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New Sustainable Agenda for Slums Future Expansion, Case-Study: Ezbiit El-Matabea, Alexandria, Egypt

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ABSTRACT

Slums has become the main phenomenon of contemporary urbanization. About half of the world's population lives in urban areas; as the rate of urbanization in developing countries has increased faster than in developed countries. The majority are conducted in rapidly expanding informal settlements indeed several regions can't cope with this increase in adequate living standards. Urbanization was accompanied by slums that are high population density neglected parts of cities where community facilities and living situations are substandard, poor, unhealthy, and unsafe which is constructed legally or illegally among an inadequate supply of clean water, sanitation, or electricity. The paper throws light on slums with their negative impact on communities and thus proposes a new sustainable urban agenda that helps the slum residents to enhance their lives and stand for threats by accessing safe water, primary health care, well-being, sanitary facilities and avoid issues like destruction of ecosystems, the depletion of natural resources, pollution, overcrowding, increasing inequity, and deterioration of quality of life. In conclusion, a slum area in Egypt is chosen to be studied, analyzed and to apply the proposed agenda on, and then followed by an analysis to review the benefits of applying this new upgrading structure.

1. INTRODUCTION

"If you weren't an optimist, it would be impossible to be an architect" Norman Foster.

The previous is a famous quote said by the lead architect Norman Foster inviting architects nowadays that they should not only design buildings that function efficiently, but also design a beautiful architecture that enhances people's life and spread optimism worldwide without affecting the natural environment.

As the world urbanized and the population increases, many low-income families are often evicted by force and pushed to the edge of cities to unplanned houses and poorly serviced areas [1-3].

Many countries are incapable to cope with these changes in good living conditions, leading to the appearance of slums [4]. These informal settlements are deteriorated areas that lack health, education, privacy, sanitation, important services and needs improving living conditions responsibly, providing access to decent housing in the short and long term [5].

Regrettably, all the previous don't affect the inhabitants only, but it also affects the whole country leading to a major fall back in many fields like drop in economical conditions, disorder in political stability, severe decline in public health and wellbeing, increase in child mortality, spread of violence and disasters, collapse of aesthetic values and continuity in the cycle of poverty. Therefore, governments that neglect slums are heading their inhabitants to poverty and illiteracy, beside keeping investors away from investing in an unsecure country full of growing slums and shrinking economy.

Furthermore, the process of slum upgrading involves many aspects concerning land, structural building, physical and social environment, visual dialog and urban planning [6]. Therefore, all the previous aspects should be considered and studied by governments in order to direct financial investments to the right place and problem, one must recognize the linkages between the undermining issues [7]. Also, governments should encourage architects to upgrade slum and convert them into sustainable desirable houses rather than demolishing these unwanted communities [8].

Communities with all their authorities and institutions should understand that urban informality fails to provide adequate facilities, buildings, and organizations, leading to a continuing deterioration in the environment or socio-economic situation [9]. Therefore, various local, international policies and development assistance attempted to address these issues but failed due to absence of well-structured agenda that covers all aspects of upgrading slums [10].

Unfortunately, governments undertook many trials and followed many strategies to assist themselves in upgrading slums but most of them were insufficient or incomplete in the upgrading process leading to its failure. Therefore a new agenda strategy should be proposed to help decision makers and governments to control slums growth, upgrade existing slums, improving its inhabitant's health, spreading education and awareness concerning disasters of informal structures and enhancing aesthetic values. All the previous will lead countries to economical booming and recovery.

Therefore, it is urgently needed to develop an innovative planning, visions, practices and models to achieve a transition from a non-sustainable informal settlement to a sustainable formal or semi-formal settlement [11]. The relationship

between sustainability and urban slums is diverse and distinct, as sustainability has evolved into a significant concept in its application to cities, and embraces the metabolism's metaphor. Cities can be considered more sustainable if they reduce their resource inputs and waste outputs, which will lead to improving their livability and enhance the housing conditions reintegrating the economically and socially excluded areas into urban regeneration [12, 13].

In conclusion, this study develops a new agenda to enhance transitions from urban informality to sustainability in order to support the process of sustainable development of any specific environment.

2. METHODOLOGY

This research is an application that develops techniques, generating procedures of how to upgrade slums. Therefore, it is divided into four main phases:

- Phase one is a literature review that explained the meaning of the word "slums" and grabbed the importance of slums upgrading with its positive effect of people, finance and communities (Figure 1).
- Phase two is generating new "slums upgrading agenda" by reviewing previous upgrading experiences and famous upgrading strategies proposed by authorities and local institutions like UN habitat. The agenda is divided into three main stages concerning urban planning development, land and building readjustment and finally visual dialog enhancement. Moreover, all the previous will lead to many enhancements concerning social and health that will also be reviewed and discussed.
- Phase three is a complete analysis to one of the famous slums in Alexandria city in Egypt, called "Ezbiit El-Matabea." The study contains a current situation analysis of accessibility, building conditions, heights, structures, important religious buildings and many other aspects followed by a SWOT analysis, which is a tool to analyze external and internal factors by identifying the strengths, weaknesses, opportunities and threads in site to achieve a systematic approach and support for policy-making situations. Then, combining the SWOT groups with Analytic Hierarchy Process (AHP) method, which is an approach based on pair wise comparisons at different hierarchical levels with a scale from 1 to 9 for measuring the relative significance of features to rank them [14-16]. The idea of using AHP as part of SWOT framework is to systematically evaluate SWOT factors and making them measurable according to their priority and intensity.
- Phase four is the application of new Agenda on the selected area and testing its applicability and success on inhabitants and cities in many aspects. Then using A'WOT method which is a hybrid technique that combines the SWOT analysis with the AHP for improving the quantitative database for strategic planning processes [14, 15]. Finally, conclusion and discussions are generated for the new agenda

Figure 1. The methodology adopted in the research

Figure 2. Slums as unsafe overcrowded houses

3. SLUM DEFINITION AND FORMATION

A slum is a residential area that is built by local people and away from the supervision of the governments [17]. Moreover, they can be described as substandard housing that is poorly serviced and often overcrowded [18]. Slums are caused by a variety of interconnected aspects, including informal urbanization, poor governance especially field of land policy, land management planning and, migration and population movements associated with urban intensification, disasters, conflict and economic weakness, climate change, long-term poverty and inadequate reasonable dwelling. These problems resulted in urban informality's emergence [19-21].

These rapidly built houses lack many essential services like electricity, water, sanitation, transportation, infrastructure and recreational grounds. Therefore, it is leading to the widespread of unhealthy, unsafe, and socially undesirable residential areas [22]. All previous unplanned areas and slums have appeared due to the huge rise in population with simultaneous drop in economics conditions, therefore, forcing the poor to build a shelter that protects them from external natural threats and satisfy their basic needs, without thinking about legality, functionality, suitability of this house and its negative impact on nature and country (Figure 2).

The uncontrollable spread slums are not reaching a limit due to the complete neglection and denial of governments for their

existence. Besides, what makes the slums areas collapse rapidly is the absence of any official documents or awareness from the side of the inhabitants. On the other side, governments and decision makers are heading to build new communities rather than upgrading the existing ones and enhancing the quality of buildings, services and living conditions [23].

Slums are formed all over the world due to the appearance and continuous breakdown in some communities fields like employments, education, rapid population growth, limited empty lands, natural disasters, poverty spread and many other problems that lead inhabitants to build their own houses on governmental and personal lands that is not specified as a residential use. Besides, building with personal experience without any experts' opinion leads to an unplanned week structures and services. As a conclusion for all the previous, unplanned areas with poor stolen services and demolished infrastructure lead to unplanned urban communities that face and affect governments economically, politically and socially due to the usurping of its lands.

Slums are global phenomena that are not only spread in developing countries, but they are also reaching the developed ones. This cancerous spread in informal housing is reaching developed countries all over the world through migration that took place due to spread of poverty, lack of job opportunities, inconvenient educational level, deteriorated services and continuous human search for a better decent life. Therefore, these inhabitants thought that other countries rather than theirs can provide them with essential needs so they decided to leave their homes and families behind and migrate to search for better life opportunities. Moreover, they settled in tents or poor structure in cities margins and started their search for job opportunities to support themselves and their left behind families.

4. WHY DO SLUMS NEED TO BE UPGRADED

Low-income inhabitants are facing many difficulties concerning physical and psychological health, living and housing conditions. It is vital for all countries and decision-makers to upgrade slums, apply sustainable principles and convert all demolished and inhumane buildings into adequate, safe and affordable houses that provide protection and all essential services like clean water, electricity, drainage system and others [24].

Figure 3. Reasons of slums upgrading

There are numerous negative effects for unplanned urban growth on communities, especially third world counties like Egypt. On one side, these negative impacts will affect many aspects like health, safety, environment, economic, social and aesthetically values [23]. On the other side, it will also lead to spread of violence, disasters, and evictions, and perpetuating the cycle of poverty (Figure 3).

5. NEW AGENDA FOR SUSTAINABLE SLUMS EXPANSION AND UPGRADING

It is important to understand that demolishing slums, families' displacement and wasting financial resources to build new buildings are not the best solutions for upgrading slums. For upgrading slums, there is a need to apply the sustainable concept to improve the quality of life, protect the environment, and support its surroundings. In addition, it upgrades the human behavior and ensures that people have access to basic services, enjoy comfort, health and safety. Also, it convinces the community to invest its resources and provide new jobs. Reaching a sustainable slum means to solve all problems facing structures, urban patterns, and inhabitants and deriving solutions to maintain a sustainable building with highest performance and clean environment. Therefore, a new agenda for sustainable slums expansion and upgrade is developed to help architects and decision-makers to convert slums into new sustainable cities (Figure 4).

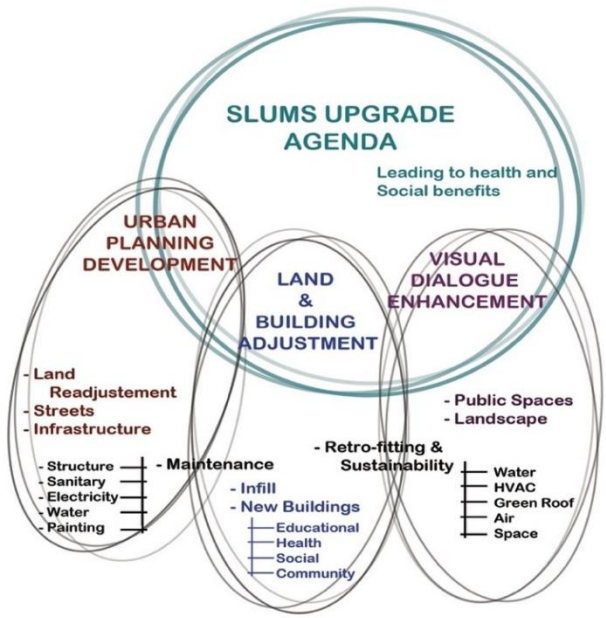

Figure 4. New Agenda for Sustainable Slums expansion and upgrading

5.1 Phase 1: urban planning development

5.1.1 Land readjustment

Land readjustment is considered a technique for promoting sustainable urban development through planned and managed urban expansion and intensification through enhancing aggregate value of both individual and neighborhood properties. Land readjustment important features are land surrenders for infrastructure and public space requirements. This tool provides fair cost-benefit sharing for projects, among government agencies, property owners and planners. It helps

for preplanning the informal settlements with roads, infrastructure, open spaces and public facilities. In conclusion, upgrading neighborhood and landowners can stay and benefit from better living conditions and increased value of their real property [25].

Moreover, there are many efforts and directions for land readjustment, as UN-Habitat suggested a land readjustment's new approach named Pilar –Participatory and Inclusive Land Readjustment. This approach responds to many challenges related to traditional land readjustment and its goal is ensuring that all stakeholders are engaged in the development processes while achieving sustainable and comprehensive results. It also widens the visions on early, consistent and realistic stakeholder involvement in engaging public participation, implementing urban redevelopment, besides identifying local dynamics, like community networks, heritage, culture and local businesses to maintain the fundamental positive place's local dimension in the process of change. This model may offer serviced lands at an affordable price to minimize the slums' negative impacts, provide new public and private sector approaches by sharing the value of land for funding infrastructure and sharing development problems and profits. In addition to developing a process, which enhances local dynamics, sustains community commercial networks, culture and heritage and thereby contributes to generating greater society support for urban development that increases inclusiveness, livability and sustainability in urban areas throughout its processes and built infrastructures [26].

5.1.2 Streets

A major consideration should be given for opening streets, strengthening, expanding or enhancing current streets and access for encouraging urban regeneration and management. The integration of the slum's streets into the city's urban street system provides physical, social and economic integration of these communities to improve the quality of life and cities' economical effectiveness [27]. Many organizations adopted many actions to improve the slums' streets such as:

- Defining streets' layout pattern and implementing streets and services such as re-blocking, redeveloping, or widening streets.
- Regulating tenures while giving the streets and houses names and numbers to provide inhabitants with a postal code and address, thus strengthening their belonging.
- Enhancing accessibility and establishing facility systems.
- Providing street lighting and fixtures that may result efficiently in increasing access, use, outdoor activities, events and social interaction among residents. This action will maintain the feelings of public security of inhabitants.
- Improving streets' design and safety play a significant role in social and economic activities.
- Affording essential utilities, like electricity, water, sewage, pedestrian ways, public spaces and paving the roads and sidewalks.
- Developing hierarchy of roads, open spaces and services by linking new roads with open spaces in upgraded slums to city's transit system via public transportation network, which improves access and revenue-generation opportunities [27].

5.1.3 Infrastructure

Filling gaps in basic infrastructure and services in urban slums are essential to end extreme poverty, reduce inequity, foster shared prosperity, make life better for the urban poor and help the nation realizing its growth potential. Also, improving infrastructure is essential for the transformation of slums into urban neighborhoods, better urban configuration and spatial structure [28].

The upgrading of slums at their base level comprises improving hygiene and enhances the physical environment of the existing area. Besides, the improvement and installation of basic infrastructure such as air water, sanitary facilities, solid-waste collection, power, rainwater sewerage, access roads and pedestrian paths, and streets lights, and housing upgrades and land security [29].

The installation of all previous basic facilities is not enough, but also it is important to choose suitable location of the facilities, prefer private facilities, achieve synergistic interventions and ensure the adaptability of infrastructure to the needs and the ability of systems to clean, maintain or repair [30].

5.2 Phase 2: land & building adjustment

5.2.1 Infill

Infill development is the re-use of vacant, abandoned, passed over, or underutilized land within built-up areas of existing communities, where infrastructure, however its quality, is already in place. Land infill is the ideal solution for using vacant lots, which often become dumping grounds for waste, posing health and safety hazards, abandoned properties that require maintenance and demolition [31, 32].

5.2.2 New Buildings

Beside restoration of old structures, it is important to build new homes for people, to save them from overcrowded and demolished structures. These new buildings may be residential, educational, health, or other functions needed by inhabitants. These functions will assist governments to raise social, cultural and economic levels in slums, thus enhancing people's physical and psychological health. Moreover, these buildings can be hospitals, health care units, schools, community centers and sports centers [33, 34].

5.2.3 Retro-fitting and reaching sustainability

The retrofit process is a general term that seeks to increase building performance and decreases its negative impact on the built environment. This action will occur by controlling and reducing the total energy consumption worldwide through starting by reducing energy and carbon dioxide emission of buildings. Also, the principles of retro-fitting process are similar to these of sustainability; therefore, a sustainable city will be created that enhance inhabitant's socio-health life. Finally, sustainable retro-fitting can be reached through several means like [35]:

(1) Water Efficiency: It is important to fetch new clean resources of fresh water while reducing the overall usage of water and minimizing wastewater. Moreover, water efficiency can reach its highest goals by reusing.

(2) Continuous HVAC Commissioning: It means a constant testing, maintenance and reporting the performance of HVAC to allow achieving maximum results.

(3) Green Roof: Although nowadays it is a traditional solution, the green roof system has many thermal and environmental advantages that raise building performance and create a clean atmosphere surrounding the building. These many advantages can be summarized as following:

- Energy conservation for heating and cooling;
- Decrease thermal effect on building
- Purification of air and absorption of noise
- Not only replacing vegetation and creating new public spaces, but also increasing aesthetic value
- Social and psychological benefits [36].

(1) Indoor Air Quality: improving air quality is an improvement for many aspects concerning health and social lives of inhabitants and this action can occur through the following:

- Reducing sources of air pollution and maintaining clean filters
- Removing Vacuum and dust regularly allowing the creation of Clean surface
- Providing good ventilation and purify air by using indoor plants [37]

(2) Operations and Maintenance Optimization: R real-time visibility of the operational status of different parts of the building is a must (i.e., Mechanical, Electrical, Environmental, and Plumbing) and can lead to preventative maintenance rather than emergency repairs [35].

(3) Space Utilization Management: It is important to obtain efficient space use results and avoid any waste in designed spaces, therefore occupancy data should be calculated to inspect the exact utilization of all rooms and spaces to determine whether the overall space should be redesigned or redistributed among building occupants [35].

5.2.4 Retro-fitting and reaching sustainability

The main aim of building maintenance is to restore and improve every facility inside the building, like [38]:

- Strengthening the building structure and fixing wall cracks
- Maintaining should be a routine like cleaning, servicing, oiling, greasing, renewal of plastering, painting walls, painting wood-works
- Enhancing all sanitary installations and water pipes to prevent water leakage.
- Checking all electric insulation periodically
- Painting internal and external surfaces of buildings is essential for various reasons hygienic, protection of structure and aesthetic
- Adopting Sound and thermal insulation

5.3 Phase 3: visual dialogue enhancement

5.3.1 Public spaces

The key characteristics for improving conditions in urban public spaces include a well-maintained public area, enhanced secondary connectivity, livable micro-climates, meeting points for enhancing social cohesiveness, properly ecological systems and secured playgrounds for kids and employment [39]. Moreover, creating public spaces and opening streets provides a great chance for exploring and demonstrating other types and patterns of varied land uses. Also, land tenure schemes and housing types are favored compact cities on a manageable scale. Moreover, there is a great potential to convert the public areas into creative innovative built environments using technologies, eco-friendly construction materials, alternative sources of power and subsistence activities and business [40-43].

5.3.2 Landscape

Landscape is a fundamental element for slum upgrading to create livable environments, improve the urban environment, address the challenging set of environmental problems of slums and develop the quality of life [44]. The slum landscape approach provides new perspectives for current development projects and may stimulate continued progress [45].

Gardening in slums enhances aesthetic values and promotes new performance that contributes to cultural change and may generally extent to become a large part of the slum culture. New gardens can attract personal care and engagement to the neglected public realm [4, 46].

The design of gardens must be as simple and legible as slums' houses and combine a vernacular manner of making and thinking. The gardens are recognizable as well as new urban elements, which entertain, surprise or offer comfort and satisfaction [47]. In conclusion, the parks adapt and articulate the basic human performance of accommodation, and support the establishment and enhancement of the slum landscape [48].

6. CASE STUDY: UPGRADING EZBIIT EL-MATABEA INTO A SUSTAINABLE COMMUNITY

6.1 Ezbiit El-Matabea location

Ezbiit El-Matabea is a slum neighborhood located in Alexandria city, Egypt (Figure 5). It is located in the east district, near the Elnozha airport and situated between El-Mahmoudea lake in the north and the railroad in the south, with a total area of 84.2 feddan, overlooking Airport lake.

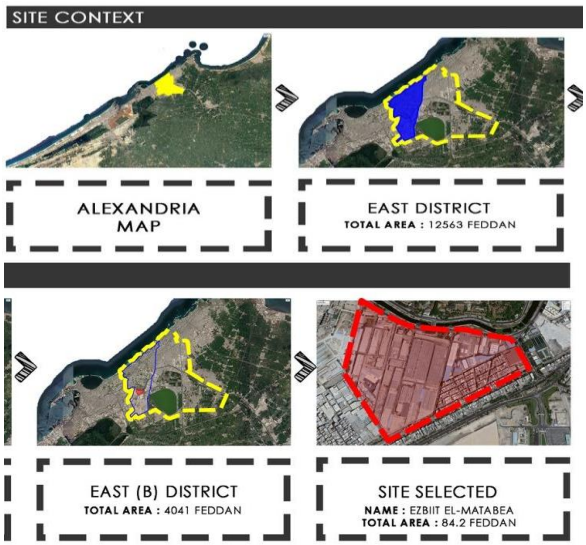

Figure 5. Site Ezbiit El-Matabea context

6.2 Historical background

In 1800 Ezbiit El-Matabea was a vacant land, but in 1885, Khedive Ismail ordered to establish Moharam-bek printing company under the name " Egyptian Trading Company."

During 1956, the company was built in El-Nouzha Area near Alexandria Airport and the company started providing housing units for workers beside the company. In 2001, a group of companies was established, such as Alexandria Spinning & Weaving Company, Arabisco Company, Bisco Misr Company, which leads to increase in population so the companies also needed to provide housing units for their workers, but due to the increasingly high number of workers

with the limitation of land, informal illegal houses started to appear (Figure 6). This massive population increase reached its peak in 2017; leading people to extend their housing units on the train railway and some companies became deteriorated.

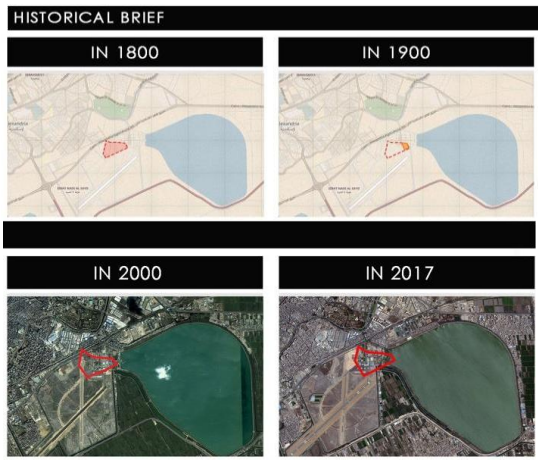

Figure 6. Historical brief of Ezbiit El-Matabea

6.3 Analysis of current situation

The analysis of the selected slum is the first important stage to understand the area before applying the proposed upgrading agenda. Therefore, it is important to analyze various aspects to reach a complete vision of strength, weakness, opportunities and threads facing the slum and its inhabitants. Moreover, this analysis will cover slum's site boundaries, street networks with accessibility, visual aspects, land use, urban fabric and everything considering existing buildings like conditions, structures and heights.

For a better view of the selected area "Al-Matabea" slums, a zoning diagram will be done to differentiate between the zone containing "Moharram Bek" printing agents' company and residential areas, where the application of upgrading agenda will be applied later (Figure 7).

Figure 7. Historical brief of Ezbiit El-Matabea

By studying the slum surroundings, it was found that firstly at the north, there is Moharam Bek printing company, followed by "El-Shohada square road" then "Alexandria zoo" and "Antoniades gardens and palace. Secondly, in the east direction, there is "El-Matar street," between the slum area and "Alexandria water company." Thirdly, in the south direction, there is "El-Oroba Street" followed by another slum area. Fourthly and finally, in the west direction, there is "El-Maesref Street" and companies (Figure 8).

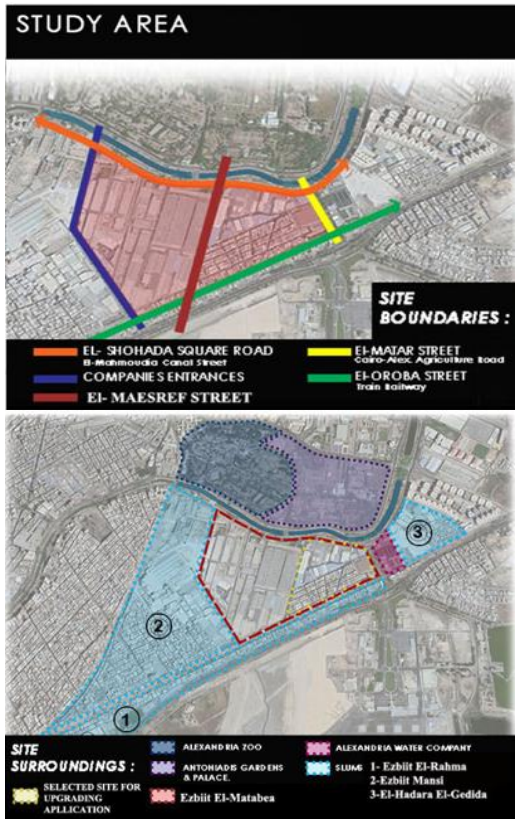

Figure 8. Study area analysis covering site boundaries and surroundings

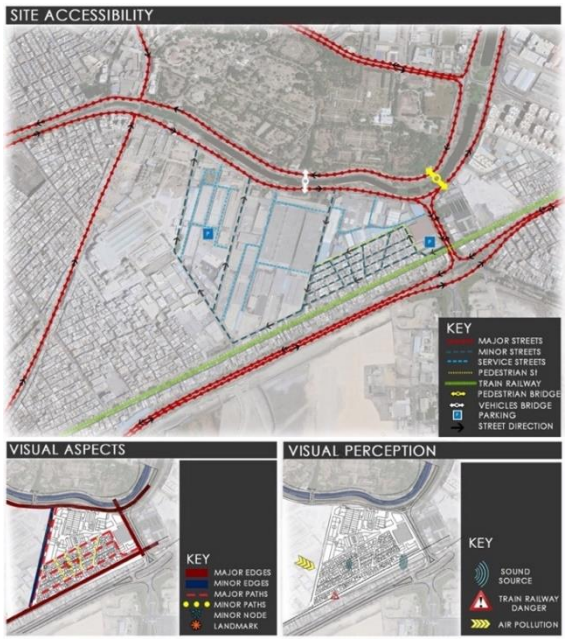

Figure 9. Site accessibility, visual aspects and perception

After analyzing the street network, the following study will determine the site accessibility to understand Pedestrian paths with major and minor streets with their directions and

available parking slots. Besides, indicate the positions of the train railroad and its relation with the slums (Figure 9). Finally, this analysis will be combined with visual aspects and perception maps showing edges, paths, nodes, important landmarks, sound sources and danger.

Besides the previous analysis, the existing condition master plan is reviewing the slum area with all important buildings like religious buildings as Nour El-Islam Mosque and church of St. George. Additionally, many other pictures taken from the study area showing the overall conditions concerning buildings finishing, structures, streets, landscape elements and infrastructures (Figure 10).

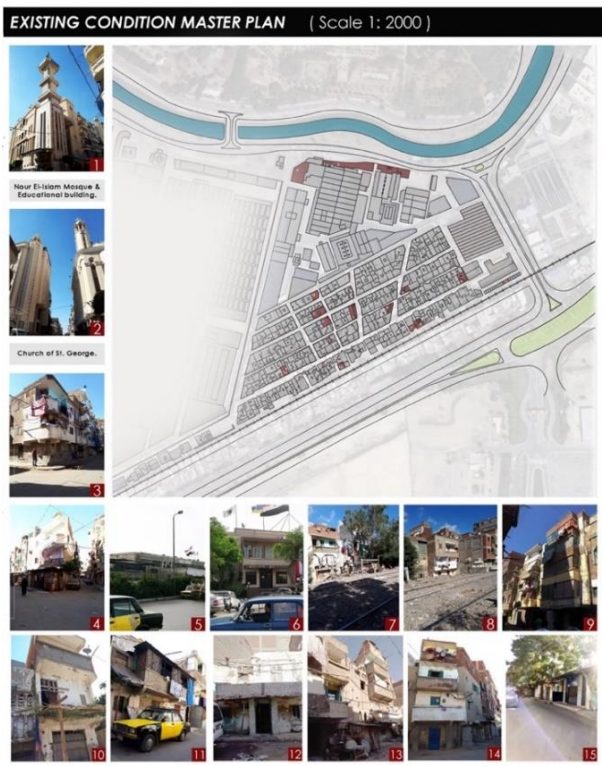

Figure 10. Existing conditions

Lastly, the analysis phase will end by studying buildings and lands, therefore, it is stated that most lands are used for residential and a combination of residential and commercial, in addition to a commercial area named “El Matabea” printing company. Additionally, when visualizing the urban fabric, it was stated that 66.6% is considered solid while the rest 33.4% is void. Moreover, most buildings are skeleton structures that are deteriorated due to poor building conditions and week structures as inhabitants are building themselves away from the supervision of engineers and government. Finally, for building heights, it was found that buildings vary from one to four floors, but the most widespread is four floors buildings (Figure 11).

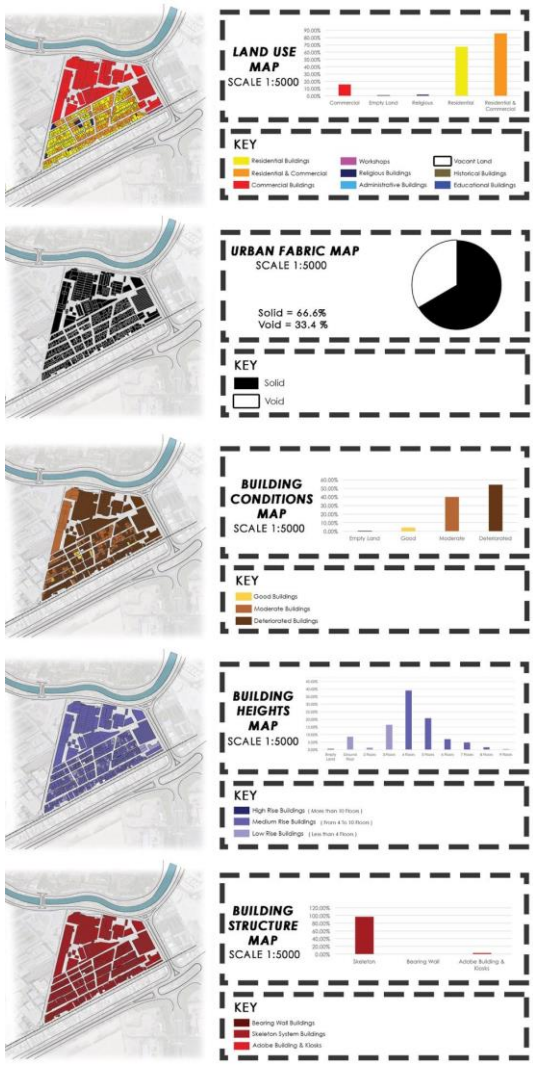

Figure 11. Documentation maps

Table 1. SWOT analysis

Strengths	Weakness
1. Streets are wide enough but not paved for cars to pass through them. 2. Some buildings are provided with public services such as electricity, water supply & drainage. 3. Strong social relations between people. 4. Existence of Spiritual buildings that gives sense of identity of the community as a whole. Such as: Church of St. George - Nour El-Islam Mosque & educational building.	1. Presence of some sanitation problems. 2. Most of the buildings are provided with electricity in an illegal way (steal from public streets electricity). 3. Some residential buildings are deteriorated and others don't provide the minimum requirements of housing as a shelter. 4. Lack of quality amenities which can serve the local community. 5. Pollution spread as Wind directs factory exhausts towards residential buildings. 6. Low educational level which leads to spreading of poverty & un-employment 7. Moharam-bek printing agents include some deteriorated abandoned buildings that aren't working nowadays. Therefore, became deteriorated and neglected areas
Opportunities	**Threats**
1. Taking advantage of the grid & linear urban fabric. 2. Making use of Abandoned and neglected spaces in Moharam Beik Printing Agents, that might be used for housing or new projects to provide new job opportunities solving un-employment problem.	1. Great danger and death of children because the train railway has direct access from the main streets and some residential buildings. 2. Pollution spread due to lack of services which leads to cause of diseases. 3. Spread of bad habits due to crimes and vandalism 4. Informal housing threatens lives of residents & cities.

6.4 SWOT Analysis of current situation

A SWOT analysis will summarize all the analyzed data resulting from reviewing and understanding the study area, meaning that all strengths and opportunities are spotted from one side and on the other side, all weakness and threats will be revealed and solutions will be generated (Table 1).

The AHP technique is applied in the SWOT matrix by comparing SWOT groups in pairs using the comparison scale from 1 to 9 in Table 2. Following by comparing SWOT factors within each SWOT groups as indicated in Tables 3-6. The overall priority of the SWOT factors is calculated as given in Table 7.

Table 2. Pairwise comparisons Matrix of SWOT factors

SWOT Groups	S	W	O	T	Priority
S	1	0.20	5	0.33	0.131
W	5	1	7	3	**0.551**
O	0.20	0.14	1	0.14	0.044
T	3	0.33	7	1	0.274
Consistency Ratio = 0.088					

Table 3. Pairwise comparison matrix of the strengths criteria

SWOT Groups	S1	S2	S3	S4	Priority
S1	1	0.20	3	0.20	0.032
S2	5	1	7	3	**0.241**
S3	0.33	0.14	1	0.14	0.018
S4	5	0.33	7	1	0.119
Consistency Ratio = 0.084					

Table 4. Pairwise comparison matrix of the weaknesses criteria

SWOT Groups	W1	W2	W3	W4	W5	W6	W7	Priority
W1	1	9	0.33	7	5	3	7	0.267
W2	0.11	1	0.11	0.20	0.14	0.14	0.33	0.019
W3	3	9	1	7	5	3	9	**0.379**
W4	0.14	5	0.14	1	0.33	0.20	3	0.051
W5	0.20	7	0.20	3	1	0.33	5	0.092
W6	0.33	7	0.33	5	3	1	7	0.162
W7	0.14	3	0.11	0.33	0.20	0.14	1	0.029
Consistency Ratio = 0.087								

Table 5. Pairwise comparison matrix of the opportunities criteria

SWOT Groups	O1	O2	Priority
O1	1	0.33	0.25
O2	3	1	**0.75**
Consistency Ratio = 0.0			

Table 6. Pairwise comparison matrix of the threats criteria

SWOT Groups	T1	T2	T3	T4	Priority
T1	1	3	0.33	7	0.267
T	0.33	1	0.20	5	0.127
T3	3	5	1	9	**0.566**
T4	0.14	0.20	0.11	1	0.04
Consistency Ratio = 0.063					

By merging the SWOT and AHP methods, the following outcomes indicate the ranking of each priority in the SWOT groups of Ezbiit El-Matabea: the weakness was given the greatest priority because of the issues facing the slum while the opportunity was given the least priority, in addition the various factors differ in significance through the four SWOT groups. As expected, the outcome reflects the negative impact of vulnerabilities and threats in the case study.

Table 7. Priorities for comparing SOWT groups and factors

SWOT Groups	Scaling Factor	SWOT Factors	Local Priority	Global Priority
Strength	**0.131**	S1	0.032	0.0042
		S2	**0.241**	**0.03157**
		S3	0.18	0.0236
		S4	0.119	0.0156
Weakness	**0.551**	W1	0.267	0.1471
		W2	0.19	0.1047
		W3	**0.379**	**0.2089**
		W4	0.51	0.0281
		W5	0.092	0.0507
		W6	0.162	0.0893
		W7	0.029	0.0160
Opportunity	**0.044**	O1	0.25	0.011
		O2	**0.75**	**0.033**
Threat	**0.274**	T1	0.267	0.0732
		T2	0.127	0.0348
		T3	**0.566**	**0.1551**
		T4	0.04	0.0110

6.5 Converting Ezbiit El-Matabea slum into a sustainable community

After analyzing the case study, there is a need to convert Ezbiit El-Matabea slum into a sustainable community. The proposed agenda will be applied and the three phases will be implemented as follow:

6.5.1 Phase 1

The first phase focuses on urban planning, so the land was readjusted to respect the grid urban fabric of the neighborhood also the street networks and the main spines were redefined to enhance accessibility. Redeveloping of the urban context & the deteriorated surrounding area were taken into consideration. The taking advantage of all available resources such as Brownfield development to upgrade the economic condition and increase the efficiency of production. The land was redeveloped to provide satisfactory living conditions and the urban spaces were planned. The natural and built environments of existing integration neighborhoods were repaired and restored to form a new area urban developed through a strong street network consisting of main spine, secondary streets and a developed infrastructure (Figure 12).

Figure 12. Phase 1 map

6.5.2 Phase 2

This second phase concerns the upgrading of buildings, many processes were taken into consideration. Providing the center of neighborhood with educational buildings starting from kindergartens & ending with secondary schools, taking also in consideration, newly proposed community centers to increase awareness level of residents, end illiteracy and resolve their social & cultural issues. There are many industrial buildings, so the adaptive re-using of these buildings is needed to be light industry factories that in return will provide job opportunities to residents increasing their income. Moreover, to strengthen the sense of belonging to inhabitants, it is important to return the heritage value of Moharam-bek printing agents & providing new job opportunities by renovating & reusing of un-used buildings. This action will lead to achieve housing units with high performance & maximum requirements but with least cost by providing new types of housing units in order to satisfy the need of different residents. In conclusion, many interventions will be done like demolition old or run-down buildings, constructing new, up-to-date houses and implementing new projects. Moreover, adding green roofs in some buildings to purify the air from pollution and increase the aesthetic value of all regions, while helping inhabitants to plant their own food.

Respecting building laws and regulations should be done through many actions like removing the danger presented in buildings on the railroad and replacing the houses of residents in a better place for achieving safer life. Building materials should perfectly be chosen for the structure and suitable for the long run & to avoid any damage in the structure system. Finally, some existing buildings are in a good or moderate condition but they need some repairs and maintenance it is suggested to achieve better aesthetic and functional value (Figure 13).

Figure 13. Phase 2 map

6.5.3 Phase 3

The final phase emphases the urban design of the neighborhood by improving the visual appropriateness of the spaces and enhancing the quality of amenities, security, privacy & comfort for residents. Preventing exhausted polluted air from spreading through air by using landscape elements as a separation between industrial buildings & residential buildings to absorb polluted gases such as CO_2. Additionally, separation of railroad from residential buildings to provide safe life for residents by using landscape elements "green belt" and hardscape elements with aesthetic view such as stairs, fences, lighting, and street furniture. Also, governments should consider designing the urban landscape in several spaces and artworks in the public spaces (Figure 14).

Finally, to maintain the social bond between residences, some deteriorated buildings will be removed from the heart of the slum area and will be replaced by a green park and plaza with seating areas, kids' playgrounds and entertainment zones that are connected directly to the main spine of "Ezbiit El-Matabea" (Figure 15). This park will also contain the already existing spiritual buildings, leading to emphasis of their existence and providing them with outdoor spaces for social bondage and future outdoor expansions.

Figure 14. Phase 3 map

Figure 15. Proposed plaza

7. BENEFITS OF APPLYING THE NEW UPGRADING AGENDA ON EZBIIT EL-MATABEA SLUM

7.1 Health & well-being

Upgrading slums will directly affect health and well-being as it will upgrade all basic services such as [49]:

- Presence of clean water, for drinking and cooking.
- Provide ventilation by adding suitable openings for spaces rather than their absence.
- Upgrade sanitation and hygiene facilities preventing diseases from the quick spread.
- Add a planned service for waste removal.
- Allow access of health care and other services that protect households from disease.

- Enhance building structures and remove collapsed buildings.
- Provide basic needs like electricity, to minimize the usage of coal and biomass fuel for lighting that causes air pollution and emission of greenhouse gases. Also, providing legal access of electricity to protect people from legal liability.

7.2 Safety

The informal settlements are built away from eyes of the governments; therefore, there is an absence of secure, woven pathways, signs and amenities, leading to impossible control of crime. All the previous lead to the birth of insecurity areas therefore actions should be taken to provide the return of privacy that leads to a decrease in crimes [49].

Also a great benefit is taken from making advantage of the existing grid & linear urban fabric by paving streets, maintaining pavements and widening streets to allow pass and entrance of cars and emergency to all buildings. In conclusion, all the previous will strengthen the streets grid, increase the safety of people and decrease car accidents.

7.3 Environment

A huge decrease in pollution levels will be strongly observed especially after adding a green belt between the industrial buildings & residential zone that in return will filter polluted air and increase oxygen levels. Also, the residents' awareness to reduce the water, soil and noise pollution is needed for controlling the environment and decreasing the negative impacts [36].

7.4 Economic

Making advantage of neglected and deteriorated buildings like Moharam Beik Printing Agents, allowed government to provide indemnity to residents who lost their houses in the upgrading process. Also, providing new buildings is a great utilization of lands, it will upgrade the financial situation and allow expansion in many fields concerning health, education and others. Therefore, this governmental control and upgrade of slums will return the identity of this residential area and provide a decent life that will also return Egypt to be a strong like before [33].

7.5 Aesthetic values

The design of urban spaces, landscape, streets, public arts and buildings provide the revival of the beautiful aesthetic view in Alexandria city, coastal city in Egypt [50], that was damaged after the spread of slums due to:

- lack of materials and severe economic condition that led the informal buildings to be mostly left on red bricks and without any external finishing
- Presence dozens of buildings on agricultural plots, which damaged the aesthetic views of the massive farmlands along the agricultural road [51].

7.6 Social

After developing all the previous aspects and applying all four phases of the new slums upgrade agenda, the informal unsecure areas will be replaced with new planned urban communities with secured healthy inhabitants and well-structured buildings. Moreover, this will lead to the decrease in evictions and disasters like robberies, murders, violations, sexual rapes [52]. Also, it will rise of awareness to develop the social behavior and the end of violence.

7.7 Poverty cycle

The upgrade of the slum will break the cycle of poverty, increase the equity in resources distribution and the productivity rates after the rapid decrease due to [9, 34]:

- Spread of illness, due to problems in ventilation, sanitation and clean water, and Illiteracy. This illiteracy is due absence of proper schools and the partial collapse of houses with the absence of proper space, good light and ventilation. These problems were solved by providing new education buildings, schools and upgrading demolished buildings.
- Lack of proper employment rather than the black market that most inhabitants are forced to work at due to their marginalizing from the formal economy, as the lack of a formal address is an obstacle to gaining employment. These problems were solved by naming the streets and providing workshops to offer new job opportunities

Finally, the priority matrices for each factor's alternatives and the Ezbiit El-Matabea's benefits rank are presented in Tables 8 and 9.

The results below display that the most benefit will be the breaking of poverty cycle, then the health & well-being which are significant for slum sustainable development. This order indicate that the new agenda will be effective and will have positive impacts during upgrading slums.

Table 8. Un-normalized alternatives pairwise comparison

	S1	S2	S3	S4	W1	W2	W3	W4	W5	W6	W7	O1	O2	T1	T2	T3	T4	T.	AV.
Benefit 1	3	9	7	3	9	1	9	7	9	7	3	3	3	3	9	3	9	97	5.706
Benefit 2	9	3	7	1	3	3	7	3	3	3	7	9	7	9	3	9	7	93	5.471
Benefit 3	3	5	1	3	7	1	5	7	9	3	5	3	5	9	9	7	5	87	5.118
Benefit 4	1	5	3	7	3	5	5	5	3	9	9	1	9	1	3	5	5	79	4.647
Benefit 5	7	7	3	7	7	3	7	9	3	3	7	7	7	5	3	3	7	95	5.588
Benefit 6	5	7	7	5	1	7	9	3	1	7	7	5	7	3	1	9	7	91	5.353
Benefit 7	3	9	7	5	5	5	9	7	3	9	9	3	9	1	3	7	7	101	5.941
Total	31	45	35	31	35	25	51	41	31	41	47	31	47	31	31	43	47	643	37.82

Table 9. Normalized alternatives pairwise comparison

	S1	S2	S3	S4	W1	W2	W3	W4	W5	W6	W7	O1	O2	T1	T2	T3	T4	T.	AV.
Benefit 1	0.097	0.2	0.2	0.097	0.257	0.04	0.176	0.171	0.29	0.171	0.064	0.097	0.064	0.097	0.29	0.07	0.191	2.572	0.151
Benefit 2	0.29	0.067	0.2	0.032	0.086	0.12	0.137	0.073	0.097	0.073	0.149	0.29	0.149	0.29	0.097	0.209	0.149	2.509	0.148
Benefit 3	0.097	0.111	0.029	0.097	0.2	0.04	0.098	0.171	0.29	0.073	0.106	0.097	0.106	0.29	0.29	0.163	0.106	2.365	0.139
Benefit 4	0.032	0.111	0.086	0.226	0.086	0.2	0.098	0.122	0.097	0.22	0.191	0.032	0.191	0.032	0.097	0.116	0.106	2.044	0.12
Benefit 5	0.226	0.156	0.086	0.226	0.2	0.12	0.137	0.22	0.097	0.073	0.149	0.226	0.149	0.161	0.097	0.07	0.149	2.54	0.149
Benefit 6	0.161	0.156	0.2	0.161	0.029	0.28	0.176	0.073	0.032	0.171	0.149	0.161	0.149	0.097	0.032	0.209	0.149	2.386	0.14
Benefit 7	0.097	0.2	0.2	0.161	0.143	0.2	0.176	0.171	0.097	0.22	0.191	0.097	0.191	0.032	0.097	0.163	0.149	2.585	0.152
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	17.00	1.00

8. CONCLUSIONS

Slums are generally the result of a combination of rapid urbanization and demographic growth, bad policies, and inappropriate incentive systems, including poor governance, inappropriate regulatory frameworks, dysfunctional housing markets, and a lack of political will.

Improving slums has the potential to enhance people's attitudes and resolve many issues as cities are now experiencing numerous problems at many levels. Certain deal with environmental concerns, like deteriorating air quality, rising air temperatures, and increasing noise levels, whereas others are associated with societal defects comprising a decrease in community feeling and an increase in psychological stress.

The paper proposed an agenda to upgrade the slums in cities using three main phases: urban planning development, land &building adjustment and visual dialog enhancement. This agenda will result in promoting sustainable standards and make the city more attractive for living, reversing urban sprawl and decreasing violence mitigation. The application of this agenda focuses on urban upgrading that provides a package of improvements in planning, land readjustment, streets, pedestrian ways, infrastructure and services as well.

Also, the upgrading of the buildings' quality is significant as the sustainable building is resource-efficient, environmentally responsible, economical to construct and maintain, healthy, and socially responsible throughout its lifecycle. Additionally, enhancing the open spaces in the urban perspective to involve air purification, the reduction of noise pollution, and aid in creating appropriate micro-climatic conditions to residents therefore these spaces are related to quality of life to visualize greens far beyond the idea of simply being traditional recreational sites or visual resources for communities such as policymakers and practitioners can begin to think about parks and open spaces as valued contributors to urban policy goals and targets, such as employment opportunities, public health and youth and community development.

To enhance the community's quality of life as well as the health and social conditions of slums, there are many recommended processes should be taken into consideration:

- Promoting social's benefits and providing health's lifestyle opportunities.
- Providing high aesthetic values that have a positive impact on the city's image and hence economic interest.
- Meeting the residential environment's requirements through proper planning that permits different purposes and practices.
- Affording the infrastructure, services, clinics and school facilities.
- Enhancing social integration and providing multifunctional spaces and services to meet the desires of various users.
- Adopting vandalism prevention's measures to guarantee high-quality, sustainable green areas and offering ease of use and convenient accessibility to public open spaces.
- Presenting various environment educational opportunities for increasing ecological awareness.
- Being reactive to changed developments and needs as well as positive to the economy.
- Providing sustainable buildings to become resource-efficient, environmentally responsible, economical to construct and maintain, healthy, and socially responsible throughout its lifecycle.

Finally, upgrading slums is the start of becoming a recognized citizen so the governments should keep into consideration its informal inhabitants and direct their resources and finance to meet their needs.

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