data and resort to the use of geographic information systems (GIS) for the purposes of quantitative and geometrical analysis. The main results for the basic criteria affecting the role of sustainable transport on Ramadi city by gradation from top to lowest ,(i.e. environmental criterion, followed by economic, social, and finally schematic). As for secondary standards, the highest value was the share of the standard of treatment of residential destroyed areas, within the environmental criterion, and the lowest value is the calibration of road efficiency within the planning criterion.

1. Introduction

Slums are a feature of the Iraqi cities in the transition phase. This phenomenon has affected the sustainable urban development in general and the transportation sector in particular through its opposition to the most important pillars of sustainable development; which is not to inherit problems for future generations. Cities, that have been formed over the

past decade and the slums which form a large part of the structure, will create big problems for future generations that will be difficult to be solved unless being addressed them with some solutions to mitigate their impact.

Urban transport is the main cause of pollution, polluted emissions and the phenomenon of global warming. The issue of the sustainability of urban transport has attracted the attention of researchers and institutions, which are supported by the United Nations. The fact behind the phenomenon of

* Corresponding author. Tel.:07807910485.

E-mail address: drthaersh@uoanbar.edu.iq

random housing has a reverse impact on urban sustainability because they are not subject to the requirements and standards of urban planning and thus led to increase the transportation problems ,consequently increased the associated problems such as environmental, economic and social problems ;it is not only for random housing areas but also for the entire urban area.

1-1 Research aims

The study aims to investigate the treatments that achieve sustainable urban development and transport sustainability within these slums and in the surrounding urban areas. And reducing the negative aspects that are associated with the traditional treatments for this phenomenon to achieve this aims , the objectives are clarified through two aspects:

The first objective: is a general objective which includes: the detection of the general meaning of the informal settlements (their problems, dangers, and means of development) under the prevailing concepts of urban sustainability.

The second objective is the special goals :by developing a comprehensive plan to determine the size of the problem and its spatial distribution. Suggest appropriate ways to address the problem.

1-2 Research Hypothesis

Following modern and non-traditional methodologies with the planning requirements of the city's road network in addressing slums and integration with the surrounding urban area.

1-3 Research methodology

The research methodology revolves around two main aspects:

- 1- Descriptive method which describes the phenomenon of random housing according to the planning dimension and its relation to the planning of transportation in the city.
- 2- Analytical descriptive is a method with a quantitative concept of planning studies using AHP.

1-4 Research problem and difficulties

Problems and difficulties appear from the Lack of available data and clear scientific perception in the relationship of transport sustainability with the urban planning and design - of informal areas

All tables should be numbered and every table should have a caption. Headings above tables, left justified. The tables should be as simple as possible. Below is an example of how the tables should be. Please insert the tables after mentioning them in the text directly.

2. The concept of random housing

Residential slums are defined as qualitative behavior that is not governed by prior planning or programmed to take place and live in it(UN.,2012).

The randomness, here, is relative to the relationship of housing with organized housing within the framework of the master plan of cities, population groups and the governing policies of the implementation of these dwellings may be built within the land allocated for non-residential uses such as green areas and areas allocated for agricultural, industrial or

educational purposes (UN.,2012).Slums are one of the most prominent manifestations of early urban inflation, emerging as clusters that grow randomly in urban centers and on their outskirts. The arab Institute for Urban Development defined as areas whose dwellings were built without a permit and in land owned by the state or owned by others. These dwellings are often built outside the scope of government services because they are not recognized by the state (Shurok and Antthar,2016).

Random clusters in cities are characterized as follow:

1-a poor quality of housing, which is not subjected to any kind of supervision, and some of them lack basic facilities such as water, sanitation and electricity, and green areas or open areas, which leads to consider the streets are the only respite to entertain the population.

2-Narrow streets and sometimes skewed due to random division, which leads to the difficulty of the existence of internal transport and the lack of smooth traffic because of different levels of streets in some cases.

3- The overlap of economic activities and markets with the residential areas, where people mostly depend on the street as a means to displaying and selling their products.

3. Sustainable urban development and the concept of sustainable transport

Sustainable urban development is the process of balancing among environmental, economic and social requirements. This balance is applied at the local level. Sustainable transport refers to mobility within patterns and mechanisms that have a low impact on the environment. These include modes of non-mechanized transportation, these are known as environment friendly transport.(Ahsaan,2016).

The US Institute of Sustainable Transportation defines sustainable transport as the achievement of mobility and basic access to meet the needs of sustainable development without affecting the quality of life for subsequent generations (Sanaa,2016). Thus, the concept of sustainable transport emerged in conjunction with the concepts of sustainable urban development in cities. With the rapid expansion of cities as a result of population growth, there was a need to raise awareness about reducing the environmental costs of urbanization. And depletion of non-renewable resources and high levels of pollution in urban areas.

Sustainable urban development should include the responsibility of the current generation, for negative planning decisions, or complacency by those responsible for the existence of urban cancerous patterns that are difficult to address in the future. The most prominent of these problems is random housing, which will bear the problems and consequences of future generations. Sustainable development through its impact on the basic ecological and socio-economic and finally planning so will monitor the impact of slums on these dimensions (Ahsaan,2016)

3-1Slums and social aspects of the urban environment:

The slums have become a place for outlaws and drug dealers and attraction points for many of social corrupts and a source of annoyance to the other neighbors, and they are becoming security problem that cannot be controlled by the security services, and the areas may become pockets of violence, extremism and terrorism (salah,2011). In addition, these informal residential neighborhoods lack public parks and green areas for recreation and leisure and leisure for all segments of the population. The

encroachment on state property through abuses has impeded the implementation of many important vital projects for the city's population.

3-2 Slums and economic aspects of the urban environment:

That random clustering is incompatible with planning, which is usually based on the principle of the relationship between economic activities (Ahsaan,2016), and urban land that is an essential part of the fixed capital. It is an investment advantage that must be exploited in accordance with the economics of the land and the public interest. It is the problem of over-exploitation of the economic resources of the city, and this exploitation is at the expense of other uses, resulting in an imbalance in the uses and the resulting problems.

Often, the extension of the informal settlements towards the fertile agricultural lands that lead to the spread of construction on them or on the lands of water basins that are polluted by this extension and random residential expansion, as well as the extension and emergence of these neighborhoods on the unorganized areas can be at the expense of another use which could be more suitable like agricultural, industrial, areas of wells and groundwater and mineral ores that limit their exploitation and utilization (salah,2011).

3-3 Slums and environmental aspects of the urban environment:

The environmental damage to random housing can be divided into two parts, the first of which is the damage in the same informal areas and the second is the damage of the informal settlements

to the city environment. The first type is the absence of sanitary drainage systems to transport liquid and solid human waste to places far from residential communities, resulting in environmentally harmful treatments such as the dumping of solid waste in locations close to residential buildings or the use of cesspits contributing to the pollution of groundwater. There are also other environmental problems resulting from poor planning in these areas, especially with regard to air and audio pollution and the overlap of industrial activities and workshops with housing. (Mohammed,2016).

The balance between the rate of the built land and open spaces within the residential area, and its direct impact on the creation of clean air and clean environment without germs and epidemics, it leads to non-compliance with the legal restrictions that overlap buildings, which adversely affects the rest which is reflected on the psychological state of individuals . Thus, on their products and reduce the level of their daily activities and there is another dimension to the overcrowding of buildings and the lack of enough rebounds for residential buildings and that is the lack of privacy of the housing unit. As for the impact on the city, most areas of the transgressors are in the agricultural areas, green areas or river banks that contribute to the purification of the city's air, as well as the banks of the rivers are places of entertainment and throwing pollutants directly to the water, contributing to the pollution of water in the city rivers (Ahsaan,2016).

3-4 The impact of random housing on transportation planning:

The transport network plays an important role in planning the city as the arteries of the traffic. The use of land is linked to one another. Most researches have agreed on one principle that transport and traffic within

cities cannot be planned in isolation from land uses. At the same time, these uses cannot be planned in isolation from transport uses due to the nature of overlapping and spatial relations among streets and their components, and forecasting the journey volumes and traffic flow. The strength of the relationship between transport and other uses is significant, the fact that the latter generated traffic and transport in the city and any change in the uses of the land would be reflected in return on the patterns of movement .The most important studies that show this relationship are traffic and geographical studies (Pohekar,2004).

In addition, indiscriminate housing leads to delays and hindering reconstruction programs, as these infringements on important areas of the urban fabric of the city hinder the planning and organizing the use of the land.

4. Global treatments for informal housing

The problems that led to the emergence of random housing in different countries have been varied. It was difficult to define policies or model programs to solve these problems, but the treatment can be divided through a number of policies:

4-1 The policy of upgrading (recognition)

Rehabilitation of slums includes providing the necessary infrastructure and social services as well as urban upgrading and also includes the re-planning of these areas to revive the region and society on the one hand, and the developing of a strategy to link these communities to a comprehensive plan on the other. The framework of upgrading the general level, covers all aspects; i.e. economic, social and cultural development ,within a strategic framework to address the problem of random housing in a radical and effective manner(Mohamed,2016).

The acceptance of these areas with giving them the legal and legitimate status, is one of the main methods in urban planning policies, which requires introducing all services to the technical and social infrastructure . This legal acceptance was developed to solve the problem of areas of transgressors through the establishment of mechanisms to ensure the ownership of land to the transgressors. However, the attempt to rehabilitate the informal housing areas after their growth is a difficult process in terms of technical and planning, in addition to the high costs compared to the areas that are developed according to the rules and the proper planning standards.(Abdel Baqi,2009).

4-2 Removal policy (non-recognition)

The use of bulldozers policy, i.e. demolition and removal of all structures, is in principle null and void. So, if falsehood is the indiscriminate construction itself, which was constructed without any limits of structural safety, health or service conditions (Ahsaan,2016). However, most of the removal plans of poor areas were not successful because there is no radical solution to the residents of the neighborhood; which is often removed, and their inability to meet the costs of new housing even if they are in easy installments. As well as, the neighboring relations and the bonds between them make it difficult to persuade them to change their residential areas (shurok and Antthar,2016).

4-3 The swap policy in city planning

The swap is defined as to give up one thing in return for something else or, to choose between two options or to balance the requirements that cannot all be met at the same time and it is also known as the land-for-time policy.

That is to give a period of time for the population to stay in these areas and this time allows the government of the state to solve this problem, while implementing the second part of the proposal, namely, addressing the real causes of informal housing for the development of final solutions. In addition, there are a number of different adopted policies by governments in solving the crisis of informal housing, such as granting a financial loan for the purpose of building their housing units, encouraging banks to invest in this area, and constructing multi-storey vertical housing complexes (Shurok And Anthar, 2016).

5. Previous studies:

5-1 open spaces as a tool in achieving the sustainable development in informal housing areas (2003).

The study pointed out that in recent years Egyptian cities have witnessed increasing rates of urbanization due to several reasons, the most important of which is the increase in the proportion of rural-urban migration.

It considered that the principle of sustainable development is the approach to solve the problem of random excesses, with the implications that emphasize the universality of development axes, Simultaneous and simultaneous consideration of development, aims at the continuation of the ecological nature of the place. The authors said that the open spaces in the informal areas, are the most important potential of these areas in the development process. It is a theater of environmental interactions and reflections of the special quality of social relations that govern this entity. The study investigated the problems that impede open spaces in the informal areas from performing their required role. It also showed that the negative impact of slums on urban planning. (Al-Hagla, 2003).

5-2 Baghdad / Karrada / area of Um Al- Ward

Based on the opinion of the population of the area, by choosing either the removal or upgrading policy, the results of the survey showed that 61% of the residents supported the decision to remove and change the region's features towards a sustainable urban environment. The study concluded a number of recommendations, the most important of which is amend the provisions of the urban laws regarding the population of slums that exceed ten years of residence and more and have them if they are fit for habitation (AL-baldawi, 2008).

5-3 Analysis of the residential structure of random housing in Al-Muthanna Governorate (2011).

The used method is a descriptive and analytical study of the nature of the region through questionnaire and surveying. The size of the small dwelling reflects the economic situation and size of the families and the number of married persons in the housing unit; as well as their negative impact on the nature of their living life. The study also showed the low quality of building materials used in the construction of residential units in

slums, which resulted in the absence of cultural appearance of the city and distortion of its features (hameed, 2011).

5-4 Study of the random growth areas of some residential areas in the city of Karbala using geographic information systems.

Geographical information systems were used to study the temporal and spatial changes of this phenomenon. The survey also included a questionnaire forms to identify the reasons why the owners of housing units these areas and also to know the level of services provided to these areas. The great answer is the weakness of state control followed by closeness to the city centre, and some residents said that they chose random housing because of the lack of suitable housing plots and high prices. (AL-Gawahri, 2015).

5-5 Spread of slums in the cities of Karma and Saqlawiya comparative study using the technology of remote sensing and geographic information systems (2015).

The research focused on the necessity of creating a geographic database within modern standards to perform the required analytical tasks on spatial data and linking them to the Internet; in order to support officials and decision makers of the warnings resulting from the slums, thus contributing to the choice of the most appropriate decision for the public benefit (Maki, 2015).

5-6 The effect of slums on urban sustainability (the study of random housing in Al-Kut City) (2016).

The survey was conducted to determine the cause of the problem and the opinions of the residents and specialists in the city of Kut and found that a very large proportion of housing units built with high-specification construction materials and that the population can be considered from the middle class materially and culturally it seems that one of the main reasons for the spread of this phenomenon is the absence of the integrated planning system and Keeping pace with the various planning stages and master plan for the needs of urban expansion, as well as deficiencies in the laws and mechanisms of organizational planning. The comparison of this strategy with the treatments showed that it is the best treatment of the random areas in Iraq in general to address the slums and meet the requirements of sustainable urban development (Ahsaan, 2016).

5-7 Economic and social costs of random hostels in Algeria (2018)

This study shows that random housing is not only modest buildings and roads, but different social structures and minds that must be developed within the framework of the comprehensive development of society.

It also found that the specter of random construction contributed to the emergence of a series of dangerous phenomena in the city, such as the exacerbation of the problem of school dropout, the lack of health safety measures, the spread of moral and social diseases. The lack of clear planning of the road network and the prevention of new roads in these areas due to the failure to resolve the legal situation, impeded the development of communities, which is contrary to the goals of sustainability, must be addressed and eliminate the reasons that led to the

emergence .The study concluded that it is necessary to issue laws and regulations in order to preserve the beauty of the identity and urban culture of the city's urban fabric, as well as to achieve a balance of social life. By demolishing irregular housing and compensating the population with suitable housing units (Rahima ,2018).

The concept of sustainable transport promotes a balance between the social and economic benefits of transport, which to protects the urban environment by adopting a guideline to formulate an effective and sustainable transport plan.

Studies show that the relationship between the uses of land and transport is the relationship of two sides of a single coin, so the change in one of them may be reflected negatively or positively on the other. (Ahsaan ,2016).

The above studies are consistent with the severe economic, social and environmental losses of indiscriminate housing and the negative impact on sustainable development. It is one of the most severe urban phenomena in urban planning. The negative impact on transport planning can not be denied.

6. Analytical and applied side

6-1 Ramadi city

Ramadi is located in the center of Anbar province at the intersection of the Euphrates River and Al-Warar Canal, 110 km west of Baghdad. It is 450 kilometers from the Iraqi-Jordanian border on the Baghdad-Rutba-Damascus road. It occupies an area of 5,764 hectares.

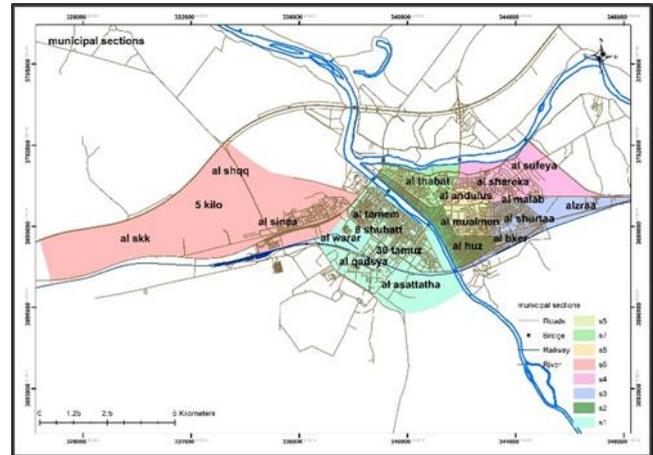
The population of Ramadi is 462283 . 229676 of which are in urban areas, while 232607 are in rural areas (Central Statistical Organization,2018)

.Ramadi was chosen as one of the cities most affected by the terrorist attack out of 96 Iraqi cities damaged in recent years according to UN reports to be a model for dealing with similar cases. The destruction included (housing role, basic infrastructure, public services, unprecedented displacement of population(Anbar Provincial Response Plan,2017).

The main strengths of a city include its location on the international road and railway, as well as its centering in the middle of local roads across the province, giving it the central role in management and services. Local resources include minerals, agriculture, and large areas of land and young energies suitable for development (Anbar Provincial Response Plan,2017).

6-2 Boundaries and description of the study area

The boundaries of the study area include the boundaries of the Municipality of Ramadi, which is the master plan. The city consists of 30 residential neighborhoods spread over the area of the city's main plan, penetrated from the north side by the Euphrates River and from the western side by Al-Warar channel feeding Habbaniyah Lake. For the purpose of identifying areas of random abuse in the city, we divided it into eight sections based on the division of the Municipality of Ramadi.



map .1 showing the eight municipal sections and residential neighborhoods Source / Researcher based on the map of Ramadi neighborhoods on Ramadi city

Table 1- Municipal sections with residential neighborhoods on Ramadi city

neighborhoods	Sector
AL snae- alhukm almahali - Al-Hussein (Qadisiya) - ALhuria - - Al-Nour (shbat 8) - Mu'tasim (July 30) – AL-gamaa-AI-Tash	1
Al-warar - June 1 (Al-Huz) -ALSKK- Mohammad Mazloum	2
Alaskary- Almalab - Al Khansaa (14 Ramadan)	3
(Sufia - ALtaqadm - ALquds (Eastern Thule)	4
Andalus – algumhuri	5
Osman ibn Affan - Al-Zeitoun - ALtawssu - Afreddos – Alskk AL garbi	6
(Alwaleed - Green (ALThubat)	7
Qatana -suq – Azizia	8

People in Ramadi usually live in individual housing units (96%),The area allocated for housing is relatively large, 50% of which are between(200-400) m2, 33% of them (100-200) m2 and about 10% of them (400-800) m2. The quality of building materials is different as that, 60% of buildings are of stone, 33% of brick and only 3% of cement. Most people live in their own property, and a few are in rented houses. However, 1.5% of the population illegally occupies state property, but this proportion has increased significantly in recent years because of the high proportion of houses destroyed after the security events that have passed through the city(Anbar Provincial Response Plan,2017).

To study the effect of random deviations on the scale of sustainable development in the city, a number of key criteria were selected, such as: (the criterion of planning, economic criterion, social criterion, environmental criterion), which is divided into a number of secondary indicators. According to available data:

6-2-1- Schematic Standard

Through interviews with officials and decision-makers, 80% of city roads are paved but need to be maintained (Municipality of Ramadi, 2018). The delay in maintenance is due to the lack of an integrated sewerage

network and the continued operation of the sewerage system, which prevents the resumption of maintenance work and road coverings.

Part of the indiscriminate excesses fall within road use and the municipality is unable to provide regular services to these areas due to the non-settlement of its legal status (Ramadi Municipality,2018).The treatment of informal settlements within the city requires a sensitive assessment as key issues, such as property land use, environmental impact, the value of real estate in the area, the number of informal housing, and finally the extent of damage, which would identify actions that could be more appropriate(UN,2012)&(National Development Plan,2018).

The (percentage of road area \ total land use)

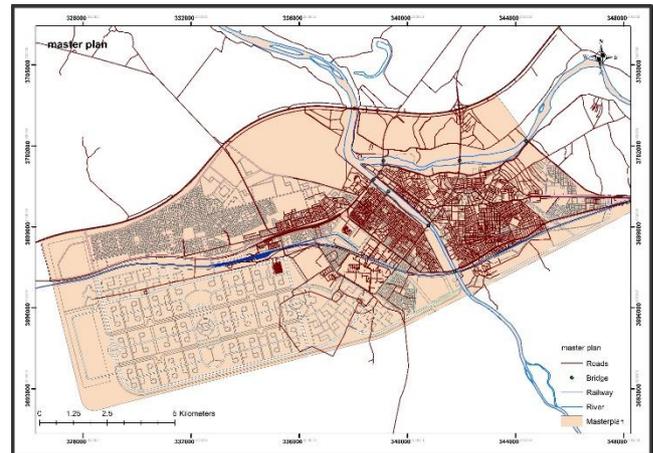
was selected as a comparison measure, because most of the buses lay within sections used for housing under the basic design or fall under different uses such as shown in the map(2) .

Table 2- the efficiency of the roads.

Section	Efficiency	standard
1	18.5%	21-18
2	12.93%	21-18
3	17.3%	21-18
4	23.8%	21-18
5	18%	21-18
6	39%	21-18
7	10.8%	21-18
8	12.8%	21-18

expansion approved by the long-term structural plan for the province in 2033 as show in map (3)

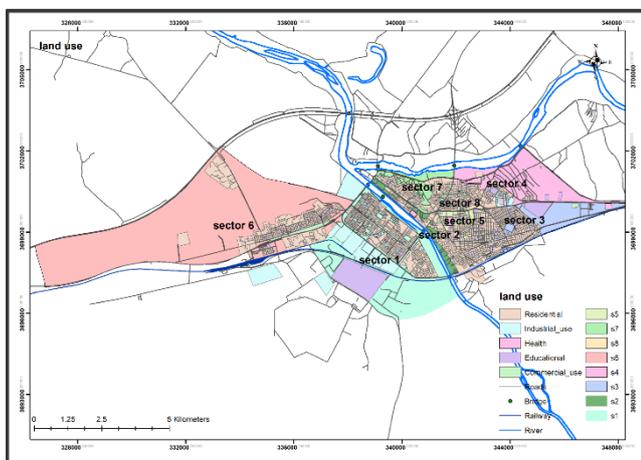
The southwestern part of the city has been identified for expansion with the study of its characteristics and topography, centers of educational and service activities and others, where the new residential expansion areas accommodate 240,000 people(Municipality of Ramadi,2018).



Map .3 Master plan of Ramadi (2033)

6-2-2 Economic standard

Studies suggest that slum growth is mainly due to non-implementation of building laws, failure to protect state-owned land due to the failure of government agencies to implement, and poor attention to national development, which attracts migration streams and housing problems which has lost the state a lot of valuable land ,in addition to the social incurred by the state and society alike. The total built-up residential function in Ramadi, which lies within the boundaries of the municipality and the master plan and its expansions, reached (2663) residential houses constituting more than 12% of the total residential function in Ramadi. Most of them are located on state-owned land (municipal). Divided by different percentages on the municipal sections as shown on the map(4), (Municipality of Ramadi,2018)

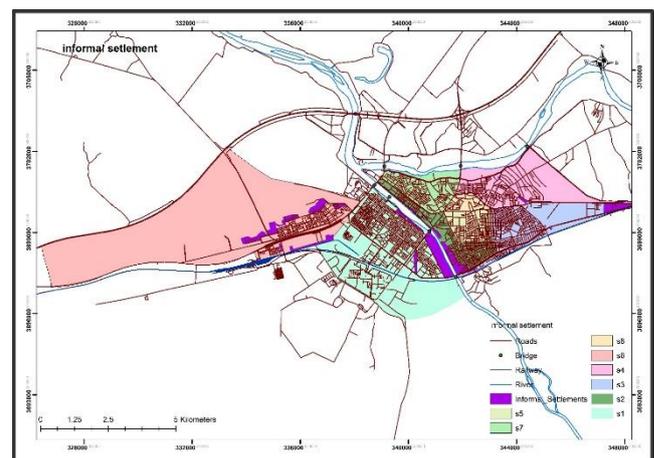


Map .2 land use

Source \Researcher based on the map of Ramadi

The presence of the international road in the north of the city made the city well connected with other Iraqi cities and provinces on the one hand, linking the Ramadi with Baghdad and other cities in neighboring countries such as Syria and Jordan on the other. In the area there is a network of main roads linking the different neighborhoods within the city of Ramadi.

The other planning indicator is to give importance to the proposed projects within the master plan for 2012, which aims mainly to create a concept of physical integration between the existing city and the areas of future expansion not implemented. In the framework of the future



Map .4 informal settlement in Ramadi city
Source \Researcher based on the map of Ramadi

The implementation of the policy of removal and the abandonments of

people to their homes simultaneously or in successive stages, and temporary absorption in residential units away from slums, which face regulatory and economic obstacles in many cities, is one solution to address the problem.

Swap policy in general is to give up one thing in return for something else, or to choose between two choices or to balance the requirements that can not all be met at the same time. Or to strike a balance between factors that can not all be achieved at the same time. It may look better than previous policies , May look better than previous policies ,The government may also avoid large economic costs by losing its land, by providing shelter to slum dwellers at affordable prices or by providing material loans to help them. That the phenomenon of informal housing in Ramadi is a manifestation of the housing crisis. Due to the unavailability of land with reasonable prices since 2012. The increase in land prices is one of the causes of the spread of the phenomenon of slums, so land prices were chosen as an influential indicator of the expansion of the phenomenon of informal housing .

The prices of residential land vary greatly due to unstable conditions, but they are generally high and are not commensurate with the income of the families in the city and often prices rise near the center of the city and areas of good service as in table (3).

Table (3) land prices in Ramadi city

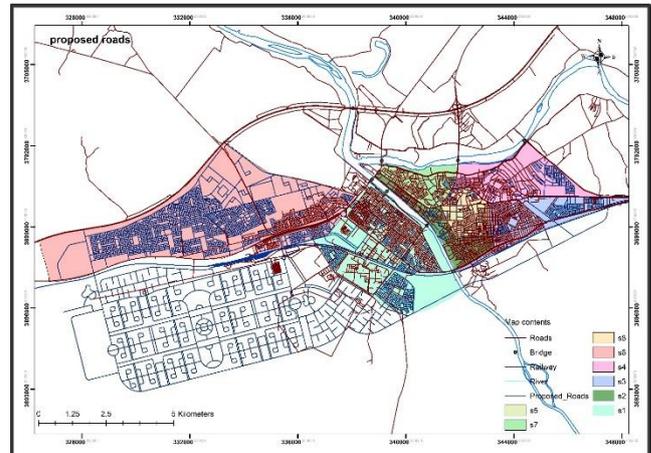
Section	Price per square meter Dinar Iraqi	neighborhoods	Price per square meter Dinar Iraqi	neighborhood
1	150000-350000	AL snae	15000-120000	Al tash
	100000-150000	AL hukm al mahaly	20000-120000	AL-gamiaa
	90000-100000	Alhussein	100000-150000	Mutasim
	100000-150000	Alakrad	100000-110000	8 shibat
2	250000-300000	Al-warar	250000-200000	ALskk
	300000-350000	Alhuz	250000-200000	Mohammed mazi
3	250000-200000	Alaskary	300000-250000	ALkhansaa
	250000-200000	ALmalab		
4	500000-525000	Sufia	250000-225000	ALquds(thule)
	400000-350000	AL taqadm	350000-300000	AL Gumhuri
6	60000-70000	Osman ibn Affan	40000-150000	Al-Zeitoun- ALta
	60000-70000	Afreddos	90000-100000	AL SKK AL-Ga
7	350000-40000	(Alwaleed)	350000-40000	AL-thabat
8	400000-350000	Qatana -suq - Azizia		

Source: Municipality of Ramadi

Most of the squatter housing units are located on agricultural land near the river. These areas are characterized by abundant water, proximity to services and urban infrastructure, so they are very desirable. The highland values in this area convince farmers to divide their plots and sell them informally to newcomers rather than to use them for agricultural purposes. If no measures are taken to control the fertile Euphrates river banks, agricultural land will inevitably be lost. Therefore, the citizens of Ramadi will rely on agricultural products from other places. The random division also impairs the implementation of the proposed roads in the 2012 master plan throughout the city and as shown in the map(5).

This requires halting informal growth in agricultural areas and addressing some of the gaps in the legal framework governing housing construction on agricultural land, such as Resolution 734, which allows landowners to

build housing units. Since there is no minimum area for agricultural land, the division of land into small plots of land is inevitable.



Map .5 overlap of slums with proposed roads , Source/Researcher based on Ramadi map

As for the other economic index, we chose the ratio of road projects to ongoing projects within the city during the year 2018, where the total projects are currently executed at a cost of JD (217.660343900), while the road projects listed below in the Ramadi municipality are (899,930, 399,000) Iraqi dinars and constitute about 41% of the project (Anbar Governorate / Directorate of Planning,2018).

6.2.3 The social standard

Some of the slums have become a place for those who are out of the law, a point of attraction for many of the owners of cases, of social corruption and sources of inconvenience to neighborhoods adjacent to slums, and may constitute a security problem that prevents the control or seizure by the security services.

Informal housing is an obstacle to the city's growth and expansion. The total elimination of informal settlements through removal has significant social effects, the most important of which is the displacement of a large segment of the population and leaving them homeless, without an appropriate alternative. Negative social impacts will continue if slums remain as they are.

The implementation of the swap principle (i.e., to give up one thing in exchange for something else) and to provide treatments in accordance with current circumstances will help to recognize these areas once they are identified and provide the necessary services.. In the short and medium term, the population of the slums will benefit. But in the long run the city will benefit because it will implement the original plan of the city based on planning studies and abide by the laws, as well as give a great opportunity of time for the organs of the legislative and executive state to arrange their situation and address the lack of housing stock, and finally this measure will deter future

transgressors, because the idea of recognition and ownership is no longer Presented. Where the total residential units built have exceeded (2663) in the city of Ramadi and located within the boundaries of the municipality and the master plan and expansions up to residential houses constitute

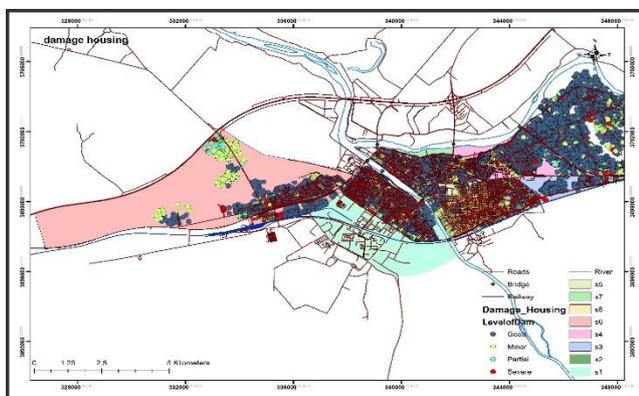
more than 12% of the total residential houses in Ramadi. Most of them are located on lands owned by the state, and they are increasing because the reason of its creation is not treated. The proportion of houses that are largely damaged or completely destroyed is 34% of all residential units in Ramadi. The percentage of random housing was defined as a social criterion should be taken into account in the study (Municipality of Ramadi, 2018).

There are several other forms of encroachment on public land, for public purposes, or investment projects within the administrative boundaries of the city, as well as the gradual and informal construction of residential units on agricultural land near the river and on the fertile land between the River Euphrates and the highway, estimated 22 settlements located within the administrative boundaries of Ramadi city. It consists of 1,574 informal housing units. A total of 212 hectares are distributed by 2012 on the master plan for a variety of land uses, including housing (42%), economic investment, (40%) green areas (10%) (Municipality of Ramadi, 2018).

6-2-4- Environmental standard

After 2014, the city suffered major destruction in residential areas, which distorted its urban landscape. Where field studies found that 12,000 homes were destroyed during the conflict with terrorism. Of which 2,400 houses were destroyed, 23% of which were slightly damaged (4,874) houses, 18% of which were severely damaged (2,100 houses), while 6% of houses were completely destroyed (1332) The earliest was the destruction rate (80%).

In January 2018, international organizations recorded a significant return of the families to the governorate, which has been displaced since 2014, reaching 1.2 million returnees, representing 36% of the families, including 457,500 people in the city of Ramadi, but most of these families were homeless. Because of the great damage to their homes (Anbar response plan, 2017).



Map (6) shows the damage housing

The index of proportions of destruction in homes was chosen as a very important indicator in the current situation of the city and as a direct cause of the spread of informal housing and distort the urban landscape of the city.

However, if they are recognized or subjected to some services, their negative impact will remain and will only change slightly that the slum dwellers benefit more than the residents of the city for the continued

depletion of agricultural land and distinctive sites in the city. The removal policy can significantly reduce the negative environmental effects.

The fluctuation in population levels, and the fact that many new immigrants have been directly integrated into the community, has resulted in an increase in the population density, which is estimated at 90 to 100 people per hectare of area, while the current built-up area of Ramadi municipality is about 4,000 hectares for all land uses. The increase in population density has a significant impact on the use of transport traffic. As the city of Ramadi grows, the focus on transport needs becomes a major feature of the municipality. One of the most important obstacles facing transportation planning is the principle of sustainable development. The local authorities face the problem of rapid growth, which is often informal and informal on the outskirts of its municipal borders.

As a result of the increasing population density in the city, there is a significant increase in the number of vehicles that cause air and noise pollution, especially for cities suffering from traffic jams. These compounds play a prominent role in the generation of major air pollutants. There are many health and environmental risks resulting from the exhaustion of different types of vehicles. Its operational capacity is gasoline or diesel, which is considered one of the most important sources of air pollution. Fuel combustion within vehicles excludes many contaminants, mainly carbon monoxide, volatile organic compounds, nitrogen oxides, sulfur dioxide and particulate matter, as well as toxic lead compounds from exhaust when using gasoline containing lead and other metals (Anbar response plan, 2017).

We consider that the standard of vehicle preparation is very important in influencing the increase in air pollution. Through the available data, we found that the number of cars in 2017 was 39706 vehicles, while the number increased to 42634 in 2018 (General Traffic Directorate, 2018).

7. General evaluation

The previous part of the study dealt with the detailed comparison of the options for dealing with the phenomenon of random housing regarding the sustainable urban development. In order to compare the proposed methods of dealing with the slums, the method of Analytic hierarchy process (AHP) will be used to compare options through a questionnaire for use by academics, local government officials and office managers who deal with slums within sustainable transport strategies.

The study proposed three strategies for dealing with random housing

- Removal policy (non-recognition)

- Swap policy (recognition with disposition)

- Upgrading policy (inclusion of treatments by urban design) The study aims to shed light on each of these strategies and try to evaluate the city's reality according to the principles of evaluating the sustainability of transport and then finding the best alternative to solve the problem of random housing.

8. Use AHP to access the best alternative

Before dealing with the steps of AHP, the purpose of the multi-criterion decision (MCDM) must be recognized. Thomas Saati, author and inventor of the pyramidal analysis process, said that the decision maker usually faces a complex system of interrelated components of resources, people also have the incentive to predict or control and are interested in inspecting the system. Clearly, the better the decision maker realizes this complex procedure the better the expectations or decisions would be (Afifi,1989)(Pohekar,2004).

8.1 Analytic hierarchy process

The process of hierarchical analysis is a process that helps decision makers to make complex decisions with multiple criteria. These decisions may be the most accurate among the decisions that can be made. This method is characterized by the assessment of non-quantified standards. The process of hierarchical analysis is a process that helps decision makers make complex decisions With multiple criteria and these decisions may be the most accurate among the decisions that can be taken, and this method is characterized by the assessment of non-quantified standards (Afifi,1989).

8.2 Steps of pyramidal analysis method

Saaty explained that it starts by putting the elements of the problem in a pyramidal way and then makes a relative comparison between the elements of the problem at one level, based on the selection criteria, and we get these comparisons on the overall priorities and we calculate the extent of stability and the extent of overlap between elements, The method of pyramidal Analysis is as follows (Alhiti,2017)

Step 1: is to form the hierarchy of the problem of the study

Step 2: Identification and calculation of priorities (Afifi,1989)

Step 3: Measuring the degree of stability.

$$CI = (\lambda \max - n) / (n - 1)$$

Once the consistency index (CI) is obtained, it should be compared with the random cursor values (random Index) to identify the stability ratio

$$CR = CI / RI$$

Where CR = stability ratio

CI = Stability index

RI = Random stability index

The stability ratio as it approached zero, the sentences were stable and the maximum acceptable stability ratio is (0.1) or 10%.

9. Geographic Information Systems (G.I.S)

Geographic Information System (GIS) is a method of organizing geographic and non-geographic information by computer and linking it to its geographic locations based on specific coordinates. Geographic Information System is the spatial element in which the information is located. System represents computer technology and related software (AL-hiti,2017).

GIS offers a potential for digital mapping of the city's territory. It is interested in showing properties to identify the possibility of special obstacles to future expansions of the future location of the city, as well as

the ease of dealing with land owners when necessary, especially during the establishment of public service projects which require sufficient space.

10. Expert matrices:

After the interviews conducted by the researcher with a section of the sample questionnaire, through which the proposal of the main criteria and sub-influential in achieving the goal of research was suggested to identify the best alternative to achieve the goals of sustainable transport. The sample of the experts was chosen from non-random samples and the selection process is important because the decisions of these experts or so-called Stakeholders give strength and sensitivity to the decisions and results of using this method.

11. Results of discharge of questionnaires:

The results of the evaluation of the basic criteria affecting the policies of random housing in Ramadi city, in sequence from top to bottom: the environmental criterion, followed by the economic criterion, and then the social and finally the criterion of planning.

For secondary standards, the highest values for secondary standards were the criteria for treating damaged residential areas within the environmental criterion, while the lowest value is the criterion of road efficiency within the basic criterion of planning.

Table 4. Prioritize the main and secondary criteria according to the experts' opinions

Evaluation(1-9)	Sub Criteria	Main Criteria
4	No. of accidents and Casualties	Social c1
5.33	Rates of random housing	
6	High land prices	Economic c2
5	Percentage of road projects	
7.66	The proportions of destruction	
4.33	Increased number of vehicles	Environmental c3
4.667	Proposed road	
3.33	road efficiency	Planning c4

From the table above, we note that the maximum damage to the city suffered after the war with terrorism, which gained 7.66 points because of the interest of specialists in this aspect. Followed by another sub-factor The rate of random housing in the entire city of Ramadi is one of the social factors associated with the economic aspect and got (5.33) points, where it is considered by people to have exceeded the law and waste state property. The sub-factor, which ranks third, is the percentage of proposed road projects that are currently being implemented from all development projects and is of great importance to stakeholders and decision-makers. (3.33) because most city streets are considered tiled, although they need periodic maintenance. Especially in areas where sewage and sewerage are maintained. An analysis of the results of the above table shows that the total score obtained by the main criteria was in the following sequence. Where environmental standards ranked first and economic standards ranked second. Social standards ranked third and planning standards

ranked last and according to expert opinions. The result of the questionnaire distributed to (10) stakeholders emphasizes the importance of the environmental standard in achieving the research objectives. This standard is the mainstay of any development. This result may also be due to several of the standard sub-factors that resulted from the stakeholders in the agreement that were included in the important factors that affect the achievement of the research objectives in the following steps. The matrices reached after completing the questionnaire forms will be submitted by stakeholders from During the extraction of the arithmetical parameters of the matrices obtained from the questionnaire forms.

12. Recommendations:

And through the extensive study of the reality of the city and the impact of random housing on various aspects and the questionnaire submitted to stakeholders and decision-makers and analysis of priorities through the program of pyramidal analysis we could come up with a set of recommendations.

1-The results of the evaluation of the basic criteria affecting the policies of random housing in Ramadi city, in sequence from top to bottom: the environmental criterion, followed by the economic criterion, and then the social and finally the criterion of planning.

2-The highest value for secondary standards was for the standard of treatment of residential destroyed areas, within the environmental criterion, while the lowest value is the criterion of efficiency of roads within the basic criterion of planning.

3- Organizing informal settlements and providing them with services, as they are located on land designated for future residential areas and contact with existing urban fabric.

4- Implementation of the proposed expansion of the master plan in gradual basis on the land on non-agricultural land to reduce the housing deficit and pressing on the land.

5 -Support for the construction of affordable housing units can provide an option for the transfer of vulnerable families who have lost their homes

6-Institutional and legal frameworks and traditional treatments are not ready to deal with the phenomenon of slums due to the present conditions of the city, but the land-for-time policy can be the basis for appropriate legal legislation to deal with informal settlements because they are not institutionalized. The current circumstances of the country, are not ready but the land-for-time policy could be the basis for. appropriate legal legislation to address the slums in Iraq because it takes into account the current circumstances

This policy of implementation requires activating the role of municipal supervision in building legislation.

7-Preparing a draft law that would allow the legal status of these informal settlements to be settled, since the existing laws do not permit the approval and rehabilitation of these gatherings, but provide for the removal and accelerate the ratification of the draft law amending resolution 222 (1977).

This will contribute to facilitating the treatment of agricultural land within the city, which is specific to urban uses, and provides land for housing projects and services, or investment formally and domestically, thereby limiting the use of future overruns.

8-Support the construction of affordable housing units to help those affected by terrorist acts and reduce the housing crisis.

13. Reference

- Abdel Baqi, Dr. M. " "Role of Urban Planning in Reducing the Environmental Problems Resulting from Transport Traffic," Center for Planning and Urban Studies , Journal of Engineering Sector,2009.
- Al-Baldawi ,Z.R. "Slums between Reality and Ambition - Towards a Sustainable Urban Environment - A Case Study of Mother of the Rose" Journal of Planning and Development - Issue 18 - 2008. P. 26, 2008.
- Al-Hiti, d. Th. Sh., "Evaluation of planning strategies for the reconstruction of destroyed cities using the method of pyramid analysis Ramadi city model," Iraqi Journal of Civil Engineering, 11 Issue: 1 Pages: 1-16, 2017.
- Al-Hjla , Dr. Kh., " Open Spaces as a Tool in Achieving the Sustainable Development in Informal Housing Areas. Arab Regional conference, 2003.
- Al-Jawahri, Z. A. " Study of the random growth areas of some residential areas in the city of Karbala using Geographic Information Systems, "university of Babylon journal,23(1),73-83, 2015.
- Anbar Governorate - Directorate of Planning,2018.
- Central Statistical Organization , "National Development Plan (2018-2022)," 2018 .
- General Traffic Directorate ,2018.
- M. Dr. Makki Ghazi Abdul Latif and M. M. Mustafa Bahayas Kayas. The spread of slums in the cities of Karma and Saqlawiya comparative study using the technology of remote sensing and geographic information systems. Journal of the Faculty of Basic Education - University of Mustansiriyah, 21 (91), pp.28-1, 2016.
- Ministry of Planning / Central Bureau of Statistics / Statistics Directorate of Anbar province.
- Municipality of Ramadi,2018.
- Pohekar, S. D., & Ramachandran, M. "Application of multi-criteria decision making to sustainable energy planning—a review. Renewable and sustainable energy reviews", 8(4), 365-381, 2004.
- Rahima, H., Economic and Social Costs of Random Hostels in Algeria. KnE Engineering, 3(4), pp.375-387,2018.
- The Ministry of Planning, "Poverty Reduction Strategy (2018-2022)," 2018.
- Abbas,Dr. I. , "The Effect of Slums on Urban Sustainability Proposed Planning Mechanisms for Development ,"Qadisiyah journal of engineering science. 9(3)24-447, 2016.
- Afifi, Ahmad Kamal El-Din." Urbanely Underdeveloped Areas, Random Housing "Arab City Magazine, Organization of Arab Cities and Capitals, Qatar, Doha, , 1989.
- Anbar Provincial Response Plan,2017.
- Hameed. Dr. M.K. "Analysis of the Residential Structure of Random Housing in Muthanna Governorate," Journal of Education College Wasit University, 1(11), 2011.
- Ministry of Municipalities and Public Works" Draft of the Structural Plan for Anbar Governorate", Iraq, 2014 .
- Mohamed, Dr. M. I. "Planning dimensions of the phenomenon of random housing (field study for the area of the neighborhood in) City of Kut), Journal of Education College Wasit University, 1(22), 399-428, 2016 .
- Satea ,Dr. S.A.& OMRAN,Y.T. " Sustainable Transport and Urban Shape University of Technology," Iraqi journal of Architecture,12(1), 187-206, 2016.
- Shorouk N. J. & Antthar J. J , "Development of the urban environment for informal settlements Baghdad City model," Journal of Geographical Research ,(23) , 2016..
- Strategy development of the city of Ramadi and update the master plan for 2010..
- United Nations , "Spatial Development Group (2013-2017)," Iraq ,2012.
- Zubaidi ,Dr. S. D., "the slums in the city of Baghdad and their environmental and economic impact social and security issues. diyala journal of human research,(52),406-4304, 2011.