

Use of Modern Technology to Develop Investment Housing Projects in Iraq

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Abstract – The problem of housing is one of the most important problems in Iraq, especially with the increase in the rate of population growth which is one of the highest rates in the world and after the great destruction that happened in Iraq because of wars and terrorist acts, and here begins to think about the real solutions of this crisis using modern technology and taking into account the feasibility of using modern construction materials compared to the traditional method of construction.

Investors are seriously considering changing the traditional building style and transition to modern building materials to increase quality, win a time, ease of installation and achieve dimensional consistency with ease of internal and external finishing work. The hot weather in Iraq requires real attention to the issue of thermal insulation of buildings and therefore can use the advantage of modern materials to increase thermal insulation and reduce in the energy consumption. This article sheds light on the investment housing projects in Baghdad city.

Keywords – cost, investment, materials, technology, time

1. INTRODUCTION

The housing sector is one of the most affected sectors in Iraq after the wars in Iraq spanning 38 years, and from here investors began to invest in the field of housing, the feasibility studies of projects focused on the determinants of financial, economic, environmental and social.

While increasing the need for the development and expansion of all kinds of buildings in Iraq it becomes necessary to consider the nature of the materials. In Iraq the temperatures reached high levels is the highest in the world exceed 50°C .that huge rise in temperature requires thinking about the use of new materials and modern technologies that contribute to increasing thermal insulation and reduce the consumption in energy in a country already suffering from an energy generation crisis. The insulation in most buildings makes by using a primitive ways and often confined to the roof of buildings only.

The need for residential housing units increased to 4 million units in 2014 [1] in addition to the need for commercial and industrial buildings, especially after the great destruction on infrastructure because of the war. Most of buildings in Iraq not designed to resist seismic loads and this increases the risk and hazard of buildings collapse these building when strong earthquakes occur especially after increasing earthquakes in this area between Iran and north of Iraq.

After all of the above it is necessary to move towards practical and economically

feasible alternatives. The feasibility of choosing the right style for constructing buildings is not limited to choosing cost of construction only but depends on the control triangle (time, cost, quality).

One of the most important factors in the success of construction projects is the time, reducing the time of completion of the projects leads to rapid recovery of the value of the project in addition to accelerating solution to reduce the crisis of residential and commercial buildings.

The quality of the projects completed depend on the choosing of materials with high effects in future on performance of origin in terms of performance in another functions like a insulation, reduce the consumption in energy, keep to environment, and increase the construction age and durability.

1.1. Most important problems of housing sector in Iraq

There are many problems related to the construction of residential complexes, which directly contribute to reducing the technical value and economic feasibility of these projects, important factors are:

- high in impletion cost,
- pollution,
- low quality,
- loss in HR management,
- increase in energy consumption,
- high in completion time,
- human resource management absence.

1.2. Common materials of construction in Iraq

a) Residential complexes:

Most of the residential buildings consist of concrete structures and a concrete roof, usually ranging from 3 to 9 floors, most often.

The partitions makes by using a hollow block or bricks with a thickness 10- 24 cm. In a few cases lightweight blocks are used (foam concrete blocks).

b) Stand-Alone Villa:

This type represents the majority of the types of residential complexes and arises mostly using the strip foundations and then walls of the bearing-load walls using the bricks or hollow concrete blocks and that depend of regions in Iraq. Every unit consists between 1-2 stories with a total area between 100-300 m² in most cases.

Below is a table of building materials used in various areas of Iraq.

Table 1 Building materials used in Iraq

Region	Material used in walls
North	Hollow concrete blocks Solid concrete block
West	Clay bricks Solid stones
South	Clay bricks
East	Clay bricks
Baghdad	Clay bricks

In north, south, west and Baghdad zones are not used a concrete block because these zones have high temperatures especially in summer.



Fig. 1 Building styles in Baghdad

Below is a traditional material used in various areas of Iraq

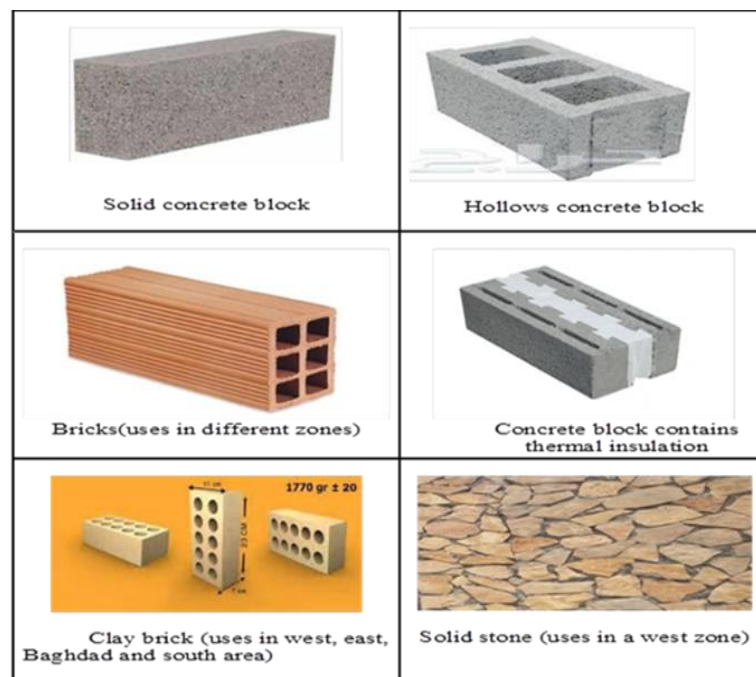


Fig. 2 Common materials in Iraq

2. INVESTMENT IN HOUSING COMPLEXES

Iraq is one of the most attractive countries to invest in housing, especially after the increase in demand for housing units and the new tendency of the state to focus on building residential complexes in an investment way.

Iraq's population is 38 million, according to the latest official statistics. Investors should focus on time competition and reduce cost to meet the economic viability requirements of investment in the housing sector. With the increasing investment companies operating in Iraq, the need to achieve the main requirements for the success of the investment project is increased by reducing costs, reducing the time of achievement and achieving customer satisfaction, which means achieving high quality, in addition to the modern investment requirements of increasing the operation of the plant and reducing the consumption of electric power. Water and environmental conservation requirements by reducing thermal emissions, minimizing waste and using clean energy to save energy for those buildings.

Below is a total population in Iraq according to Iraqi Ministry of Planning, Central Statistical Organization.

Table 2 Total Population in Iraq [1], Resource: ministry of planning

Year	Total Population
2015	35,212,600
2016	36,169,123
2017	37,139,519
2018	38,124,182
2019	39,127,900
2020	40,150,200
2021	41,190,700
2022	42,248,900
2023	43,324,000
2024	44,414,800
2025	45,520,500
2026	46,639,900
2027	47,771,600
2028	48,914,100
2029	50,061,500
2030	51,211,700

2.1. Iraq's need for residential units

Estimated the need for housing units in Iraq to 4,000,000 housing units, which represents a very large number calls for thinking of urgent and quick solutions to alleviate this problem, especially with the high rents prices significantly, which put great pressure on citizens with low incomes.

The reliance on traditional methods of construction cannot solve the problem and do not achieve the goal of solving this problem quickly, especially in terms of the time of completion of these projects.

2.2. Contribution of new technology and Materials on improve management of residential buildings

a. Reduce consumption of electricity

The problem of electricity is one of the most complex problems affecting the public life of citizens, as the demand for electric power is increasing continuously with a large power deficit of up to 12000 megawatts, while the output does not exceed 15000 megawatts and as shown below.

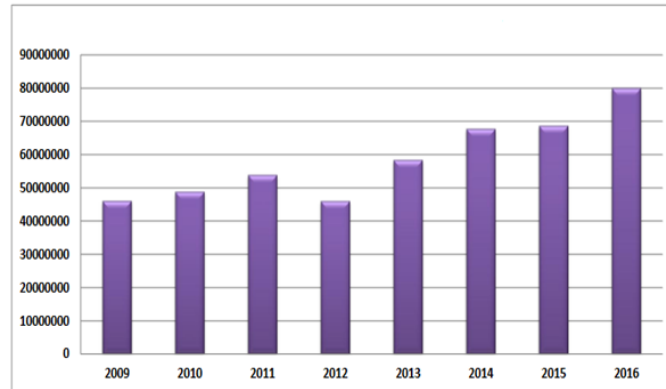


Fig. 3 Consumption of electricity in Iraq KWH [2], Resource: ministry of planning

The majority of the consumption of electric energy is in the share of residential complexes, hence the role of modern technology in reducing the consumption of electric power through the use of modern insulation materials contribute to reduce the consumption of electric power in the country has one of the highest temperatures in the world exceed sometimes 50 °C. The most important materials that help increase the thermal insulation rate in residential buildings are:

➤ *Foam concrete:*

Foam concrete is one of the most important materials that may have a significant impact on improving the performance of construction projects in many ways. Its density ranges from 200 to 1800 kg / m³. This helps reduce the load on the structure of the building. Heat insulation of buildings significantly compared to other structural materials such as bricks and concrete blocks.

Foam concrete is easy to transport and therefore makes work faster and less risky than personnel safety.

Finishing works in construction will be much faster and easier compared to bricks and other types of masonry masses.

Table 3 The typical values of thermal conductivity of foam concrete [3]

Type of foam concrete	Sort of foam concrete according to average density	Non-autoclave foam concrete	
		28 day compressive strength MPa**	Thermal Conductivity W/mk
Heat-insulated	D400	1	0.1
	D500	1.4	0.12
Constructional-heat-insulated	D600	3.5	0.14
	D700	5	0.18
	D800	7	0.21
	D1000	10	0.24
Constructional	D1100	14	0.34
	D1200	17	0.38

➤ *Prefabricated walls:*

Precast or prefabrication concrete is one of the most important elements that lead to improved performance in the stages of construction of residential buildings in the manner

of investment, which have significant benefits in increasing the efficiency of performance, especially thermal insulation of buildings and thus reduce the consumption of electricity.

The use of foam concrete in prefabricated units has the great effect of increasing thermal insulation by adding foaming materials during the process of precast concrete walls.

➤ *Insulated glass*

Doors and windows in residential units are considered to be the most sources of energy loss in buildings and houses. The windows contribute at least 34% of the loss of energy and the doors contribute to loss of at least 40% of the total loss of energy, that means doors and windows constitute a total 75% of the total value.

From this fact comes the importance of good insulation of doors and windows and the most important question.

Below is one of the heat insulating glass models which increase the thermal insulation ratio in addition to voice insulation.

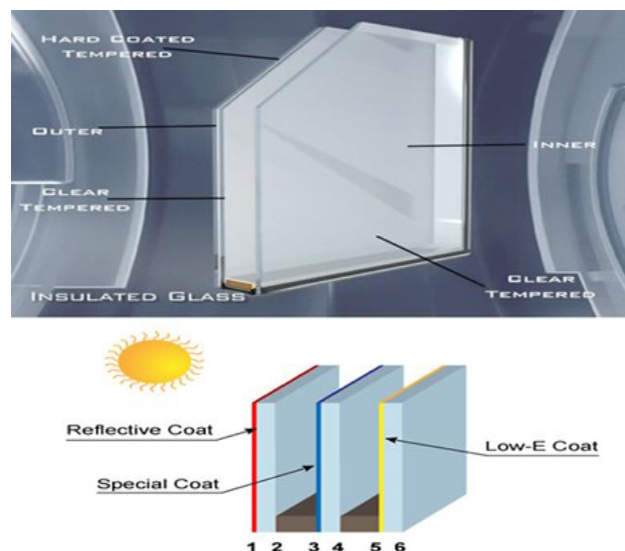


Fig. 4 Insulated glasses [4], Resource: ar.drgreiche.net

b. Improve the time of projects completion:

The management of time is one of the most important challenges facing the construction of residential complexes where most investment projects delayed delivery of housing units because of the use of traditional means of construction and for several reasons:

- ✓ Increase the transport time
- ✓ Increase the masonry time
- ✓ Increase the finishing work time

While the use of modern technology and new materials to overcome significantly delays in the time of completion of the project in addition to other advantages of the modern materials, including the use of structural elements and the proportion of manufacturing and foam concrete and other materials that lead to a reduction in the completion time by a large percentage may exceed 15% of Total time of completion.

3. FACTORS AFFECTING TO INVESTMENT FOR HOUSING PROJECTS

The main objective for investors to invest in the field of housing is to achieve profitability, and since the investment in this sector of the opportunities in Iraq, the competition for the completion of these projects at a high level and that the realization of the requirements of feasibility of the implementation of these projects based on several key elements:

- *Cost of projects:*

Many investment companies have been affected by their sales of residential units due to the large competition for the most advanced companies in terms of using modern technology cheaper than the traditional materials whose economic feasibility of using them is not useful. The sale price of residential units are 400\$/m² -1000\$/m² according to the quality and according to the materials used in the implementation of the work lightweight materials such as foam concrete and walls filled with isolated materials increase thermal insulation, in addition to its contribution to reduce dead loads and thus reduce the rebar and reduce the space Structural sections, which in turn contributes to reducing the total cost of housing units.

- *Time of completion:*

The management of time in projects is one of the most important challenges facing investors as the management of time risk takes a lot of effort and allocate an additional budget for the total cost of the project because of the large number of labor and the use of traditional systems in the implementation as the heavy construction blocks need a considerable time for implementation in terms of transport and construction Terminations and thus the need for more time. The value of the project's recovery is inversely proportional to the project completion time. Therefore, the use of modern construction techniques significantly reduces the length of time needed to complete the project. This includes the use of prefabricated concrete walls and beams. The use of these techniques greatly helps to reduce the completion time by 15-20 %.

- *Customers satisfy:*

Quality management requires keeping abreast of the major developments in modern building materials and harnessing them to develop building systems to achieve the highest levels of comfort and prosperity for the customers and thus achieve higher profits and achieve the feasibility of investment in those projects. The term quality is the true synonym for customer satisfaction, and including reducing energy consumption through insulation methods as well as reducing noise, fire protection and protection against natural hazard and risks.

- *Environment requirements:*

Construction works effect of thermal emissions, buildings represents 35% and 50% of total emissions [5].

As a result, thermal emissions and pollution continue to end the life of the building, and therefore alternative solutions must be found to reduce pollution and thermal emissions and replace the traditional materials of construction to new materials that have few emissions and which meet environment requirements, and away from substances harmful to the environment and from these materials and finishes harmful material P.V.C and formaldehyde, which is used as an adhesive, and vinyl material used in flooring [6].

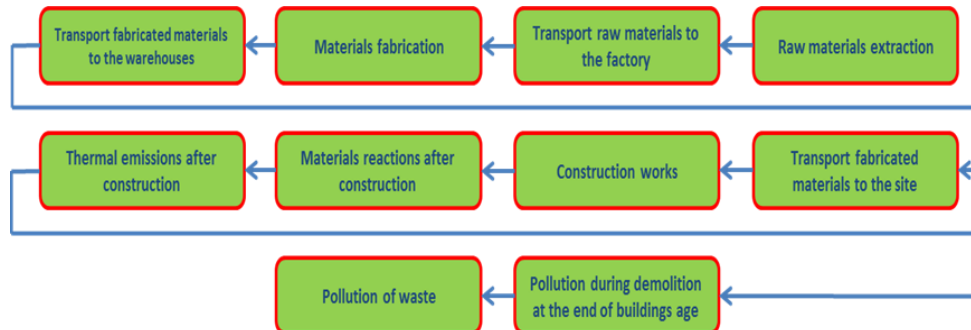


Fig 5 Pollution and thermal emissions during the building cycle

4. CONCLUSION

The investment in the housing sector is one of the most promising areas in Iraq and requires further development and study to achieve two important aspects of what is required to manage investment projects in the field of housing:

First: To achieve the economic feasibility of these projects through the use of modern materials and advanced technology in the construction to continue competition by reducing the costs of these projects and reduce the time of achievement, which represents the most difficult challenge for the investment companies and also achieve the high quality of origin, which is customer satisfaction.

Second: Achieving the environmental requirements set by modern construction regulations aimed at reducing pollution and thermal emissions throughout the life cycle of the building. This is done using modern building materials that are environmentally friendly and do not cause excessive thermal emissions outside the building. Most of the materials that reduce emissions are natural materials. Concentration on water and air inside the building through good cooling systems as well as the use of thermal insulation to reduce the consumption of electricity consumed in the building and reduce thermal emissions, and the most important parts that require thermal insulation walls Glass windows in addition to the roofs of buildings.

5. REFERENCES

- [1] Ministry of planning, central Statistical Organizationhttp, Iraq, 2017 <http://www.cosit.gov.iq/ar/2013-01-31-08-43-38>
- [2] Ministry of planning, central Statistical Organizationhttp, Iraq, 2017 <http://www.cosit.gov.iq/ar/industrial/electric-water>
- [3] Qesm Al Wahat Al Khargah, New Valle Governorate, Egypt, 60M, 2017, <https://uae.makinah.net/ar/subject-details--165--26>
- [4] Dr. Jresh, DCI International, Egypt, 2018, ar.drgreiche.net
- [5] Dr Hüdai Kara, Metsims Sustainability Consulting, Oxford OX2 7NL, United Kingdom
- [6] <http://www.startimes.com/?t=29310694>

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