

Sustainable Indicators Framework for Strategic Urban Development: A Case Study of Abu Teeg City in Assiut, Egypt



Ghada Ragheb*, Maha Abd El-Wahab, Riham A. Ragheb

Department of Architecture, Faculty of Engineering, Pharos University, Alexandria 21311, Egypt

Corresponding Author Email: ghada.ragheb@pua.edu.eg

<https://doi.org/10.18280/ijstdp.170109>

ABSTRACT

Received: 5 November 2021

Accepted: 17 December 2021

Keywords:

AHP method, sustainability aspects, sustainable urban development, strategic approach, sustainability indicators, SWOT analysis

A fruitful approach to the sustainability of cities is described through criteria and indicators that measure the effectiveness of urban operations. To create a sustainable urban environment, an effective strategic approach must be developed that achieves sustainability criteria and indicators. It is difficult to evaluate sustainability strategies due to a sheer number of indicators or the heterogeneity of evaluating options and their relevance. In this context, the research is concerned with reviewing the previous literature for sustainable standards and indicators by specialized international organizations. For achieving a proposed structure of indicators that is easy to implement and includes the essential aspects of sustainability to serve as a priority setting support to propose a sustainable strategic approach. The analytical approach was used in the current situation of Abu Teeg City in Assiut using SWOT technology to examine the internal and external factors through questionnaires and discussions with experts, then applying the AHP method to prioritize the factors to make them measurable. Hence, an effective approach to city sustainability can be discussed using TOWS matrix. The proposed approach relates to the promotion of heritage tourism, infrastructure, environmental development, agriculture, economic and social development of the population, sustainable management, and the housing sector.

1. INTRODUCTION

The planning process changes over time depending on the rapid change in the type of issues related to the city's structure. The strategic plan involves rational planning (predicting, analyzing, and land use allotment), which leads to developing long-range physical plans [1]. If the traditional strategic plans of the city are considered the document that governs urban development in terms of land use only, an iterative process will be led to produce the same fixed results without development. Therefore, there is a need to develop the traditional strategic plans to become sustainable to keep pace with emerging developments that are difficult to predict. It requires a transition to a sustainable strategic plan as a tool to improve the coordination of urban policies on a large scale by considering its urban implications, ideally working with assumptions about the future of development trends, projects design, and type of participation, through activating its elements and linking them to criteria and indicators derived from sustainability goals.

The issue of applying the principles of sustainable urban development in the planning policies and programs of most countries is one of the most important challenges facing the stakeholders [2]. Many Egyptian cities suffer from urban problems resulting from the shortcomings of their strategic plans, which were not developed according to contemporary planning standards that operate in accordance with the principles of sustainability [3]. They were no more than plans regulating land uses, building densities, population, transportation, imposing decisions, etc., which in turn

produced unimplementable paper plans instead of being a working tool to guide development on the ground because of their lack of response to the needs of cities and the requirements of their residents. The plan may reflect negatively, especially in the historical cities, which have a distinct cultural heritage [4]. This research developed contemporary and comprehensive standards for preparing and evaluating more sustainable strategic plans that deal with current and future emerging requirements to prepare development plans.

1.1 Sustainable urban development

Sustainable development is a comprehensive vision that addresses several long-term social, economic, and environmental issues for cities. It can be achieved -on several different levels (national, regional, and local)- by reconciling the future visions, aspirations, and needs of the population, and the current reality, and security-enhancing in urban areas. This vision is translated into a set of programs and policies through a strategic plan to set a framework for achieving sustainable development. Sustainable urban planning is necessary for current city planning strategies. But so far, there is no specific urban form that policymakers and government adhere to [5].

Providing for future needs is at the core of sustainability, and resource depletion (energy, water, and food) is the main concern. Therefore, "natural resources must be viewed as capital that must be developed to meet the needs of future generations, and not as a source of income for some time and can be stopped" [6]. It is necessary to make a critical analysis

for understanding the cities' resource stocks and moving toward a more self-sufficient system through the movement and limits of social activity [7-9].

The implementation of sustainable urban planning practices is one of the most important challenges facing many developing countries due to economic constraints [10, 11], the lack of good infrastructure and management capabilities [10, 12]. Urbanization in many countries has an important effect on unanticipated city growth, changing the guiding priorities of the economy, threatening resource bases, and fuel consumption [13, 14]. In many cases, environmental conservation can be absent from state policies, since it is considered to be undeveloped, particularly when the main objective of development is the economic aspect [6].

The theme of sustainable development revolves around intergenerational equality, which is essentially based on four distinct but interrelated pillars, namely environment, economy, society, social or cultural. Decision-makers must be aware of the relationships, complementarities, and trade-offs between these pillars and ensure that human behavior and actions are renatured at the international, national, and societal levels [3]. The environmental pillar is related to physical applications and terms, which happen through intersecting the domains of both nature and services involving the importance of human commitment to the built environment and natural realms for protecting and improving the ecosystem to support its function over time. While the economic pillar refers to a field that focuses on the applications and discussions related to producing, using and managing an efficient distribution of resources. As well as the political pillar focuses on the applications and implications related to the fundamental power issues with respect to the agreement, policies, strategies, and rules of a shared social life to manage goals, procedures and provide comprehensive responsibility [15]. The fourth social and cultural pillar highlights the applications and terminology that express the continuity of the social and cultural significance of a shared life by time and enhance better quality of life and inclusive development [16, 17].

Sustainable development is based on environmental, economic, political, and social aspects that can only be accomplished with great efforts from an inclusive perspective. For cities, the indicators are considered a measure of the manner in which different city factors and parts operate and behave providing an overview of the present status or any upcoming opportunity [18].

1.2 Strategic approach

It is a strategic working document that considers the time and space with their metrics and is followed by a decision-making process to develop and direct urban environments and control their growth and expansion. This document serves as an engine to enhance the city's role as an innovation hub to improve the quality of life of its residents by regulating the use of resources in various sectors in an environmentally friendly manner and using more efficient energy with eco-friendly transportation systems, and preserving biodiversity. In addition, encouraging partnerships between the government, municipalities, and private institutions to fulfill their role in the responsibility of urban development and the multiple efforts, develop and increase infrastructure and vital systems and achieve economic development. As well as, engaging residents of all societal groups, providing environments for business, commercial activities, and various social innovations

with the aim of creating a sustainable, safe, attractive, and productive environment.

So, the urban activities and services are allowed a better geographical distribution. Urban space can be considered a strategic entry gate for driving sustainable development, through innovative and responsive urban planning to improve the quality of life. This is through reducing transportation needs and service costs, improving land use, enhancing mobility and adequate spaces for various activities, providing areas for recreation, preserving heritage, etc. [19]. As in the strategic development plan of Brunei, which supports international efforts to manage urban spaces sustainably, there is an approach to providing land for affordable housing with agricultural and commercial spaces. Additionally, the parks have become landmarks signifying the value of healthy lifestyles and some roads are closed to vehicle traffic on weekends four-hour morning. that enables the public to enjoy recreational sports, many entertainment and commercial activities, for promoting healthier living and strengthening family activities. Urban spaces in Brunei make a significant contribution to supporting open access to safe, inclusive and accessible green and public spaces, which enhance the quality of life.

The strategic planning process is by its nature an open, participatory process with interrelationships of different levels of planning to promote coordination as the basic principle. It consists of an adaptive methodology, which can be considered a tool for sustainable urban development, as well as a tool for achieving the management and treatment of future changes [20]. The principles of strategic planning offer guidance and rationale for regularity flows and investment activities, resulting in transformations of development form and framework [21]. Effective people's involvement in decision-making, planning, and implementing is one of the most important tools for enhancing political sustainability to ensure the efficiency of the sustainable planning process [22, 23]. This process is done through an integrated understanding of the needs of communities and a view of the community as a stakeholder in planning procedures [24].

The strategic sustainable plan can achieve various goals, including preserving the quality of life and public spaces through a sustainable balance between urban land and nature [25]. As well as justice, equality, improving the conditions of the population, and ensuring equitable access to economic and social resources to eliminate urban poverty. Reducing the consumption of natural resources, and creating various job opportunities that lead to economic prosperity. The sustainable plan works through several fields, including setting precise rules for land use that are applied in accordance with the principles of urban development to limit the urban spread and focus on the policy of sustainable urban renewal. In addition to the development of a comprehensive strategic vision by the various partners with the identification of funding sources, schedule, implementing agency and risk analysis, as well as including the active participation of civil society in planning, design, and management in the long term [26].

The article focuses on reviewing previous literature on sustainable standards and indicators by countries and specialized international organizations such as UN-HABITAT, UNESCO, and others. To propose an integrated structure of criteria and indicators around the pillars of sustainability, and is easy to apply to different city situations. To serve as a support to decision-makers, governments, and stakeholders to identify priorities that can be used to sustain strategic plans.

An effective approach can be contributed by applying SWOT technology and the AHP method to the case of Abu Teeg city, Assiut, Egypt. The research concludes by suggesting an approach for sustainable city development using the TOWS matrix and including several different aspects such as tourism and entertainment possibilities improvement, infrastructure enhancement, socio-economic development, and sustainable management [27].

2. METHODOLOGICAL FRAMEWORK

This article is on the basis of a detailed analysis of previous studies regarding the criteria and indicators of sustainability. This study helps by identifying indicators of sustainability in the political, environmental, social, and economic fields that are suitable for use by stakeholders and decision-makers. The case of Abu Teeg city in Assiut, Egypt was studied. The analytical approach was used for the current situation and development of the city. That method is applied by using a SWOT technique to examine internal and external factors and followed by the AHP method application for prioritizing those aspects to be measurable. Afterward, SWOT priority aspects were applied for preparing an effective approach [28].

2.1 Previous studies of sustainable indicators

The list of criteria and indicators for the pillars of sustainability was determined through a review of studies, frameworks, and evaluations. These methods have been assessed or identified as sustainability indicators in the political, environment, society, and economic fields. These integrated important documents, books, papers, journals, academic methods and comparisons. They were obtained from the databases available for ScienceDirect, Google Scholar, Web of Science, Scopus, Taylor, Francis, and Sage. Also, they were extracted from conference papers, government reports, and highly rated specialized journals (Sustainable Operations Management, Social and Behavioral Sciences, Habitat International, Sustainability, Sustainable Development and Planning, Cities, and others).

The literature review phase and previous studies consisted of selecting many frameworks, tools, standards, and indicators that are most used around the world to assess urban sustainability by several international organizations. These organizations have been working with city indicators such as:

* UN-Habitat is the leading agency responsible for designing, organizing and publishing databases of city indicators that reflect the Millennium Development Goals. The most significant series of city indicators is the UN-Habitat Expanded Databases of Global Urban Indicators.

* The World Health Organization, the World Health Organization, compiles 32 health indicators for cities in different urban areas. UNESCO has promoted and developed indicators' series to assess municipal policies, social development, and heritage preservation.

* The European Foundation, which proposed "European Urban Indicators" as a part of the Common Europe Indicators Project.

* The International Council on Monuments and Sites (ICOMOS) is a professional association that develops indicators for the conservation and protection of cultural heritage sites.

* The General Authority for Urban Planning is responsible for setting general policies for urban planning and sustainable urban development. It is responsible for preparing urban structural plans for all cities and villages in Egypt. It has established a National Urban Observatory (NUO) that compiles a wealth of data, information, and indicators that provide a good picture not only of urban conditions in different cities but also the availability of specific housing indicators. The collected data, information, and indicators are regularly updated and published on the website of the General Authority for Urban Planning.

All the chosen documents and methods were analyzed along with the essential information related to the indicators to be categorized and analyzed were extracted. It was found that there are many indicators, approaches, and advanced systems for the city that are measurable, repeatable, and predictable. Most importantly, it is coherent and equivalent through years and among cities. There is a series of indicators collected and applied by urban areas, representatives, similar through states, and stringent. Because of the study of the indicators of these organizations, there are 5 main domains of the city indicators Figure 1: Social and cultural development; Environment and infrastructure; Economic development; Local Administration; Housing, and slums. these indicators are strongly related to the pillars of sustainable development. Tables 1-5 collect the different indicators from these different organizations and puts them in five categories proposed by the UN-habitat and The General Organization for Physical Planning (GOPP) to be able to evaluate the strategic urban plans. This analysis allowed to define a structure for the criteria and indicators contained in each group for assessing the sustainability for cities.



Figure 1. The relation between the sustainability pillars and five main domains of the city indicators

Table 1. List of indicators of social and cultural aspects

Criteria / Main Indicator	Sub-Indicators	Ref.
Population (Numbers, average household size, female-headed households, and growth rate), Population characteristics, Urban population expansion, Planned settlement	Support geographically well-balanced settlements systems	[29, 30]
Poor families, Poor houses	Support social inclusion and assist underprivileged groups.	[29, 30]

Education, Literacy rates, School enrolment Inclusive Education Homicides / HIV prevalence	Support gender equality the development of human settlements Index of the average educational years of the population aged 17 to 22, adapted to expose inequities Afford equivalent opportunity to a healthy and safe lifestyle.	[29-32] [30]
Health (services)	Wider health and well-being benefits / Presence of health educational program in the city / Percent of children completely immunized / Per capita population engaged in primary healthcare/ Population percentage covered by health insurance / Access to primary healthcare services / Quality of areas that contribute to public health, community activities and cultural identity.	[33, 34]
Perceived/ actual threats walking trips	Reduction in perceived and actual threat More efficient walking trips	[35] [35]
Road injuries	Reduction in road deaths, injuries	[35]
Community ownership	Greater community ownership	[35]
Vocational training in the cultural sector	Measure of coherence and management of technical and vocational education and training (TVET) and higher education for culture.	[36, 37]
Contribution to the output / identity building cultural activities	Population percent contributed in at least one cultural activity during the past 12 months.	[36, 37]
Gender equality target outcomes	Measure of gender differences in politics, education and labor domains and legislative frameworks on gender equity / Level of positive evaluation of gender equity.	[36, 37]
Creativity	Creative and innovative cities	[34, 36, 37]
Inclusive city	the power of culture to promote human and inclusive and human-centered cities	[36-39]
Sustainability	Safeguarding urban identities / Social justice	[36, 37, 40]
The degree of satisfaction of the population with the availability of services	Educational services Health Services Recreational services	[29, 30]

Table 2. List of indicators for environment and infrastructure aspects

Criteria / Main Indicator	Sub-Indicators	Ref.
Water consumption and price of water	Efficient management of water supply and demand.	[29, 30]
Treated wastewater / Waste management	Reduction of urban pollution/ elimination of solid waste and regular collection of solid waste/ Household waste collection quality index	[29, 30, 33, 34, 41]
Environmental pollution/ local disturbances	City's responsibilities toward the worldwide environment / Quality of life locally/ Reduction in (air pollution, noise pollution, visual intrusion, water pollution)	[29, 30, 35, 41]
Infrastructure	Drinking water / Sewage / Electricity / Phone (telecommunications)/ Natural gas	[26]
Urban spaces	More sustainable use of urban space / Inclusive public spaces / Relative amount of urban green spaces/ Public accessible to parks.	[34-37]
Entertainment	Sports & Recreation / Pedestrians ways / Living space	[34]
Industrial sites	Derelict industrial sites	[34]
Energy consumption	The city's responsibilities to the worldwide environment.	[41]
Urban mobility / Travel time	Reduction in (vehicle infrastructure and vehicle use) / Promote efficient transport systems and respectful of the environment / Travelling time / Cycling in city / Public transport means and network cover / Road condition and transfer patterns / Road network efficiency	[29, 30, 34, 35, 41]
Transport modes	Improving the quality of the built and natural environment through culture / Human scale and compact cities / Sustainable, resilient and green cities	[36, 37]

Table 3. List of indicators for economic aspects

Criteria / Main Indicator	Sub-Indicators	Ref.
Promote small businesses	Informal jobs/ Support small and micro businesses, in particular women-led ones.	[29,30]
Growth of economic activities / City product	Employment / domestic products / The joblessness / Change in household income / Participation in the labor market/ Encourage public and private partnerships and support creative jobs / Cities output	[26]
Immediate Economic	Pedestrian activity/ More Expenditure/ More uses on street More repair and regeneration of sites/ Increased local distinctiveness	[35]
Strategic Economic	Enhancement of city's performance/ New policy responsibilities for public spaces / Integration of dormant economic resources / Establishment of new economic districts / Quality of life enhancement/ Creation of new image changes	[35]
Socio-economic	Joblessness level/ percent income below average per habitant income / Disabled employed persons percent/ Key social elements of sustainability/ Urban safety / Quality of green heritage and public space	[31, 38]
Cultural activities	Contribution percent to GDP from formal and private cultural activities.	[36, 37]
Cultural employment	People percent carrying out cultural activities among total worked persons / Citizen participation.	[36, 37]

Table 4. List of indicators for local administration aspects

Criteria / Main Indicator	Sub-Indicators	Ref.
Income and spending	Optimum cost and expenses	[26]
City council human resources	Provides city council human resources	[26]
International and local organizations	Cooperation with international and local organizations	[26]
Revenues of local authorities	Encourage decentralization and support local communities.	[27]
Voter's involvement/ Civic associations / Public society involvement within cultural governance	Promote and help citizens involvement and civic commitment / Provide transparency, accountability and efficiency of cities, towns and urban areas' governance / Index of the promotion of the participation of culture professionals and minorities in formulating and implementing cultural policies, measures, and programs relevant	[27, 33, 34]
Cultural political and institutional frameworks	Development measure of the political and institutional framework for protecting and promoting culture, culture diversity	[36, 37]
Standard-setting frameworks of culture	Development measure of the standard-setting frameworks for protecting and promoting culture, culture diversity and rights	[36, 37]
Supply of culture infrastructures	Supply certain cultural facilities in accordance with population of the state within the administration divisions directly under the government level	[36, 37]
Policies / Sustainability	Integrating culture in urban policies to foster sustainable urban development / Sustainable local development / Improved urban governance / Financing sustainable urban development	[36, 37]

Table 5. List of indicators for housing and slums aspects

Criteria / Main Indicator	Sub-Indicators	Ref.
Income and spending	Optimum cost and expenses	[26]
Tenure and home financing	Possession type/ The price of the housing unit in relation to income/ Financing.	[26]
Dwelling condition	Per capita residential space/ Building materials/ Crowding rate/ Type of units/ Possession patterns/ Use of units/ The reasons for the vacancy of housing units/ Building heights	[26]
Dwelling quality	Compliance with safety and security standards/ Building permits/ The age of the building/ Building condition/ The condition of the exterior finishes/ Peace state/ Putting natural lighting/ Compliance with safety and fire standards/ The condition of the water supply pipes/ The condition of the sewage pipes/ Plot areas/ Residential unit areas/ The per capita share of housing land and residential land	[26]
Housing industry	Housing production/ Investments in housing/ The share of investments directed to the housing sector in the GDP	[26]
Lands/ Land prices (value)	The ratio between income and the land price/ Land designated for housing/ Provide equal access to land/ Land prices/ Residential building prices (price per square meter for buildings)	[29, 30]
Slums	Residents of slums/ Contact basic services/ population percent living in unsanitary housing / Estimation of homeless citizens	[26, 31]
Homes in dangerous places	Avoid catastrophes and reconstruct settlements	[30]
Stable buildings/ Overpopulation	Approve the law to appropriate accommodation	[30]
Safe tenancy	Provide safe occupancy	[30]
Accommodation financing	Ensure equity in access to finance	[30]
Essential services	Promote accessibility to safe water/ improvement of sewerage / service connectivity.	[30]
Accessibility		
Preservation of the heritage	Development measure for a multi-dimensional heritage preservation framework.	[36, 37]

2.2 SWOT analysis

The SWOT tool is considered one of the most important strategic research tools. It helps in studying the external and internal backgrounds for the sustainable development of cities, for promoting urban development sustainability. The internal and external factors affecting the development of cities are analyzed. As well as identifying the internal advantages and shortcomings in the internal and external environmental factors, and then developing proposals and strategic plans in coordination and cooperation between the various departments to develop and develop cities for their sustainability. By analyzing Strengths, Weaknesses, Opportunities, and Threats (SWOT) as a strategic tool, the gap between existing resources and the prerequisites for the sustainability of cities can be identified [42]. The urban planning SWOT tool is applied to help planners take advantage of strengths, reduce weaknesses, seize new opportunities and avoid potential risks. Then, decisions can be made on sustainable urban renewal projects, as well as the development of revitalization strategies in different urban neighborhoods. Thus, the SWOT analysis technique is a viable approach to designing various strategic

thinking and procedures [43].

2.3 AHP method

Sustainable development is characterized by a complex nature that is reflected in the decision-making process and requires a lot of structuring and organization. In order to support decision making on sustainable development, different multi-criteria techniques can be used [44]. The Analytical Hierarchy Process (AHP) is one of the highest efficient and widespread methods for multi-criteria decision making. It presents an appropriate methodology for analyzing decision-making issues. AHP has the capability to lead policy-makers to reach greatest judgments on various problems. It provides comprehensive and well-balanced ranked system to address decision-making issues around a shared purpose [45]. AHP software has many applications such as selection procedure, order ordering and prioritization. It helps weight the criteria as a numeric database. The criteria weighting for each item defines its relative significance in relation to other items in a hierarchy. Therefore, it makes it easier for decision makers to prioritize and rank the factors [46]. After the

hierarchy is established, the comparative significance of the principal criteria and the sub-criteria are determined by comparison in the form of binary pairs. This is done by using a scale of intensity from one to nine, shown in Figure 2, for measuring the relative significance of elements.

Intensity of importance	Definition	Explanation
1	Equally important.	There are two requirements that are of equal relevance to the achievement of the objective.
3	Little more important than the other.	A criterion is supported relative to another according to judgements and experiences
5	Significantly / Critically important	A criterion is strongly supported relative to another according to judgements and experiences
7	Obviously important	One of the criteria is regarded as highly important and predominant
9	Extremely important.	Heights are ordered where the proof indicates that one criterion is more important than the other.
2,4,6,8	Where compromise is required, median values between the two associated judgments.	
Reciprocals 1/3,1/5,1/7,1/9	By comparing the standard, I criteria j, whether any of the numbers enumerated above are dedicated, a mutual value exists.	

Figure 2. Pairwise comparison scale of Saaty [47]

3. CASE STUDY OF ABU TEEG CITY, ASSIUT, EGYPT

This research relates to the proposed approach to the sustainability of cities that is described through criteria and indicators that measure the effectiveness of urban operations. Abu Teeg is a large city in Middle-Upper Egypt on the western bank of the Nile. It is an ancient pharaonic city more than four thousand years old. It was the political capital of the tenth region in Upper Egypt. Its name was in hieroglyphics “Botik” meaning the storehouse because it was a warehouse for goods in the days of the pharaohs called in the Greek language “Apotek.” In Coptic, “taboutiqi,” then transliterated to “butig,” and when the Arabs entered it, they added the letter “alif” at the beginning of the word to it, so it was called “Abu teeg,” which is its current name [47].

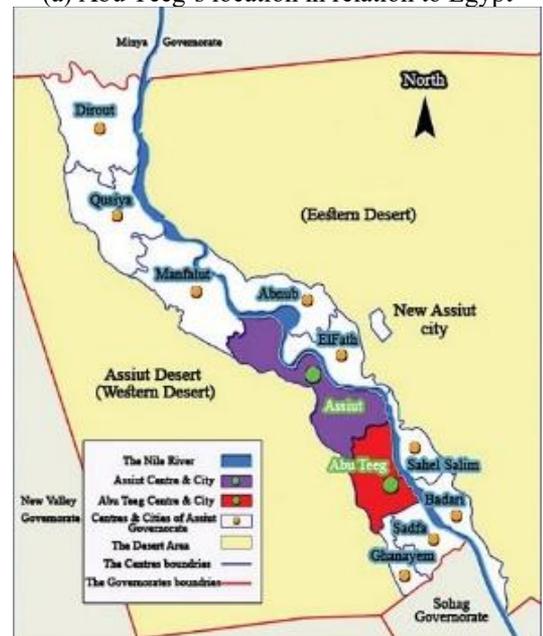
The Abu Teeg Center is one of the most prominent centers in Assiut Governorate due to its geographical location, as it is located 28 km south of Assiut, and it is bordered on the east by the Nile River, on the west by the Western Desert, on the north by the center of Assiut, and on the south by the center of Sadafa Figure 3(a), (b) [48]. The total population reached 338,963 thousand people in 2013. The total area is 129.24 km², which represents 7.6% of the total area of the governorate. The total cultivated land is 114.88 km², and the most important agricultural crops are: cotton, wheat, sorghum, corn, and beans [49].

The urban form of the city of Abu Teeg has changed during the previous decades because of administrative and urban change from rural to urban, which prompted the city to change the urban structure. There are no unsafe areas in the city, but there are unplanned areas. The urban sprawl increased on agricultural lands and led to the rapid erosion of the agricultural area surrounding the city. Some of these areas suffer from narrow, winding streets and dead-end lanes, and wide streets are rare and sewage problems. There are also shortcomings in basic services, as well as in cultural, social, security, entertainment and educational services. The Assiut region has a competitive advantage, which is the presence of

more than one linkage between the region and other regions, represented by roads, railways and waterways, which constitute a distinct transport and network. There are also huge agricultural activities represented by the cultivation of food crops and the presence of animal husbandry. There are vacant lands in the city, barns, warehouses, and sheds, amounting to 11.97% of the city’s area and can be used for urban development within the city.



(a) Abu Teeg’s location in relation to Egypt



(b) Abu Teeg’s location in relation to Assiut Governorate

Figure 3. Abu Teeg's geographical location

There are two Villages with a special nature and distinctive production and tourism in the center: Al-Nakhila Village: It is famous for its handmade kilims and carpets and Al Zarabi Village: It contains an integrated industrial area that includes different industrial projects. The city of Abu Teeg was selected as it is a historical city and there are many Pharaonic, Roman, Christian Figure 4(a) and Islamic monuments Figure 4(b) such as the Wali Allah Sultan Al-Farghal Mosque, which is the most important monument in the center [47].



(a) Church of Mar-Mina in the village of al-Nekheila,1864



(b) Sultan Al-Farghal ancient Mosque

Figure 4. The Abu Teeg's historical city [50]

Also, it enjoys a privileged location and many capabilities, such as fertile agricultural lands and its distinction at the level of Assiut region, which encourages the opening of other development areas in various economic sectors and the urban strategic development of the city through:

- * Maximizing the use of all physical and human potentials in the city.
- * Sustaining development in the city in order to preserve the rights of future generations to benefit from the city's resources.
- * Resolving problems and shortcomings in some development sectors in the city.
- * Supporting the city's identity and competitiveness within its region and with its neighboring urban centers, thus confirming its role locally and regionally.

This part can be distributed with subtitles. It should provide a concise and precise description of the experimental results, their interpretation, as well as the experimental conclusions that can be drawn. Through research, questionnaires, and discussions with experts, a quantitative model for SWOT analysis is created for the sustainable development of cities.

3.1 The SWOT model of Abu Teeg city

This article presents a new strategic approach to the Abu Teeg city with the aim of sustainable development that is described through criteria and indicators that measure the effectiveness of urban operations, starting from the SWOT analysis of the city. The strengths, weaknesses, opportunities, and threats that the city may face have been identified. Then the factors in the SWOT analysis were classified and ranked, by assigning importance coefficients to each factor. The total value of each component was determined: S, W, O, T. Through a comparative analysis of these values, a strategy that fits the current situation of the city can be proposed. AHP method was used for determining the relative significance of the analysis factors. In that way, values obtained through the foresight

exercise as a result of comparing pairs of objectives, criteria, and issues are provided to suggest the desired strategy [51].

SWOT is a systematic approach to thinking and making a fair judgment about management and planning issues [52]. The modeling process starts upon the completion of the SWOT study to arrange the decision-making issue. SWOT information has been composed throughout government papers and questionnaires from experts. Planners, academics, as well as development specialists, participated in the survey. The answers are discussed and organized into a limited number of points that fit the idea of making pairwise comparisons in AHP. Thus, the SWOT classifies (Strengths, Weaknesses, Opportunities, and Threats) have been divided into five specific sub-criteria representing the sustainability pillars, to indicate the key features of the evaluation. The specific SWOT aspects may be outlined as below in Figure 5 and Tables 6-9.

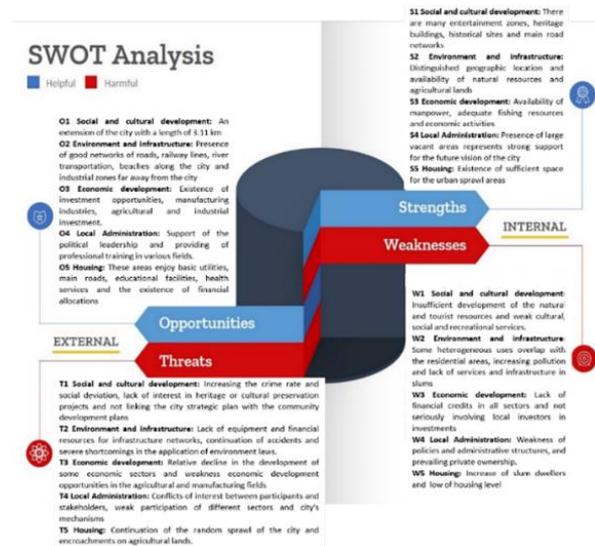


Figure 5. Various factors of SWOT of Abu Teeg city



Figure 6. Nasser Zoo near the Corniche [53]



Figure 7. Jazirat Al Awanah in front of the Abou Teeg city [53]

Table 6. SWOT study of Abu Teeg city strengths

Sub-criteria	Strengths
S1 Social and cultural development	<ul style="list-style-type: none"> The presence of Nasser Zoo near the Corniche and the Corniche Road, which represents the most important tourist attractions Figure 6. The presence of the island in front of the city (Jazirat Al Awanah) Figure 7, which has an area of about 11 acres, and through its exploitation, the city can be described as a tourist and recreational city. The presence of many famous religious shrines, Christian and Muslim Availability of basic infrastructure and services such as water, electricity, and sewage. presence of main road networks
S2 Environment and infrastructure	<ul style="list-style-type: none"> Availability of natural and environmental resources The city is rich in agricultural lands of high-quality of the second class and lands capable of agricultural reclamation. Distinguished geographic location The presence of agricultural land on three sides
S3 Economic development	<ul style="list-style-type: none"> Availability of labor needed for manufacturing industries. Availability of adequate resources for fishing activity. The willingness of some residents to contribute to development projects. Existence of other economic activities such as raising animals and poultry.
S4 Local Administration	<ul style="list-style-type: none"> The presence of large areas owned by the nation represented in the island located in front of the city of Abu Teeg and the allocation of five acres next to the main water station south of the city represents strong support for the future vision of the city, and it is a characteristic that is not available in other cities.
S5 Housing	<ul style="list-style-type: none"> Existence of sufficient space for the urban sprawl areas to accommodate the expected population increase for the target year

Table 7. SWOT analysis of weaknesses identified for Abu Teeg city

Sub-Criteria	Weaknesses
W1 Social and cultural development	<ul style="list-style-type: none"> Weak cultural and recreational services despite the availability of the ingredients for success are represented in the natural characteristics of the Nile River and religious tourism. The lack of development of natural and tourist resources available in the city Lack of social services that entertain and educate young people increases the crime rate and social deviation for them.
W2 Environment and infrastructure	<ul style="list-style-type: none"> The overlap of some heterogeneous uses with the residential areas of the city, which deteriorated these areas, both environment and planning, as is the case for the weekly market (cattle and salkhana market) Figures 8, 9 Increasing pollution from different industries Lack of services and infrastructure in the slums threatens the continued environmental deterioration of the city
W3 Economic development	<ul style="list-style-type: none"> Weakness and lack of financial credits in all sectors represent a strong obstacle in activating future plans in those sectors. Not seriously involving local investors investing in all fields and economic activities in the city of Abu Teeg. The mechanisms and policies adopted in the city are weak, which do not allow the implementation of future plans.
W4 Local Administration	<ul style="list-style-type: none"> The prevailing ownership is private ownership, whether in the land located south of the city of Abu Teeg or its north, which is located between the current urban block and the village of Al-Falio on the northern side. Lack of administrative structures and trained technical cadres to support projects for developing infrastructure networks. The increase in the number of slum dwellers, which led to a high rate of unemployment, poverty and illiteracy, which is considered a weakness that requires attention in the future vision of the city of Abu Teeg.
W5 Housing	<ul style="list-style-type: none"> The low level of housing and housing design in terms of space and the low level of finishing materials. The spread of luxury housing is more than economic the multiplicity of government agencies concerned with urban management in the city

Table 8. SWOT analysis of opportunities identified for Abu Teeg city

Sub-Criteria	Opportunities
O1 Social and cultural development	<ul style="list-style-type: none"> An extension of the city with a length of 3.11 km for establishing development projects The railroad line linking Cairo and Aswan passes through the western side of the city and works to connect the city with its neighboring cities in the north and south. The river transportation links the city of Abu Teeg with the villages located on the eastern side of the Nile, as well as between Abu Teeg and the cities and villages located on the western bank of the Nile
O2 Environment and infrastructure	<ul style="list-style-type: none"> Due to the presence of a good network of regional and local roads, it facilitates the movement of trade and labor. The existence of an industrial zone in the village of Al-Zarabi, which is 7.7 kilometers from the city of Abu Teeg, represents a strong opportunity to purify the city of Abu Teeg from any industrial activity polluting water and air, while the industrial development is based on strengthening the industrial zone located in the village of Al-Zarabi, which qualifies the city to be environmentally friendly The presence of beaches located on the Nile River along with the city
O3 Economic development	<ul style="list-style-type: none"> Existence of investment opportunities (different organization and private sector) represented in tourist investment, both recreational and religious, because of the existence of beaches overlooking the Nile, the "moled" of Sidi Farghal, and the monastery of Anba Makar.

	<ul style="list-style-type: none"> • Availability of industrial investment due to the presence of manufacturing industries, small industries, and agricultural investment because of the availability of agricultural lands of the second degree and lands capable of agricultural reclamation.
O4 Local Administration	<ul style="list-style-type: none"> • The interest and support of the political leadership to prepare a general and detailed strategic plan for the city. • The government providing of professional training in various fields through accredited training centers.
O5 Housing	<ul style="list-style-type: none"> • These areas enjoy a water and sewage network and main roads, which facilitates their economic development, in addition to their location near the existing education and health services • The existence of financial allocations from various parties, such as the National Investment Bank, to address the housing problem

Table 9. SWOT analysis of threats identified for Abu Teeg city

Sub-Criteria	Threats
T1 Social and cultural development	<ul style="list-style-type: none"> • Increasing the crime rate and social deviation for young people as a result of the lack of financial funds to develop the available resources and find social services for them • Lack of interest in heritage and cultural preservation projects • Not linking the general and detailed strategic plan of the city to plans for community development and completion of social and cultural projects, which leads to the imbalance required for urban development of the city • The lack of equipment and financial resources for infrastructure networks threatens to continue the environmental deterioration in the city.
T2 Environment and infrastructure	<ul style="list-style-type: none"> • The presence of the Assiut-Sohag agricultural road passing next to the railroad leads to the continuation of accidents and traffic risks that the city suffers from Figure 10, which requires a radical solution to this problem and to be taken into consideration when developing the local and regional road network in the general strategic plan of the city of Abu Teeg. • Severe shortcomings in the application of laws and legislation that guarantee the protection and improvement of the environment • The relative decline in the development of some economic sectors, as is the case in the field of agriculture, fishing, mining, quarries and manufacturing industries, threatens to decrease the rates of economic development and the spread of poverty and unemployment. • Lack of economic development opportunities in the agricultural field and manufacturing industries, due to the continued random urban expansion on agricultural lands, which leads to the loss of large areas of these lands
T3 Economic development	<ul style="list-style-type: none"> • Conflicts of interest between participants and stakeholders. • Weak participation of the private sector and stakeholders. • The weakness of the mechanisms and policies adopted in the city, which does not allow the implementation of future plans
T4 Local Administration	<ul style="list-style-type: none"> • The continuation of the random sprawl of the city and the increase of encroachments on agricultural lands Figure 11, which lost the city's urban balance in the future extension and the inconsistency of its urban fabric.
T5 Housing	



Figure 8. Overlap of some heterogeneous uses with the residential [54]



Figure 10. Some risks that the city suffers from [55]



Figure 9. The garbage piled up in the main streets [55]

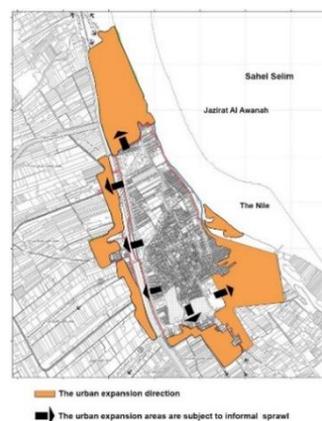


Figure 11. Urban expansion areas are subject to informal sprawl [55]

AHP technique is used in the SWOT matrix, which is applied by making pairwise comparisons of SWOT sets utilizing the 1-9 Saaty Comparison Scale. The outcomes are presented in Table 10. Next, SWOT matrix features are compared taking into account SWOT groups as indicated in Tables 11-14.

Finally, the SWOT factors overall priority are calculated as shown in Table 15.

Using a combination of AHP and SWOT methods, the results below demonstrate the classification of each priority for the sustainability pillars with relation to Abu Teeg city SWOT groups:

Strengths gained the highest priority due to the importance of their function within successfully implementing for sustainable development strategies through achieving (0.42%), followed by opportunities (0.35), while weaknesses declined

and ranked fourth with (0.09%). The result is logical for sustainable development processes where the city's potentials are incorporated into its strengths, that can compensate for the negative impact of weaknesses and threats. The sub-criteria vary in importance, as the environment and infrastructure were gained, in relation to strengths, the highest priority with (0.45), followed by economic development (0.27). Also, the highest priority for Economic development is (0.48) for vulnerabilities. Whereas Local administration represents a big opportunity (0.46), and the environment and infrastructure are the least important opportunity (0.011). As expected, social and cultural development is a major threat (0.50). Note that the above preferences indicate the relative value of the SWOT variables in relation to the SWOT category in Abu Teeg's analysis.

Table 10. Pairwise comparisons Matrix of SWOT factors

SWOT Groups	S	W	O	T	Importance Degrees of SWOT Groups
Strengths (S)	1	3	2	3	0.42
Weaknesses (W)	1/3	1	1/5	3	0.14
Opportunities (O)	1/2	5	1	3	0.35
Threats (T)	1/3	1/3	1/3	1	0.09
Consistency Ratio CR=13.6%					

Table 11. Pairwise comparison matrix of the strengths criteria

SWOT Groups	S1	S2	S3	S4	S5	Importance Degrees
S1 Social and cultural development	1	1/9	1/7	5	1/3	0.10
S2 Environment and infrastructure	9	1	3	7	3	0.45
S3 Economic development	7	1/3	1	3	5	0.27
S4 Local Administration	1/5	1/7	1/3	1	3	0.08
S5 Housing	3	1/3	1/5	1/3	1	0.09
Consistency Ratio CR=34.8 %						

Table 12. Pairwise comparison matrix of the weaknesses criteria

SWOT Groups	W1	W2	W3	W4	W5	Importance Degrees
W1 Social and cultural development	1	5	1/7	1/7	3	0.11
W2 Environment and infrastructure	1/5	1	1/7	1/3	1/3	0.04
W3 Economic development	7	7	1	3	5	0.48
W4 Local Administration	7	3	1/3	1	5	0.29
W5 Housing	1/3	3	1/5	1/5	1	0.07
Consistency Ratio CR=17.7 %						

Table 13. Pairwise comparison matrix of the opportunities criteria

SWOT Groups	O1	O2	O3	O4	O5	Importance Degrees
O1 Social and cultural development	1	1/9	1/5	1/7	1/3	0.04
O2 Environment and infrastructure	9	1	1/3	1/5	1/3	0.11
O3 Economic development	5	3	1	1/3	5	0.27
O4 Local Administration	7	5	3	1	5	0.46
O5 Housing	3	3	1/5	1/5	1	0.12
Consistency Ratio CR=18.3 %						

Table 14. Pairwise comparison matrix of the threats criteria

SWOT Groups	T1	T2	T3	T4	T5	Importance Degrees
T1 Social and cultural development	1	7	3	7	5	0.50
T2 Environment and infrastructure	1/7	1	1/5	3	3	0.10
T3 Economic development	1/3	5	1	5	5	0.28
T4 Local Administration	1/7	1/3	1/5	1	1/3	0.04
T5 Housing	1/5	1/3	1/5	3	1	0.07
Consistency Ratio CR=10.1 %						

Table 15. Priorities for comparing SOWT groups/sub-factors

SWOT Groups	Group Priority	Swot Factors	Factor's priority within the group
Strengths	0.42	S1. Social and cultural development	0.10
		S2. Environment and infrastructure	0.45
		S3. Economic development	0.27
		S4. Local Administration	0.08
		S5. Housing	0.09
Weaknesses	0.14	W1. Social and cultural development	0.11
		W2. Environment and infrastructure	0.04
		W3. Economic development	0.48
		W4. Local Administration	0.29
		W5. Housing	0.07
Opportunities	0.35	O1. Social and cultural development	0.04
		O2. Environment and infrastructure	0.11
		O3. Economic development	0.27
		O4. Local Administration	0.46
		O5. Housing	0.12
Threats	0.09	T1. Social and cultural development	0.50
		T2. Environment and infrastructure	0.10
		T3. Economic development	0.28
		T4. Local Administration	0.04
		T5. Housing	0.07

3.2 Suggested Approach to sustainability in Abu Teeg

The Suggested approach must be harmonized with internal and external factors comprehensively. Its terms can be described according to the results identified from SWOT factors with AHP. Through the TOWS Matrix, information is assisted in organizing information, thus establishing a strategic approach. "According to Wehrich, the strategy is derived by maximizing strengths and opportunities as well as minimizing

weaknesses and threats. SO, strategies maximize both strengths and opportunities, while ST strategies rely on strengths that can deal with threats in the environment. WT strategies are created by minimizing both vulnerabilities and threats, while WO strategies attempt to minimize vulnerabilities and maximize opportunities" [45]. The strategic suggested approach to Abu Teeg city sustainability is shown in Tables 16-20.

Table 16. The TOWS matrix to formulate the strategic approach in environment and infrastructure aspect

TOWS Matrix Environment and infrastructure	Opportunities - O	Threats - T
	<ul style="list-style-type: none"> The railroad lines. The river transportation. Good network of regional and local roads. Industrial zone in the village of Al-Zarabi. 	<ul style="list-style-type: none"> Lack of equipment and financial resources Accidents and traffic risks.
Strengths - S	SO	ST
<ul style="list-style-type: none"> Availability of natural and environmental resources. The city is rich in agricultural lands and lands capable of agricultural reclamation. 	<ul style="list-style-type: none"> Protecting agricultural wealth from urban sprawl. Encouraging the benefit of the natural environment of the city through development projects and activities for a clean environment. Taking the advantage of having more than one axis linking the city of Abu Teeg with other cities and villages to facilitate the movement of trade and employment in the morning and evening. 	<p>Using the returns from environmentally friendly agricultural and development projects to improve and increase the infrastructure and various road and transportation networks.</p>
Weaknesses	WO	WT
<ul style="list-style-type: none"> The overlap of some heterogeneous uses with the residential areas. Increasing pollution. Lack of services and infrastructure. 	<p>Strengthening the industrial area located in the village of Al-Zarabi, represent a strong opportunity to purify the city of Abu Teeg from any industrial activity that pollutes water and air, which qualifies the city to be environmentally friendly.</p>	<p>Separating the heterogeneous uses with the residential areas, such as the various markets and industrial activities that are transferred to the village of Al-Zarabi.</p>

Table 17. The TOWS matrix to formulate the strategic approach in economic aspect

TOWS Matrix Economic development	Opportunities - O	Threats - T
	<ul style="list-style-type: none"> Existence of investment tourist opportunities. Availability of industrial investment. 	<ul style="list-style-type: none"> The relative decline in the development of some economic sectors. Lack of economic development opportunities in the agricultural field and manufacturing industries.
Strengths - S	SO	ST

<ul style="list-style-type: none"> • Availability of labor. <ul style="list-style-type: none"> • Availability of adequate resources for fishing activity. • The willingness of some residents to contribute to development projects. • Existence of other economic activities. 	<p>Pushing the wheel of development in the city by encouraging various industrial, agricultural, and tourism investment opportunities to increase the rate of economic growth and job opportunities. Diversification of the economic base with the aim of sustainability and focus on promising economic activities such as food, craft, small and medium industries.</p>	<p>Expanding the development of various industrial, production, and service sectors alike with the aim of economic diversification to maintain and develop the city's economic activity.</p> <p>Establishing strict laws that prevent random urban expansion on agricultural lands.</p>
Weaknesses	WO	WT
<ul style="list-style-type: none"> • Weakness and lack of financial credits in all sectors. <ul style="list-style-type: none"> • Not seriously involving local investors investing. 	<p>The possibility of businesspersons and private sector owners participating in the development work through the conduct of procedures to allow urban development in addition to the localization of some services on it.</p>	<p>Encouraging the involvement of local investors and the private sector in the city in the development process in all fields in line with the state policy.</p>

Table 18. The TOWS matrix to formulate the strategic approach in local administration aspect

TOWS Matrix Local Administration	Opportunities - O	Threats - T
	<ul style="list-style-type: none"> • Prepare a general and detailed strategic plan for the city. <ul style="list-style-type: none"> • The government providing professional training. 	<ul style="list-style-type: none"> • Conflicts of interest between participants and stakeholders. • Weak participation of the private sector and stakeholders. • The weakness of the mechanisms and policies adopted in the city.
Strengths - S	SO	ST
<ul style="list-style-type: none"> • The presence of large areas owned by the nation represents strong support for the future vision of the city. 	<p>The vacant lands in the city can be used in urban development works, especially in activities that maintain an acceptable housing density, such as recreational and service activities.</p>	<p>Develop mechanisms and policies to support the implementation of future plans within the framework of sustainability.</p>
Weaknesses	WO	WT
<ul style="list-style-type: none"> • The weakness of mechanisms and policies. • The prevailing ownership is private ownership. • Lack of administrative structures and trained technical cadres. 	<p>The need to reconsider development strategies in a way that ensures the development of all economic sectors, which require the inevitability of adding new production energies (artisanal activity) and increasing the efficiency of using the available economic energies (service and commercial activity).</p>	<p>Activating the participation of civil society, the private sector and various councils in the city administration. in addition to training of administrative structures and cadres to improve governance.</p>

Table 19. The TOWS matrix to formulate the strategic approach in Social and cultural development aspect

TOWS Matrix Social and cultural development	Opportunities - O	Threats - T
	<ul style="list-style-type: none"> • An extension of the city with a length of 3.11 km for establishing development projects. 	<ul style="list-style-type: none"> • Increasing the crime rate and social deviation for young people. <ul style="list-style-type: none"> • Lack of interest in heritage. • Separation of the general and detailed strategic plan of the city to plans for community development.
Strengths - S	SO	ST
<ul style="list-style-type: none"> • Nasser Zoo near the Corniche. • The island in front of the city (Jazirat Al Awanah). • Many famous religious shrines, Christian and Muslim. <ul style="list-style-type: none"> • Basic infrastructure and services. • Main road networks. 	<p>Using historical, cultural, recreational, and natural values throughout the city as opportunities to establish development projects and invest in the tourism field in the city due to its location on the Nile and the presence of some elements of tourist attractions. Through the development of hotel capacity, recreational services, and others related to tourism activity, especially with the presence of infrastructure, basic services, and main road networks.</p>	<p>Can use development projects and invest in the tourism field to reduce threats, develop the human resources of the city and take advantage of human capabilities. Raising economies, advancing economic activity, providing job opportunities, and reducing unemployment and crime rates.</p>
Weaknesses	WO	WT

<ul style="list-style-type: none"> Weak cultural and recreational services. Lack of development of natural and tourist resources. Lack of social services. 	<p>Alternatives can increase the cultural and recreational services, develop natural and tourist resources available in the city. Which leads to improving the social services.</p>	<p>Effective strategic approach and touristic projects development can preserve the community and its site to restore confidence. through developing the available resources and find social services to reduce the crime rate.</p>
---	---	---

Table 20. The TOWS matrix to formulate the strategic approach in housing aspect

TOWS Matrix Housing	Opportunities - O	Threats - T
	<ul style="list-style-type: none"> Existence of sufficient space for the urban sprawl areas to accommodate the population increase. 	<ul style="list-style-type: none"> Availability of water and sewage network and main roads. The existence of financial allocations from various parties.
Strengths - S	SO	ST
<ul style="list-style-type: none"> The increase in the number of slum dwellers, which led to a high rate of unemployment, poverty, and illiteracy. The low level of housing. 	<p>Using the civil and private sector in the city in the process of developing and constructing housing in accordance with state policy.</p>	<p>The direction of urbanization in the city towards the lands available for this purpose, without the agricultural lands.</p>
Weaknesses	WO	WT
	<p>The necessity of upgrading the unplanned urban and service areas by completing them and raising their urban, service and environmental level.</p>	<p>Enact laws that oblige the private sector to contribute to economic housing in the available places, and upgrade the deteriorated areas, with the aim of raising the level of housing and designing adequate housing.</p>

Environmental sustainability includes the basic needs of the city and population, such as conservation, improvement, and management of natural resources, protection of the environment and habitat, and land management. A sustainable environment means that an ecosystem can maintain its functions over time. Consideration should be given to the inclusion of the environment in several areas such as water, waste, site, land, pollution, planning, design, mobility, transportation, and energy. The research recommends paying attention to the city's environment and reducing the pollution rate to enhance public health, by transferring various industries to Al-Zarabi Industrial Village to purify Abu Teeg from pollution. The city should fill the current and future deficits in educational, health, and social services. Raising the efficiency of health services in the city to reduce the spread of endemic diseases. Also, considering the provision of urban spaces and reducing energy consumption. Concerning improving the infrastructure, it must be taken into account that many service sectors need improvement. As for transport, traffic, and road sector, it is necessary to exploit the potential of some hubs of the internal road networks in terms of activating traffic on them. Reduce traffic jams in the city, and connect most city sites to an internal mass transit system. As well as attention to the sidewalks separating traffic on the main axes. Regarding the drinking water sector, the city must construct a new underground reservoir for potable water, and replace and renew old pipes in the existing water network. In addition to expanding the water network to serve disadvantaged areas, and extending the water network to future expansion areas. As well as the sewage sector must dispose of environmentally safe wastewater while ensuring continuity, including serving areas of underdeveloped development and areas of future expansion. The city also should establish a waste recycling plant with a landfill to serve the solid waste sector. To provide a clean environment to protect public health and encourage sustainable development. The city needs to absorb the expected increase in the electricity and energy sector, because

of its social and economic dimension to the city. Encouraging the benefit of the natural environment of the city in the generation and provision of electrical energy. The city is also required to establish post offices, and create smart clubs.

According to the weaknesses, Lack of sustainability refers to a bad consumer-led culture that deals with limited resources and inevitably leads to the decimation of future generations. The economic pillar of sustainability promotes the full use of resources, considering the equitable and efficient distribution of resources. The agricultural lands in the city are in the first and second grades, which indicates the high degree of fertility of agricultural lands. Additionally, the city's lands are among the most reclaimed lands at the governorate level. However, its economic return is less than the required level because of the fragmentation of holdings, which is an obstacle to the use of modern methods of agricultural development without the consolidation of agriculture. The agricultural activity in the city is distinguished, in addition to being responsible for achieving food security, as it plays a major role in providing the necessary raw materials as inputs for many industries, especially the food industries. The city is distinguished for crops such as wheat, onions, potatoes, sorghum, sham, and groundnuts. In addition to high-yield fruit crops of oranges, mangoes, grapes, bananas, and guava. As for mineral resources, the region is famous for the availability of limestone and sand used for construction functions through the scattered quarries. As for the industrial sector in Abu Teeg city, it is limited and needs improvement, and there is no mineral or mining activity in the city.

Based on the results of analyzing the current conditions of the city in all sectors (the shelter and slum sector - the local economic development sector - the utilities and services supply sector - in addition to the city's background and its relationship with Assiut Governorate, the municipality, and the region). It has been established that "Abu Teeg city is an agricultural - industrial - touristic and recreational city with a regional influence." It is a vision based on the economic

development of the city in the first place. It is important to improve the strategic economic, social, and economic aspects of the city. The contribution of cultural activities to GDP and cultural employment. Reducing random growth on agricultural lands and separating inappropriate uses from residential use. It also suggests taking advantage of the opportunity to move warehouses and agricultural services outside the residential block of the city. In addition to exploiting low-productivity agricultural lands to provide suitable areas for urban development outside the urban mass.

To upgrade the institutional and urban local governance, it is necessary to develop databases for activating the participation of popular and executive councils and civil society in the city's management. Also, should develop new mechanisms for managing the city, increasing its resources, and implementing and monitoring development work in it. As well, encouraging the participation of the private sector to sustain economic development to reduce the burden on the state. Developing the mechanisms and policies adopted in the city to support the implementation of future plans in the framework of culture and sustainability.

In order to develop the social and cultural level as strength point, it is important for using the existence strengths of making recreational and religious tourism to bring a financial return to provide job opportunities and services for young people to unload their energies. Using the natural characteristics of the Nile, the city's extension, and the elements of religious tourism as ingredients for the success of cultural and recreational services. Using the city's tourism revitalization to work to raise the level of awareness and belonging among young people, avoid unemployment and ignorance, and reduce crime. To improve the conditions of youth, women and children, narrowing social disparities between the various segments of society and continuing the equitable distribution of services, a group of different projects should be implemented in all planning sectors for achieving an urban development for the city and agreed with the relevant parties and representatives of the city's development partners. Accordingly, priority projects necessary for the population's sufficiency from the current and future needs of services such as the exploitation of the city's extension and geographical location to conduct various tourist activities and water sports along the Corniche and hold festivals in the field of religious activities; developing tourism in the Mouled Sidi Farghal area, religious tourism in Deir Abu Makar area and Nasser Zoo, in addition, working to accommodate different service because of its social and economic dimensions to the city and creating smart clubs. Attention should be given to professional training in the culture sector and public participation in going-out cultural activities to build the identity. It is significant to apply the creativity and sustainability principles in the proposed strategic urban development and reach an inclusive city. As well taking advantage of the island located in front of the city of Abu Teeg makes it among the distinguished cities in tourism in Egypt through different recreational projects that will provide many jobs opportunities.

For the housing sector as a good opportunity for sustainable development, there are many actions for improvement such as immediate removing the indiscriminate urban encroachments on agricultural lands. setting the necessary regulations for the city's slum areas and improving their level as an urgent measure and a practical solution to the shortage of shelter in the city. Also, emptying slums by well planning and working to reduce the population density in those areas. As well,

directing the urbanization in the city toward the available lands in the northern, southern and western directions. Develop a plan to determine the percentage of construction for luxury housing. And the obligation of the private sector to contribute to the construction of low-cost housing. Upgrading the deteriorated areas, planning and socially, with the aim of raising the level of housing and designing suitable housing

Also, it is necessary to improve the old urban block (the nucleus of the city) around the area of the old heart of the city, through upgrading and developing according to the appropriate urban renewal programs and policies to accommodate the expected future growth in the city's population. Especially since those old areas enjoy a water and sewage network and main roads, which facilitates their economic development, in addition to their location near the existing education and health services. Additionally, developing the slums housing areas in accordance with the appropriate policies for the population and their social and economic characteristics to achieve an improvement in the general development and the population environment of those areas after their development and provision of appropriate services. Attention should be paid to the Houses in hazardous locations and housing finances. Also, the heritage sustainability is critical to be considered to conserve the history of the city and the identity.



Figure 12. A proposed approach to the sustainability of Abu Teeg city

From the above, it is possible to propose an effective approach to the sustainability of the city, as shown in Figure 12, which revolves around reliance on agricultural and industrial development, which can contribute significantly to commercial development, as the city has good regional and local movement hubs, and the city can be transformed into an environmentally friendly city. As well as relying on the natural components and advantages of the city's location in stimulating tourism of various kinds, especially religious, recreational and heritage tourism. The extension of the city of Abu Teeg with a length of 3.11 km represents an important element in revitalizing recreational tourism through the spread of restaurants, cafeterias and water sports clubs along the Corniche. As well as the establishment of festivals and

competitions throughout the city in the field of water activities such as swimming, kayaking and surfing, and attracting cities and villages surrounding Assiut Governorate. It is an aspect of tourism promotion and its impact on the regional level. It is also possible to exploit the island located in front of the city of Abu Teeg, allowing the city to reach the ranks of the distinguished cities in recreational tourism in Upper Egypt, by establishing recreational projects that bring great benefit to the city and many job opportunities. In addition to the development of the Nasser Zoo near the Nile Corniche, it can represent an element of attraction and complement its regional importance as a recreational area for young people and residents of villages, cities and Assiut Governorate. As well as developing and supporting infrastructure. Environmental development, resource conservation and pollution reduction. Land uses management of agricultural and industrial areas. Work on the economic and social development of the population, sustainable management, and advancement of the housing sector.

4. CONCLUSIONS

Sustainability has recently attracted attention due to its impact on the activity of future generations. Gas and waste emissions and energy consumption are on the rise in urban environments. Therefore, it is necessary to develop tools and criteria to measure the sustainability of urban development in view of the huge and heterogeneous diversity of existing criteria. Or due to the limited number of indicators that lead to weak feedback on development. Therefore, the research recommends using sufficient indicators to obtain a comprehensive view of the aspects of sustainability in urban areas.

This study proposes a list of criteria and indicators through a comprehensive review of the existing literature and adopted by several international organizations. The list attempts to reach a clear and analytical picture of the sustainable nature of the urban environment by verifying the different pillars of sustainability, which can serve as a support to reveal the strongest and weakest factors that affect the sustainability of the urban environment.

Through internal environmental analysis, strengths and weaknesses are reached, while internal environmental analysis leads to identifying opportunities and threats [56]. Hard bases for a sustainable development strategy for the city are achieved, by finding a development perspective supported by the facts and data obtained through the TOWS matrix [55]. So that it is based on its strengths to eliminate weaknesses, and use opportunities to confront threats. It provides a powerful insight to present a systematically sustainable strategy if applied properly [57]. The analytical approach to the current situation and development of the city of Abu Teeg in Assiut using SWOT technology was used to examine the internal and external factors, then applying the AHP method to prioritize these factors to make them measurable. Next, SWOT priority factors were used to discuss an effective approach to city sustainability. Through the TOWS matrix, a comprehensive assessment approach is obtained that leads to supporting decision-making for the compatibility between internal and external matters [58]. The proposed approach relates to the promotion of heritage tourism and leisure potential, infrastructure and environmental development, agriculture, economic and social development of the population, sustainable management, and the housing sector.

The proposed list of indicators cannot be considered sufficient for all cases from urban environments except similar cases that have several features on different sectors (environmental, historical, cultural, natural,...etc.). But it remains debatable despite the similarity of its objectives. As it constantly changes and develops according to the availability of information, the increase in technology and measurement tools. While maintaining interdependence through the pillars of sustainability.

A limitation of the study can be considered the lack of presentation for previous studies for some cities, similar to the case of the study, and only reviewing the sustainable standards and indicators set by specialized international organizations. But this limitation can be set in future research, and it can also focus on the role of local residents in making strategic decisions for the sustainability of the city.

REFERENCES

- [1] Rakodi, C. (2001). Forget planning, put politics first? Priorities for urban management in developing countries. *International Journal of Applied Earth Observation and Geoinformation*, 3(3): 209-223. [https://doi.org/10.1016/S0303-2434\(01\)85029-7](https://doi.org/10.1016/S0303-2434(01)85029-7)
- [2] Al-Shihri, F.S. (2013). Principles of sustainable development and their application in urban planning in Saudi Arabia. *JES. Journal of Engineering Sciences*, 41(4): 1703-1727. <https://dx.doi.org/10.21608/jesaun.2013.114898>
- [3] Mensah, J. (2019). Sustainable development: Meaning, history, principles, pillars, and implications for human action: Literature review. *Cogent Social Sciences*, 5(1): 1653531. <https://dx.doi.org/10.1080/23311886.2019.1653531>
- [4] Dukale, Y., Advisor, J., Wogayehu, F. (2012). Assessment of urban plan and design implementation and management in ethiopian secondary towns: The case of dilla. Addis Ababa University.
- [5] Habibi, S., Zebardast, E. (2016). How compact are midsize cities in Iran? *Journal of Urban Planning and Development*, 142(4): 05016004. [https://doi.org/10.1061/\(ASCE\)UP.1943-5444.0000333](https://doi.org/10.1061/(ASCE)UP.1943-5444.0000333)
- [6] Randhawa, A., Kumar, A. (2017). Exploring sustainability of smart development initiatives in India. *International Journal of Sustainable Built Environment*, 6(2): 701-710. <https://doi.org/10.1016/J.IJSBE.2017.08.002>
- [7] Currie, P.K., Musango, J.K. (2017). African urbanization: Assimilating urban metabolism into sustainability discourse and practice. *Journal of Industrial Ecology*, 21(5): 1262-1276. <https://doi.org/10.1111/JIEC.12517>
- [8] Grădinaru, S.R., Triboi, R., Iojă, C.I., Artmann, M. (2018). Contribution of agricultural activities to urban sustainability: Insights from pastoral practices in Bucharest and its peri-urban area. *Habitat International*, 82: 62-71. <https://doi.org/10.1016/J.HABITATINT.2018.09.005>
- [9] Chang, I.C.C., Sheppard, E. (2013). China's eco-cities as variegated urban sustainability: Dongtan eco-city and Chongming eco-island. *Journal of Urban Technology*, 20(1): 57-75. <https://doi.org/10.1080/10630732.2012.735104>
- [10] Wamsler, C., Brink, E., Rivera, C. (2013). Planning for

- climate change in urban areas: from theory to practice. *Journal of Cleaner Production*, 50: 68-81. <https://doi.org/10.1016/J.JCLEPRO.2012.12.008>
- [11] Ding, X., Zhong, W., Shearmur, R.G., Zhang, X., Huisingh, D. (2015). An inclusive model for assessing the sustainability of cities in developing countries—Trinity of Cities' Sustainability from Spatial, Logical and Time Dimensions (TCS-SLTD). *Journal of Cleaner Production*, 109: 62-75. <https://doi.org/10.1016/J.JCLEPRO.2015.06.140>
- [12] Babalik-Sutcliffe, E. (2013). Urban form and sustainable transport: Lessons from the Ankara case. *International Journal of Sustainable Transportation*, 7(5): 416-430. <https://doi.org/10.1080/15568318.2012.676152>
- [13] Musango, J.K. (2014). Household electricity access and consumption behaviour in an urban environment: The case of Gauteng in South Africa. *Energy for Sustainable Development*, 23: 305-316. <https://doi.org/10.1016/J.ESD.2014.06.003>
- [14] Broto, V.C. (2017). Energy landscapes and urban trajectories towards sustainability. *Energy Policy*, 108: 755-764. <https://doi.org/10.1016/J.ENPOL.2017.01.009>
- [15] Petković-Grozdanović, N., Stoiljković, B., Shubenkov, M. (2016). Location criteria relevant for sustainability of social housing model. In *MATEC Web of Conferences*, 73: 06001. <https://doi.org/10.1051/MATECCONF/20167306001>
- [16] Baffoe, G., Mutisya, E. (2015). Social sustainability: A review of indicators and empirical application. *Environmental Management and Sustainable Development*, 4(2): 242-262. <https://doi.org/10.5296/EMSD.V4I2.8399>
- [17] Hale, J., Legun, K., Campbell, H., Carolan, M. (2019). Social sustainability indicators as performance. *Geoforum*, 103: 47-55. <https://doi.org/10.1016/J.GEOFORUM.2019.03.008>
- [18] Kennedy, C., Cuddihy, J., Engel-Yan, J. (2007). The changing metabolism of cities. *Journal of industrial ecology*, 11(2): 43-59. <https://doi.org/10.1162/JIE.2007.1107>
- [19] UN-Habitat. (2016). *Urbanization and development emerging futures, world cities report 2016*. United Nations Human Settlements Programme (UN-Habitat), 36-38.
- [20] Steinberg, F. (2005). *Strategic urban planning in Latin America: Experiences of building and managing the future*. Habitat International, 29(1): 69-93. [https://doi.org/10.1016/S0197-3975\(03\)00063-8](https://doi.org/10.1016/S0197-3975(03)00063-8)
- [21] Albrechts, L., Healey, P., Kunzmann, K.R. (2003). Strategic spatial planning and regional governance in Europe. *Journal of the American Planning Association*, 69(2): 113-129. <https://doi.org/10.1080/01944360308976301>
- [22] Allen, A., You, N. (2002). Sustainable urbanisation: Bridging the green and brown agendas. *UN-HABITAT*.
- [23] El-Shimy, H., Ragheb, G.A., Ragheb, A.A. (2015). Using mixed reality as a simulation tool in urban planning project for sustainable development. *Journal of Civil Engineering and Architecture*, 9(7): 830-835. <https://doi.org/10.17265/1934-7359/2015.07.009>
- [24] Swapan, M.S.H. (2014). Realities of community participation in metropolitan planning in Bangladesh: A comparative study of citizens and planning practitioners' perceptions. *Habitat International*, 43: 191-197. <https://doi.org/10.1016/J.HABITATINT.2014.03.004>
- [25] El Din, H.S., Shalaby, A., Farouh, H.E., Elariane, S.A. (2013). Principles of urban quality of life for a neighborhood. *Hbrc Journal*, 9(1): 86-92. <https://doi.org/10.1016/J.HBRJCJ.2013.02.007>
- [26] CABE. (2008). *Creating Successful Master Plans Cabe | PDF | Urban Renewal | City*. Commission for Architecture and the Built Environment. <https://www.scribd.com/document/55182339/Creating-Successful-Master-Plans-Cabe>. [accessed July 23, 2021].
- [27] Nations, U. (2008). *Achieving sustainable development and promoting development cooperation dialogues at the economic and social council achieving sustainable development and promoting development cooperation*. The United Nations, DGACM.
- [28] Görener, A., Toker, K., Uluçay, K. (2012). Application of combined SWOT and AHP: A case study for a manufacturing firm. *Procedia-Social and Behavioral Sciences*, 58: 1525-1534. <https://doi.org/10.1016/j.sbspro.2012.09.1139>
- [29] Ministry of Housing, U.& U.C. (2014). *The National Urban Development Framework in the Arab Republic of Egypt*. Egypt.
- [30] United Nations Human Settlements Programme. (2004). *Urban Indicators Guidelines. Monitoring the Habitat Agenda and the Millennium Development Goals*. [https://unhabitat.org/sites/default/files/download-manager-files/Urban Indicators.pdf](https://unhabitat.org/sites/default/files/download-manager-files/Urban%20Indicators.pdf), accessed on October 3, 2021.
- [31] UNESCO. (2015). *Cultural Urban Future, Global Report on Cultural for Sustainable Urban Development*. Paris (France). <https://unesdoc.unesco.org/ark:/48223/pf0000246291>.
- [32] EU-Eastern, Th., Programme., P.C. (2018). *Unesco culture for development indicators azerbaijan's analytical report*. <http://creative.az/files/2/pdf/180216%20UNESCO%20CDIS%20Analytical%20Report%20Azerbaijan%20FINAL.pdf>.
- [33] Hoorweg, D., Fernanda, R.N., Mila, F., Natalie, P., Villaveces, M., Herrera, E.W. (2007). *City indicators: Now to nanjing*. Policy Research Working Paper; No. 4114. World Bank, Washington, DC. © World Bank. <https://openknowledge.worldbank.org/handle/10986/6892> License: CC BY 3.0 IGO.
- [34] Barton, H., Tsourou, C. (2000). *Healthy Urban Planning. A WHO guide to planning for people*.
- [35] Rypkema, D., Cheong, C. (2011). Measurements and indicators of heritage as development. In: *ICOMOS 17th General Assembly, 2011-11-27/2011-12-02, Paris, France*. [Conference or Workshop Item], Paris, France. pp. 755-762.
- [36] UNESCO. (2014). *Social participation, core indicators*.
- [37] UNESCO. (2014). *Unesco culture for development indicators Methodology Manual*. France.
- [38] UNESCO. (2012). *Culture: A driver and an enabler of sustainable development*. UN System Task Team in the post-2015 UN development agenda.
- [39] UNESCO. (2016). *UNESCO report: 'A human-centred city is a culture-centred space' – United Nations Sustainable Development*. UNESCO. <https://www.un.org/sustainabledevelopment/blog/2016/10/unesco-report-a-human-centred-city-is-a-culture-centred-space/>, accessed on Oct. 4, 2021.

- [40] The United Nations. (2006). The International forum for social development, social justice in an open world, the role of the united nations. New York.
- [41] Policy, S. for E., (2018). Indicators for Sustainable Cities Environment Science for Environment Policy. n-depth Report 12. Produced for the European Commission DG Environment by the Science Communication Unit, UWE, Bristol.
https://ec.europa.eu/environment/integration/research/newsalert/pdf/indicators_for_sustainable_cities_IR12_en.pdf.
- [42] Halepoto, I.A., Sahito, A.A., Uqaili, M.A., Chowdhry, B.S., Riaz, T., (2015). Multi-criteria assessment of smart city transformation based on SWOT analysis. 2015 5th National Symposium on Information Technology: Towards New Smart World, Riyadh, Saudi Arabia, pp. 1-6. <https://doi.org/10.1109/NSITNSW.2015.7176412>
- [43] Yi, Z., Liu, G., Lang, W., Shrestha, A., Martek, I. (2017). Strategic approaches to sustainable urban renewal in developing countries: A case study of Shenzhen, China. *Sustainability*, 9(8): 1460. <https://doi.org/10.3390/SU9081460>
- [44] Dos Santos, P.H., Neves, S.M., Sant'Anna, D.O., Oliveira, C.H. de., Carvalho, H.D. (2019). The analytic hierarchy process supporting decision making for sustainable development: An overview of applications. *Journal of Cleaner Production*, 212: 119-138. <https://doi.org/10.1016/J.JCLEPRO.2018.11.270>
- [45] Ragheb, G.A. (2021). Multi-criteria decision making of sustainable adaptive reuse of heritage buildings based on the A'WOT analysis: A case study of cordahi complex, Alexandria, Egypt. *International Journal of Sustainable Development and Planning*, 16(3): 485-495. <https://doi.org/10.18280/ijstdp.160309>
- [46] Waris, M., Panigrahi, S., Mengal, A., et al. (2019). An application of analytic hierarchy process (AHP) for sustainable procurement of construction equipment: Multicriteria-based decision framework for Malaysia. *Mathematical Problems in Engineering*, Article ID: 6391431. <https://doi.org/10.1155/2019/6391431>
- [47] Dean, R. (2017). *Warfare & Weaponry in Dynastic Egypt*. Pen & Sword Books.
- [48] Fraser, K.W. (2014). *Before they were belly dancers: european accounts of female entertainers in Egypt, 1760-1870*. McFarland.
- [49] Asyut Governorate. (2017). Abu Teeg climate: Average Temperature, weather by month, Abu Teeg weather averages - Climate-Data.org. <https://en.climate-data.org/africa/egypt/asyut-governorate/abu-tig-227464/>
- [50] Sidhom, Y. (2018). Mar-Mina's in Abu-Teeg gets rebuilding licence after six-month wait – Watani. *Watani Newspaper, a Weekly Paper and an Online News Site*, Cairo, Egypt. <https://en.watani.net/coptic-affairs-coptic-affairs/mar-minas-in-abu-teeg-gets-rebuilding-licence-after-six-month-wait/23250/>.
- [51] Berariu, R., Mihaela, M., Gheorghe, C., Romen, B. (2011). Analysis of sustainable development strategy using SWOT. In: Abrudan, I., editor. Conference: Management of Crisis or Crisis of Management?- RMEE. 15th-17th Sept. 2011, Technical University of Cluj-Napoca, Romania, Romania.
- [52] Tahernejad, M.M., Khalokakaie, R., Ataei, M. (2013). Determining proper strategies for Iran's dimensional stone mines: A SWOT-AHP analysis. *Arabian Journal of Geosciences*, 129-139. <https://doi.org/10.1007/s12517-011-0331-6>
- [53] Thabit, M. (2018). "Nasser Park" in Abu Teeg suffers from "lack of animals". *Almasryalyoum Online Newspaper*, Cairo, Egypt. <https://www.almasyalyoum.com/news/details/1295749>. [accessed October 21, 2021].
- [54] Eldeep, A. (2015). Garbage hills control the Abu Teeg Center in Assiut. *Tahya Misr El Mostakbal Online Newspaper*, Cairo, Egypt. <https://www.tahiamasr.com/207419>
- [55] Kajanus, M., Kangas, J., Kurttila, M. (2004). The use of value focused thinking and the A'WOT hybrid method in tourism management. *Tourism Management*, 25(4): 499-506. [https://doi.org/10.1016/S0261-5177\(03\)00120-1](https://doi.org/10.1016/S0261-5177(03)00120-1)
- [56] Mojaveri, H.S., Fazlollahtabar, H. (2012). Designing an integrated AHP based fuzzy expert system and SWOT analysis to prioritize development strategies of Iran agriculture. *Review of International Comparative Management*, 13(1): 117.
- [57] Jafarnejad, A., Fathi, M.R., Omidian, A., Zarchi, M.K. (2011). Integration of FPM, fuzzy AHP and ANP methods in formulation of Software Industry strategy (Case study: System group company) | Request PDF. *Australian Journal of Basic and Applied Sciences*. https://www.researchgate.net/publication/289173874_Integration_of_FPM_fuzzy_AHP_and_ANP_methods_in_formulation_of_Software_Industry_strategy_Case_study_System_group_company.
- [58] Sivanesan, M., Pugazhendhi, S., Muralidharan, C. (2014). (PDF) Application of SWOT analysis for after sales service operations. Conference: International Conference on Advances in Industrial Engineering Applications, (Icaiea), 4-9. https://www.researchgate.net/publication/283503557_Application_of_SWOT_analysis_for_after_sales_service_operations, accessed on Feb. 23, 2021.