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Affordable Housing as a Method for Informal Settlements Sustainable Upgrading

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Abstract

One of the biggest challenges that face the development in developing countries now a day is Informal settlements. The phenomena of informal settlements urban sprawl is increasing each day, destroying cities, degrading quality of life, and eradicating urban fabrics. Which created a vital need to find new sustainable solutions for upgrading informal settlements in developing countries. One of the different approaches is affordable housing.

Affordable housing is rarely discussed in relation to informal settlements upgrading. Although affordable housing introduces many new strategies in order to grantee low priced housing and upgrading techniques. Also, it is applicable for developing countries, since developing countries' governments cannot afford to fund all informal settlements upgrading projects.

This research aims to explore the relationship between affordable housing and upgrading informal settlements. To achieve this aim this paper will highlight the definition, impact, and strategies of affordable housing .It will also explain what informal settlements are. Then analyze two relevant examples. Through comparative analysis to analyze affordable housing policies applied in the examples upgrading program. In order to prove that affordable housing policies may be a use for upgrading informal settlements in developing countries.

Keywords: Affordable housing ; Informal settlements upgrading ; Developing countries ;

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1. Introduction

The housing sector plays an important role for family stability and income growth. Therefore more attention should be driven towards housing development especially in developing countries. The impact of the housing sector has a direct effect on low and middle households. Moreover, it is essential to pair sustainability with affordability to lower maintenance costs. Also, it is important to explore how sustainability can improve cost efficiency of housing. Sustainability's relationship with housing affordability has been discussed in some fields, but it is noteworthy that there is a lack of comprehensive studies that integrate affordability with sustainable informal settlement upgrading. Which pronounces the importance of focusing on the relationship between affordable housing and informal settlements upgrading in order to improve housing affordability and upgrade informal settlements in developing countries. (Abed, 2012) .

2. Problem Definition

In developing countries informal settlements are increasing at alarming rates, which is considered a threat to the sustainability and development of countries. Although there were many researches that explored the challenges of informal settlements, there were no clear solutions for this world spread problem. Moreover, most of the upgrading programs are very costly, which in itself makes it difficult for that developing countries cannot afford these programs.

3. Methodology

Inductive and deductive methodologies were used to explain affordable housing and its relation to sustainable informal settlements development. The methodology also identify the reasons and causes of the appearance of informal settlements. Then Analytical Methodology was used to analyze relevant examples analyzing them against affordable housing policies, in order to find a relationship between applying affordable housing strategies in informal settlements upgrading.

4. Affordable Housing Definition

Affordable housing can be defined as "it is a relationship between housing and people. For some people, all housing is affordable, no matter how expensive it is; for others, no housing is affordable unless it is free" (Stoned), 2006, P. 153). (Abed, 2012). Affordability in housing markets is one of the major problems facing low income families, due to the continuous increase of construction costs. Affordability is usually measured by the relation between the household income and the housing cost and in order to understand this relation it is required to understand the classifications of households according to their income. (Abed, 2012). First it is essential to know that governments calculate income limits for affordable housing using median family income which is called Area Median Income (Rosten Woo, 2009)."Area Median Income is what the family right in the middle of the income distribution earns, by definition half the families earn more and half of the families earn less" (Rosten Woo, 2009) .

In order to understand affordable housing impact it is helpful to understand the problems that result from unaffordable housing.
- Social problems associated with unaffordable housing:

Residents live with financial stress, households spend big parts of their budgets on housing leaving low income households with insufficient money to purchase essential needs. (Litman, 2015)
- Problems associated with urban sprawl

Increased cost to provide basic infrastructure and services, and increase per capita land consumption which reduces the amount of agricultural land. (Litman, 2015). Moreover, it is obvious that the presence of unaffordable housing has the same negative impact as informal settlements urban sprawl. Since, informal settlements households suffer from lack of basic infrastructure and financial stress …… etc. This hints that affordable housing supply may prove to be a good solution to stop informal urban sprawl. There are many benefits for providing households with a sufficient affordable-accessible housing to meet their demand such as:

Improved housing options, household financial saving, reduced homeless and social problems such as crimes, diverse neighbourhoods, and allow aging in place.
- Concerning vehicle travel:
More efficient public transport services, reduced roads and parking infrastructure cost.
- Concerning urban sprawl:

Reduce cost of providing public services, improve accessibility and economic opportunity for low income residents, pollution reduction, and more local economic development. Affordable housing development is appropriate in cities with rapid urban population and economic growth, geographic constrains, and limited low-priced housing. (Litman, 2015)

4.1. Polices and approaches of affordable housing

There are many polices that aim to increase the housing affordability in developing countries. Some approaches are better than others since they reduce rather than shift the cost. According to Liman policies affordable housing polices can be classified into different categories (Ineffective and sometimes harmful, Effective but costly policies, Most Effective and Beneficial policies). This paper is going to focus on the most effective and beneficial polices as following:
- Minimize Fees for Lower-Priced Housing,
- Expedite Development Approval and Permitting,
- Identify Parcels Suitable For Affordable-Accessible Development ,
- Provide Free or Inexpensive Land for Affordable Housing,
- Brownfield Remediation,
- Targeted Tax and Fee Discounts,
- Address Neighbourhood Concerns,
- Improve Building Design,
- Resource Efficiency Design,
- Improve Affordable Transportation,
- Discourage Rental Restrictions,
- Affordable Housing Maintenance and Rehabilitation Programs (Litman, 2015).

The following table 1 shows different affordable housing policies application methods that could be applied in different upgrading programs.

Table 1: Affordable housing policies application, (Litman, 2015), (Rosten Woo, 2009), edited by researcher

Affordable housing policies	Application on upgrading program
Minimize Fees for Lower-Priced Housing:	This policy suggests minimizing planning studies fees on lower-priced infill housing, since this fess may increase retail price of small and inexpensive house project and therefore reduce the total affordable infill housing development. (Litman, 2015). Through excluding the area of affordable housing projects from the fess of the planning in order to increase the housing affordability and decrease the prices of housing by researcher.
Expedite Development Approval and Permitting	This policy aims to speed up the development approval and permitting process for low price housing in order to reduce the cost of the project and make these types of projects more attractive to developers. (Litman, 2015), through assigning time line for the project phases in order to avoid any overhead costs in order to increase the overall housing affordability by researcher.
Identify Parcels Suitable For Affordable-Accessible Development	Governments or private organizations can maintain a database of lots suitable for affordable infill housing, which helps developers build infill housing. (Litman, 2015), since the presence of parcels that are suitable for affordable housing projects to relocate residents is one important factor for the success of upgrading programs.
Brownfield Remediation	Brownfields usually has good potential to be suitable for affordable housing. (Litman, 2015), that can be used as suitable place for building affordable housing projects.
Targeted Tax and Fee Discounts	Provide discounts to lower-priced infill development (Litman, 2015). It gives tax discounts to developers who agree to grantee parts of their developments for lower income families. This can be applied by the government, which gives tax credits to the state and local agencies then the private developers apply for these credits through a competitive points system. (Rosten Woo, 2009), this can be achieved through lowering taxes fee for developer who are ready to invest in the upgrading program

Address Neighborhood Concerns	Mainly residents in any area have fear of lower income neighbors, traffic congestion, parking congestion, and reduced property values. These problems may be solved through education about the types of households that occupy affordable housing, analysis about relatively low trip generation rates of affordable–accessible housing, and a research concerning actual property value impacts. (Litman, 2015). This policy can be achieved through upgrading building exteriors, designing adaptive housing for family increase, legislation of informal settlements and supplying of basic services such as lighting, infrastructure, pavements, and green areas. Also, this policy may be achieved through "public private partnerships", as residents of the target areas are mostly aware of their needs, priorities, and concerns about the upgrading program by researcher.
Improve Building Design	Residents' opposition to the infill development usually reflects the un-satisfaction with the design of the affordable housing building, so this policy aims to develop the affordable housing design, which reduces neighborhood opposition to affordable infill development (Litman, 2015). Through relocating residents in an acceptable accommodation, either by switching places or temporary relocation. Until the building designs are improved and improving basic infra-structure will improve the overall image of the area on the long run.
Resource Efficiency Design	Encourages developers to incorporate efficient practices when building affordable housing and reduces operating costs, which increases long-term affordability. (Litman, 2015). This can be achieved through connecting networks between decision makers, developers and investors in order to achieve efficient design in shortest time by researcher.
Improve Affordable Transportation	Provide each area with affordable transport modes such as (walking, cycling and public transit, taxi and car sharing) that will directly provide savings to the households and will reduce resident need to travel by automobile. Which reduces parking and traffic problems that decreases neighbors' objections to infill development. (Litman, 2015). This can be achieved through providing the area with affordable transportation system in sequence will save money for residents and improve the overall image of the area by researcher.
Discourage Rental Restrictions	This policy aims to increase the number of rental units available in a community (Litman, 2015). Through increasing the number of rental units, and reaching an agreement with the developers to give out certain parts of their building for affordable housing or with low renting rate. In return, developers will gain some benefits such as lower taxes by researcher.
Affordable Housing Maintenance and Rehabilitation Programs	Many communities have an existing stock of affordable housing, some of which is poorly maintained and may become uninhabitable. Targeted assistance can help maintain and restore this housing stock. This can include low-interest loans home improvement loans that must be repaid when the building is sold. Such programs can favor housing in accessible locations to increase the supply of affordable-accessible housing (Litman, 2015).This can be achieved through offering capacity building, building skills, employment and providing micro credits.

5. Affordable Housing Definition

Informal development is a dominant mode of urbanization in many developing countries especially on agricultural lands, private lands … etc. Although government has made many efforts to limit the informal settlement urban sprawl, it continues to grow. In greater Cairo the migration from Upper Egypt and delta regions caused huge housing pressures that started during world war two. The migrants were attracted by economic developments that were occurring in Cairo. People at that time started to make savings and built their own homes on fringes of the village located in the peripheral part of the city, and on state owned land. Between "1960-1966" the informal urbanization process started to speed up on agricultural lands on the western and the northern part of the city. Families that could not afford buying houses built on lands belonging to the state. People invested in informal settlements because the supply proposed by the public sector was not sufficient. (Howeidy, 2009). Informality can be defined as the absence of form, and to define informality, we should identify absent forms weather they are social or physical, permanent or temporary. In urban terminologies, an informal process of urban land is identified if one or several of the following terms are:

- Urban space is occupied without permission of use and the occupant does not own or rent,
- Urban code is not followed,
- The space typology is different from the dominant formal them.

UN-habitat program explains that Informal settlements: are areas where a group of housing units are constructed on land, where the occupants have no legal claim, occupy it illegally or it is an unplanned areas where housing is not in coordination with the current planning and building regulations (Andersson, 2008).The following part of the paper discusses how different informal settlements upgrading examples applied some strategies of affordable housing. Two examples will be briefly reviewed, focusing on each examples' upgrading policy and its relation to affordable housing policies previously stated in this paper.

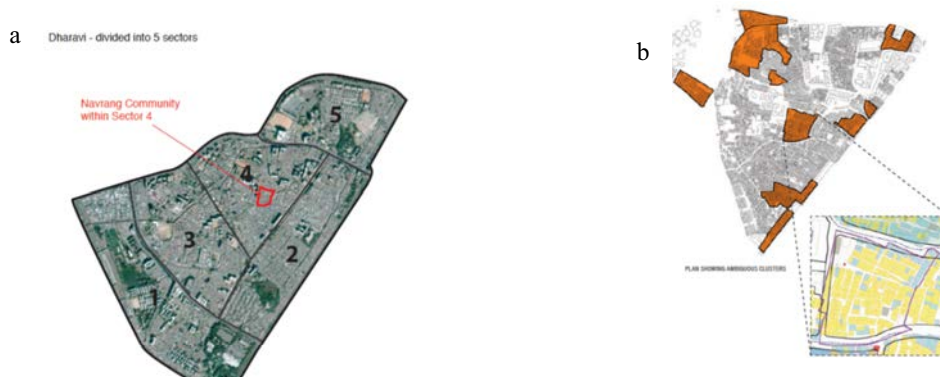## 6. Examples: Dharavi, India Informal Settlement

Fig. 1. (a) Shows the location of Narvang, which is the focus of the study of Dharavi, (b) shows zoom in on Narvang

The focus of the study will be Narvang in Dharavi as shown in fig.1, Narvang has about 300 households. Most households in this area own a house of two or three rooms, renting half these rooms as a source of income, the fear of the loss of rental income is one of the most important reasons behind residents of this area opposing the upgrade. (Shaw, 2010).The following S.W.O.T analysis shown in table 2 provides an over view for Narvang's existing situation before upgrading

Table 2: Dharavi S.W.O.T analysis

Issues	Strengths	Weaknesses	opportunities	Threats
Location	Central location	houses are rented to migrants	On site redevelopment	socio spatial segregation
Ownership	ownership belongs to the state	Complexity of actors	Cooperation between actors	public rejection for upgrading
urban structure	Livable urban structure	limited accessibility	minor interventions to improve accessibility	deteriorated conditions of housing
Building conditions	Separate room housing	Unsafe structure	Separate room housing enables flexibility of user	Unsafe buildings affecting the quality of life of residents
infrastructure	-----------------------	Low quality of service	New infrastructure intervention	Infrastructure system affects public health

The main aim of this example is to analyze the upgrading program against affordable housing polices and illustrate which of the affordable housing policies were used. The following table 3 illustrates the affordable housing polices applied in this Dharavi upgrading program.

Table 3: Dharavi affordable housing applications

Policy applied	Policy application
Improving Building Design policy	This policy application was called in the upgrading program house "swap policy". It maintains the maximum public acceptance for the upgrading project. As people affected from the upgrading program (such as widening the roads or demolishing deteriorated building) will be given the choice to stay in the same area or be relocated in new areas. (Tomlinson, 2012) .This strategy may take place in two ways according to the level of acceptance of the residents. People are usually divided into two groups. First group do not want to leave their current living area and insist on staying in the same area, others did not mind leaving the area as long as they are going to enhance their quality of live. So House swapping takes place with people who did not want to leave their current area, as shown in the following fig 3(a). by researcher

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Improving Building Design policy	Another application of improving building design is "subtract and insert (open spaces)": This policy provided all existing owners with upgraded 30 square meters apartments and replaces all existing rental spaces. The overall vision allows the existing fabric to remain in place as far as possible, with improvements in basic services. The proposed new construction is concrete frame and brick infill that allows a degree of flexibility with partitions. This system also enables possible future expansions on upper floors, which aims to increase the affordability of housing in the area.
Discourage Rental Restrictions	This policy application was called in the upgrading program "rental replacement policy". This policy suggests long term owner is granted ownership of a certain percentage of the newly built building, and the remaining part of the building will be dedicated to the upgrading program to resettle affected people from upgrading, in return the renting prices will increase due to the new facilities provided in the area so the owners will be satisfied with this solution. This solution may be costly and cannot be applied with all owners and on all buildings in the site. So beside this solution it is suggested that owners may give certain percentages of their buildings to the upgrading program and in return they could own a commercial unit that may be built in the interactive spine or a piece of land as shown in fig. 3 (b) by researcher.
Address Neighborhood needs	This policy is very important since, there is a common belief for residents that affordable housing will degrade the value of the area, with bad building exteriors, that aim to achieve affordable units. This policy application was called in the upgrading program "Adaptive spatial Designs" that is mostly concerned with architectural and urban design of the redeveloped project. The spatial framework should be designed to allow houses to extend and contract, for different functions .This flexible design increases the affordability of the upgrading program.
Address Neighborhood needs	Another application of addressing neighborhood needs is "Combined adjoining housing": This strategy gives great flexibility and increases the affordability. Small families can rent or buy only one module unit and extend it as their family increase. The standard module chosen was 3.5 x 7. The choice of a modular design for the newly designed buildings was to provide flexibility in the provided units to residents. As the new spatial units can range between one standard modules 3.5 x 7, to double or triple the module as shown in fig. 2 .This policy increases the housing affordability and sustainability in the area.
Targeted Tax and Fee Discounts	This policy application was called in the upgrading program "Cluster Based Replacement (20% of profit)" utilizes an approach that allow private developers to ultimately own 20% of the target site to be upgraded, ensuring that developers will upgrade informal areas in return.
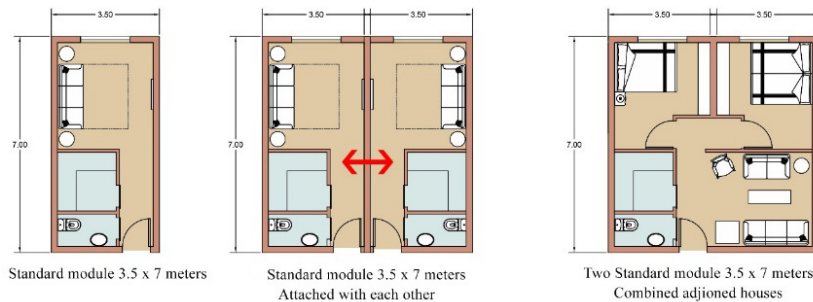
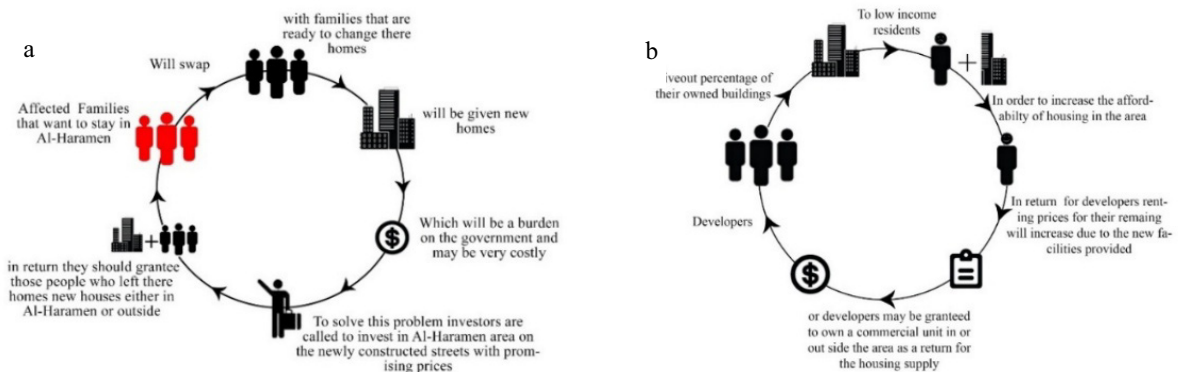Fig. 2. Combined Housing, by researcher

Fig. 3. (a) House swap application process by researcher, (b) rental replacement, by researcher.

7. Zeinhum Cairo, Egypt

Zeinhum informal settlements are located in Egypt, at the south eastern part of Cairo. Zeinhum informal area is slightly about 50 feddans, with population density of 18764 persons. There are two types of housing typologies in

zeinhum. First type: Buildings three to four stories high, with two or three rooms each. This type is characterized with poor building maintenance over the years, with narrow, unpaved streets full of garbage as shown in fig.4 (a). Second type: This type is mainly made of kiosks and shacks made of wood.

a

b

Fig. 4. (a) Zeinhom situation before upgrading (NAIF, 2013), (b) Zeinhum after upgrading (tadamun, 2016)

The main focus of the study was:

- Capacity building through providing youth with trainings to upgrade their skills,
- Finding new employment opportunities,
- Provide main basic services to the area,
- Rebuild residential units. (khadr, 2011) .

The following S.W.O.T analysis table 4 is going to provide an over view for the example current situation:

Table 4: Zeinhum S.W.O.T analysis

Issues	Strengths	Weaknesses	opportunities	Threats
Location	Central location	Lime stone cliffs are a constant risk to people	On site redevelopment	Growing socio spatial segregation
Ownership	Building legal security	settlement built on government owned land	------	Lack of ownership discourage investment and sense of insecurity
Building conditions	Presence of some good building conditions	The majority of building is deteriorated buildings	Improve buildings with good conditions will improve the area image	Unsafe buildings on stone cliffs affects the security of residents
infrastructure	--------	Lack of access to public utilities	New infrastructure intervention	Lack of Garbage collection and basic infrastructure

The main aim of this example is to analyze the upgrading program against affordable housing polices and illustrate which of the affordable housing policies were achieved .The following table 5 illustrates the affordable housing polices applied in Zeinhum upgrading program:

Table 5: Zeinhum affordable housing application, (khadr, 2011), edited by researcher

Policy applied	Policy application
Address neighborhood concern	This policy application main aim is to grantee the social acceptance of the upgrading program between the residents of zenhuim. The upgrading program strategy was to divide the upgrading area into "zones", all upgrading activities are the same in different zones: starting with the "demolition" of the existing kiosk in the area, and then the "relocating" residents in temporary settlements. At first this upgrading methodology was doubted by residents since they did not believe that they are going back to their homes but once the first zone was accomplished the residents started to trust the upgrading process and become more engaged in the upgrading process. They also offered to help in the upgrading field work (khadr, 2011). Satisfying residents is one important key factor for a successful upgrading program as well as increasing the affordability of housing. Moreover, changes in landscape were very obvious as Zeinhum suffered from shortage in landscape elements. The upgrading program aimed to transform the landscape of the whole neighborhood, by introducing more landscape elements, in order to increase the sense of community for the residents and to rise the value of the area as shown in fig.4 (b).

Expedite development approval and permitting	This policy application was creating partnerships between NGOs and local authorities, as each partner took full responsibility in the projects .The Government was mainly responsible for planning, supervision, demolition of slum housing, and infrastructure building. Businessmen were mainly responsible for building residential blocks, and services such as health care centers and schools by researcher.
resource efficiency design	This policy application was applied through community engagement by capacity building of community members in order to empower the community to create a sense of ownership in the area. Raising the capacity building strategies include many approaches such as high quality education, raising residents awareness for computer use, and educational seminars. These strategies aim to provide residents with needed skills in order to increase the employment opportunities. Training activities mainly concentrated on crafts, which were sold in exhibitions organized by NGOs.

8. Conclusion

The Following table 6 compares between the two examples according to their application of affordable housing polices. It is noted that affordable housing policies are strong approach to upgrade informal settlements, as these policies were used in different upgrading programs, in different ways. This proves that affordable housing policies may be a method for upgrading informal settlements in developing countries using the above illustrated polices. Last but not least active participation of residents is an important factor in order to grantee a successful affordable housing upgrading polices.

Table 6: Comparison Table, by researcher

Affordable housing polices	Dharavi	Zeinhum	Application
Minimize Fees for Lower-Priced Housing	Not Applicable	Not Applicable	
Expedite Development Approval and Permitting	Not Applicable	Not Applicable	
Identify Parcels Suitable For Affordable	Not Applicable	Not Applicable	
Provide Free or Inexpensive Land for Affordable Housing	Not Applicable	Not Applicable	
Brownfield Remediation	Not Applicable	Not Applicable	
Targeted Tax and Fee Discounts	Applied		
Improve Building Design	Applied		House swap strategy subtract and insert open spaces
Resource Efficiency Design		Applied	Establish productive dialogue between stakeholders and investors
Improve Affordable Transportation		Applied	Through improving street networks
Discourage Rental Restrictions	Applied		rental replacement policy

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