



Expanding Boundaries: Systems Thinking for the Built Environment

A SUSTAINABLE DEVELOPMENT APPROACH FOR AFFORDABLE HOUSING IN EGYPT

A. Mokhtar^{1*}

¹ American University of Sharjah, PO Box 26666, Sharjah, United Arab Emirates

*Corresponding author; e-mail: mokhtar@aus.edu

Abstract

Egypt suffers from a severe shortage in affordable housing. The government's main approach to the problem is to subsidize the affordable housing developments. As the available financial resources are very limited, this approach cannot cope with the size of a growing problem. Recently, the government announced that hundreds of thousands of units are planned. Yet, these – when built - will hardly cover the new demands leaving untouched the accumulated deficits of past decades. This paper propagates a new approach to address the problem. The approach aims to provide sustained developments of affordable housing units without the need for government subsidies. This is to be achieved by making the development of these units a profitable investment for the private sector. The approach is based on viewing the developments of affordable housing units as a development of a community with a variety of needs. These needs create values that allow businesses to make profit. The approach is supported by two supplementary ideas. The first is a decentralized green infrastructure for the development. The second is to make use of the Egyptian culture in term of social responsibility. The paper explains the approach and its supplementary ideas. It also shows the results of a financial study that proves the feasibility of this approach.

Keywords:

Affordable housing; Low-income housing; Real estate finance, Real estate development

1 INTRODUCTION

In its last official consensus, data shows that Egypt had about 953,140 official marriage contracts [1]. In a country where getting married signals the time to live in a separate housing unit, this figure can be a guide to the number of new housing units needed in the country. Considering that some couples use existing housing stock, government officials estimate that the demand for new housing is between 300,000 to 400,000 units annually¹. However, both the public and the private sectors together officially build about 160,000 units annually on average between 2004 and 2014 [1]. These numbers clearly demonstrate the annual and accumulated deficit

in new housing units and hence the severe shortage in housing units in Egypt. With about 6 million couples who are in the marriage age but not married and a population structure where more than 50% of the population are less than 20 years old [1], the demand for new housing units will continue to increase significantly in Egypt. This is particularly the case for the affordable housing sector of the market where it is much more difficult to accommodate its need due to the cost versus affordability factor.

While the housing shortage problem has many contributing factors (e.g. low-cost design and availability of land), the financial factor - represented in the approach to develop the housing project - is the core of the problem. The traditional approach for developing affordable housing projects requires financial contribution by the government in the form of subsidies. With

¹ Data provided through an interview with Eng. Galal Sayed Al-Ahl, Chair of the Executive Council for the National Housing Project, Ministry of Housing and Development, Egypt, July 2010.

Egypt's very tight budget, this approach hardly addresses the problem.

The government recovers part of these subsidies from selling primary land to luxury developments. This approach leaves the affordable housing units in locations that are far away from the residents' income generation locations that are typically in - or close to -populated urban areas. It also results in raising land prices for middle class buyers as the government auctions the primary land for the luxury developments. This leads to an increase in the portion of people who cannot afford a housing unit.

The aim of this paper is to report on the viability of using another approach suggested by the author to address the problem. The approach aims to ensure sustainable development of affordable housing units without government subsidies. The approach is supported by two supplementary ideas. The paper starts by an explanation of the approach and the ideas. It then reports on the results of a financial study - for an assumed development - that is based on the proposed approach. The paper then shows an analysis of these results to determine the feasibility of using the new approach.

2 NEW APPROACH

The large demand for affordable housing in Egypt represents a sizable market that is barely tapped at the moment by the large private sector developers. If those developers can make a reasonable profit in this sizable market without being restricted to the availability of government subsidies, they would use their financial capabilities and their technical expertise to continuously develop affordable housing projects. Such sustained effort will ultimately solve the problem as more and more developers will tap into this market to make profit.

Clearly, the challenge is how to make it profitable to develop affordable housing projects. The fact remains that - in Egypt - the cost of developing these housing units is much higher than the possible return from renting or selling these units at an affordable price. Therefore, a different approach is proposed by the author. This approach is based on a redefinition of the nature of this business. To explain this approach, one can look at a business example like computer printers. Selling these printers is not the main source to generate profit, rather selling the cartridges used in the printers is. Selling the printers is merely a way to create the market for the cartridges.

Similarly, we can redefine the business of affordable housing development. The existing standard business approach is:

*"We are in the **business of providing housing units** with minimum cost and*

services. We will make profit by receiving the difference between the cost and the required revenue through some form of government subsidy"

The author proposes to redefine the approach to be:

*"We are in the **business of creating a community** with a variety of needs. The created community should attract commercial activities. We sell these commercial activities and make a profit out of this"*

This fundamental change in approach impacts how a developer identifies the contents of a development program. While the standard approach focuses solely on the affordable housing units, the proposed approach creates interrelated activities that satisfy the different needs of a community of working residences in terms of workspaces, shopping areas, utilities and services, in addition to the required housing units. The developer's profit comes from selling or renting the commercial spaces and services that are now required to satisfy the needs of the created affordable housing community.

As such, a typical development using the proposed approach will have a number of profit-making components, outlined below, in addition to the affordable housing units. Clearly, having more of such components gives the impression of more revenue for the developer. Yet, there is always a maximum capacity for any community to have such profit-making components. Therefore, the key term in making such an approach successful is "interrelated activities" where the size of the profit-making components is associated with the size of the community created by the affordable housing units. These relationships are also shown below and are used to verify that the approach makes sense financially. The development components are:

- *Affordable housing units*: these are defined as units that are leased for a maximum of 33% of the minimum wage in Egypt. No down payment is required and the ownership of the units is transferred to the tenants after 30 years.
- *Retail spaces*: these are rented to those who provide the goods and services for the residents of the development. Its rentable area is calculated so that one housing unit requires one meter square of commercial space [2].
- *Office spaces*: these are assumed to be the main working space type for the residents of the development. Other working spaces such as industrial warehouses or hospitality facilities or others may be used. This depends on the location of the development and its surrounding economic prospects. The office

spaces are rented to businesses that employ the residents of the affordable housing units. It is assumed that each affordable housing unit has only one person employed by those renting the office spaces. A standard nine square meters of office spaces is assigned per person.

- *Luxury housing*: these are sold to people who own or manage the businesses operated in the development (retails and offices). It is assumed that every 20 affordable housing units (20 employees) require one luxury housing unit (one business owner or manager).
- *Transportation and utilities*: these are sold for the residents of the development.

The approach as explained above is supported by two supplementary ideas. The first is a technical one that propagates the use of green building technologies. The second is a social one that builds on the Egyptian culture and its prevailing religious drives.

From the perspective of the proposed approach, the use of **green building technologies** supports the approach in two ways:

- It creates a shift from a central infrastructure system to a local infrastructure system. Current green technologies allow the generation of energy on site from the abundance of solar energy available in Egypt. Also, underground water is available in almost all parts of Egypt with enough quantities for domestic water use. The waste water can be treated locally and reused. Such a shift removes the dependency on government-provided utilities from any proposed development (only external roads will be needed from the government). Hence, it reduces the cost of providing land by the government. Although this shift results in increasing the initial cost of the development, it enables the developer to sell these utilities (water and electricity) to the development users and to generate profit.
- It enables the selling of carbon credits in the world market. This can be a source of generating revenue for the developer.

Egyptian culture continues to be shaped by religion-based concepts that promote the care for the vulnerable portion of the society. This is evident in the existence of both historical and modern large endowments and numerous charity funds that address a variety of needs. It is also typical - for many in Egypt - to pay the religiously mandated 2.5% of their savings for charitable purposes. This cultural aspect supports the proposed approach in two ways:

- It avails funds that support the affordable housing development. For example, the paving of roads can be easily viewed as a “running charity” (the religious argument is outside the scope of this paper). This can reduce the initial cost of the development.
- It encourages the existence of profit-making developers that have charitable purposes. Those will reinvest their profit to develop more affordable housing projects. Their bottom line is achieving their social objective rather than just maximizing their profit.

3 FINANCIAL STUDY

The approach components along with the two supplementary ideas are translated to a workbook structure in Excel. This enables the testing of the approach using real financial data. The workbook structure is composed of six modules that are interrelated through a calculation engine as shown in Figure 1. These modules are:

3.1 Development characteristics

This module identifies data such as the number of developed affordable housing units, luxury units, and the area of commercial activities. The module reflects the relationship among the different components of the development as discussed above.

3.2 Financial data

This module identifies data such as the inflation rate, and the rate of increase in affordable housing rent. It is important to note here that the module assumes the following: 1) The increase in affordable housing rent is significantly lower than the inflation rate (to keep the housing units affordable). 2) The increase in commercial rent follows the inflation rate.

While these numbers can be modified in the module, the financial study used a 10% inflation rate, and a 3% increase in affordable housing rent. The used inflation rate is roughly the average in Egypt in the last 20 years [3].

This module also identifies - per unit - the cost data and the initial prices to rent and to sell the different units, spaces, and services in the development.

3.3 Utilities and green technologies

This module calculates the energy and water consumption for housing and commercial spaces based on the characteristics of the development as decided in module one. It also estimates the quantity of carbon credits that can be sold. Various technical references are used for these calculations.

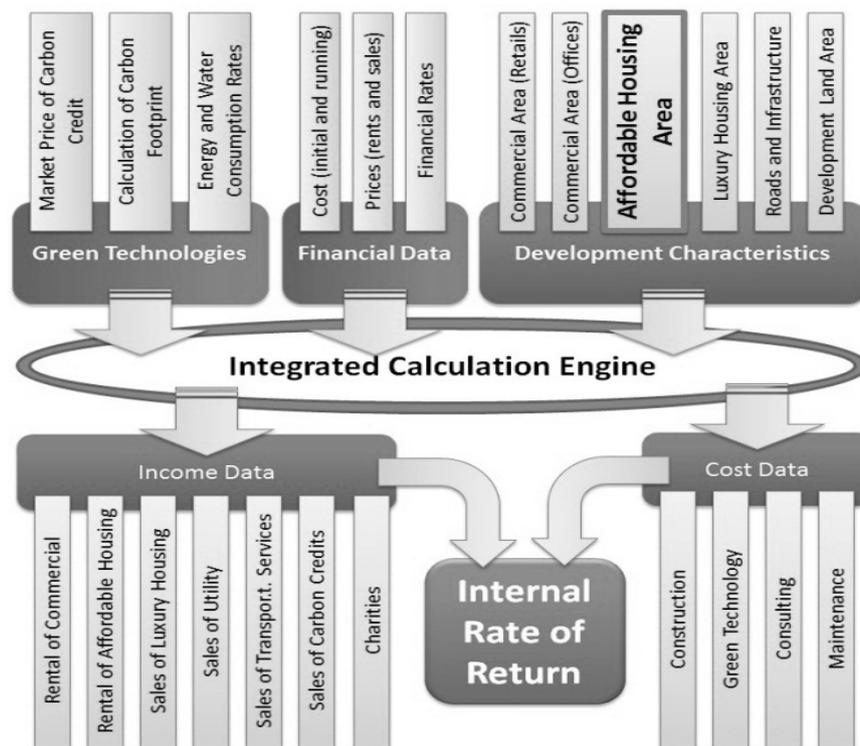


Fig. 1: Structure of the workbook used for the financial study.

3.4 Costs

This module uses the calculation engine to determine - for the whole development - the cost of construction, the cost of using green technology, the consulting cost, and the initial annual maintenance cost. The maintenance cost is a percentage of the development cost. This is essential to keep the development in a functional condition and to regularly replace and update equipment.

3.5 Incomes

This module uses the calculation engine to determine income from renting affordable housing and commercial spaces. It also calculates income from selling the luxury houses, utilities, transportation services, and carbon credits. In addition, it accounts for charitable financial contribution based on the Egyptian culture as mentioned above.

3.6 Internal rate of return (IRR)

Using the costs and incomes data calculated in the above two modules, this module generates the cash flow through a period of 30 years. This is the assigned default period for a feasibility study and it can be changed as needed. The first three years are assigned as the default period for construction and they mainly have a negative cash flow. Yet, some positive cash flow exists in this period as a result of selling the luxury housing units (over a period of five years – which is typical in Egypt). Starting from the fourth year, income is generated from the rent of commercial spaces, the rent of affordable housing, the sales

of utilities and transportation services. These values increase annually following the assigned inflation rate and other rates as mentioned above. Maintenance cost also kicks in as a negative cash flow and increases annually using the inflation rate. After 30 years, the affordable housing units are owned by their users. The office and retail spaces are sold for 10 times their annual rental value at the time. Water, electricity, and transportation facilities are also sold for 10 times their annual income. Using the described cash flow, this module calculates the Internal Rate of Return (IRR) for the development project.

4 RESULTS, AND ANALYSIS

The author assumed a development land area of one million square meters. The built area is the typical 20% of the land. Area calculations for the different components of the development follow the relationships mentioned above. The author collected the data for construction costs and the prices for renting and selling of real estate from several developers. Prices for electricity, water, and sewage treatment are those used in Egypt at the time of the study. The price of carbon credits is that which exists at the time of the study. A conservative assumption is made that only 1.0% of the rental value of the commercial spaces in the development will be donated for charitable purposes.

With the above data, the author used the workbook structure to generate a cash flow for 30

years and to calculate the IRR. The result is an IRR value of 18.19%.

However, the calculated IRR is based on some assumed input data. Therefore, the author performed several sensitivity analyses for the critical input data to check the resiliency of the calculated IRR. Figure 2 to Figure 5 show the impact of changing the inflation rate, the rental value for office spaces, the rental value of retail spaces, and the maintenance cost on the calculated IRR. Figure 2 indicates clearly the significant impact of the inflation rate on the IRR. This is understandable considering that this rate affects almost all income sources. Figure 3 shows the important impact of the rental value for office spaces. However, it is reasonable to state that the model is resilient to changes in these critical inputs as the value of IRR continues to be relatively good.

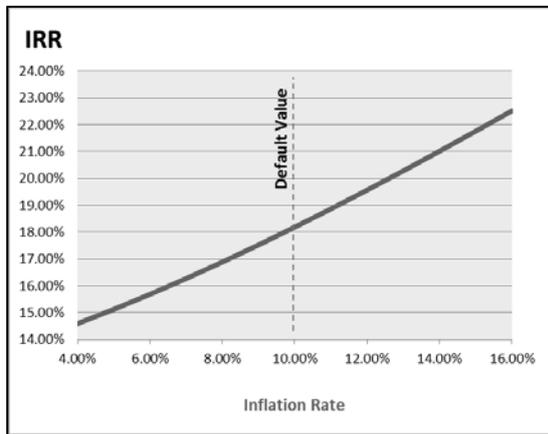


Fig. 2: Impact of the change in the inflation rate on the IRR.

Another important analysis is the breakdown of the calculated IRR to identify the importance of each income component. Figure 6 provides such a breakdown and it clearly shows that a significant portion of the return comes from the renting of commercial offices. Such a result is expected as it reflects the proposed approach. However, it also reflects the importance of having economic activities in the country. Such activities make the demand for the commercial offices (or other types of working spaces).

The results also show that selling carbon credits has a minor impact on the IRR. Meanwhile, the selling of utilities and particularly electricity has reasonable share in the IRR. However, the analysis of the cost and the income shows that the selling of utilities hardly covers the cost of the used green technologies needed to provide them. Nevertheless, the positive impact on the

environment as well as the independence from the government's supply of utilities are good incentives to use these technologies.

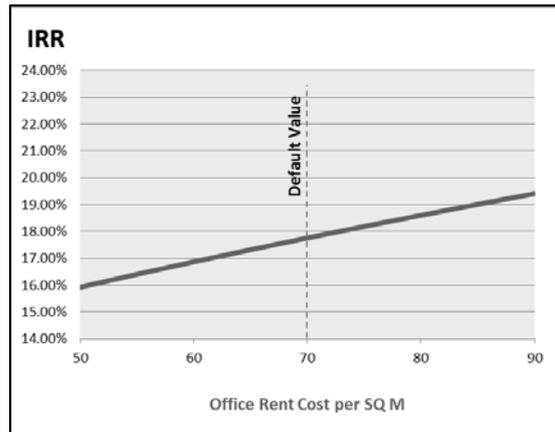


Fig. 3: Impact of the change in the office space rental value on the IRR.

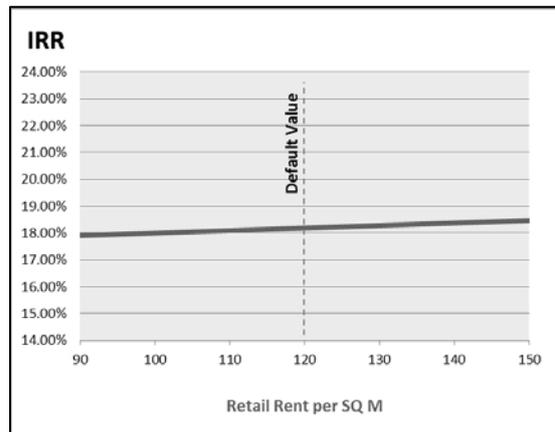


Fig. 4: Impact of the change in the retail space rental value on the IRR.

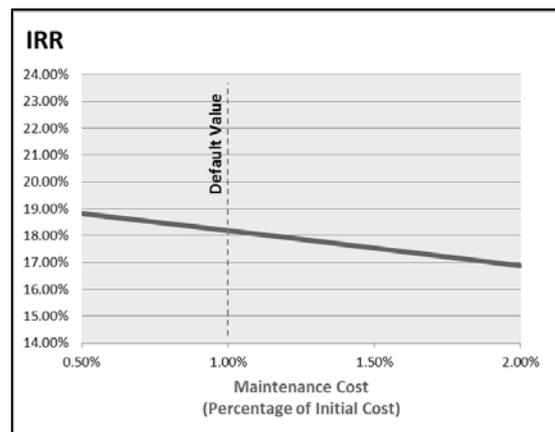


Fig. 5: Impact of the change in the maintenance cost on the IRR.

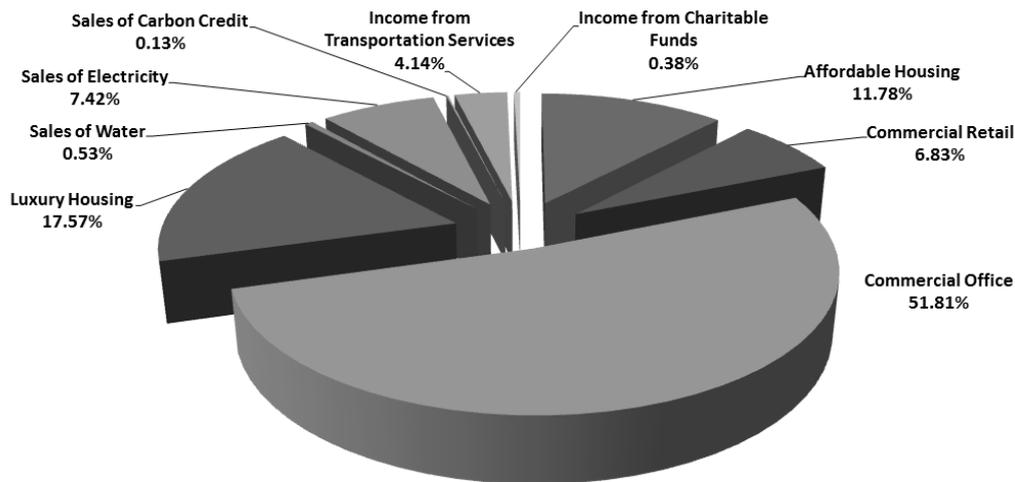


Fig. 6: Breakdown of the Internal Rate of Return.

5 CONCLUSION

To put the value of the calculated IRR in perspective, one needs to consider that banks in Egypt typically provide an interest rate of about 10% to 12% for three to five years fixed deposits. Therefore, it is reasonable to consider an IRR of about 18% as a profitable investment.

Nevertheless, an investor would consider associated risks to decide if such an IRR is worth the investment risk. Here comes the important role of two players to help support investments in developments that aim to solve the affordable housing problem:

- The first player is the government. With the proposed approach, the role of the government is no longer to provide subsidies to build affordable housing units; rather it is to minimize the risk for investors in such projects. This is done through reducing bureaucracy, providing accurate data, establishing a suitable legal framework, etc.
- The second player is the Egyptian culture. As explained above, this would encourage taking the risk in projects that are reasonably profitable but have a clear social agenda. Maximizing the profit and minimizing the risk is not necessarily the ultimate investment objective of investors who are also driven by a social agenda that promotes the care for the vulnerable portion of the society.

Following the proposed approach, developers will create clusters of communities in regions in the country with a promising economic growth. The development program of these clusters will integrate affordable housing, retail and work spaces, and luxury housing. These clusters will also be independent of government provided infrastructure and free from government

subsidies. As profit can be made from these developments, more of such clusters will be built to satisfy the demand and gradually solve the affordable housing problem in Egypt.

6 SUMMARY

This paper presents an approach for developing profitable affordable housing projects without the need for government subsidies. A financial study that used real data to implement the approach shows that a good Internal Rate of Return can be achieved and hence the continuous development of such projects can be sustained. The main reason for the success of the approach is viewing the project development as an activity to create a community rather than an activity to construct a number of affordable housing units. Unlike the current government approach that segregates the land assigned to affordable housing, luxury housing, and commercial activities, the proposed approach promotes the integration of these activities.

7 REFERENCES

1. CAPMAS, Central Agency for Public Mobilization and Statistics, Retrieved November 29, 2015, from <http://www.capmas.gov.eg/default.aspx>
2. Khoi, A., Successful Shopping center Development (2007), Retrieved September 24, 2013, from <http://www.gyoder.org.tr/zirve7/Z7sunum/Anthony.Khoi.Successful.Shopping.pdf>
3. Trading Economics (2014), Retrieved February 11, 2014, from <http://www.tradingeconomics.com/egypt/inflation-cpi>