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A FRAMEWORK FOR DEVELOPING SUSTAINABLE NEW CITIES IN EGYPT

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ABSTRACT

Over the past four decades, the objectives of sustainability were not achieved for Egyptian new cities. One of the reasons could be the lack of efficient and/or comprehensive plans addressing all aspects of sustainable development. This problem was raised at the same time for establishing the fourth generation of new cities. Thus, the research aims to determine ideologies toward achieving sustainability for the new cities in Egypt. This study splits these ideologies into the main elements of sustainability (Urban, Environmental, Economic, Social and Administrative). The methodology is proposed after the theoretical and analytical studies, specifically, assessing the regional and international cases in order to determine indicators that might help in formulating ideologies. A designed questionnaire was carried out pursuing experts, specialists, academics, decision makers, and stakeholders in different new cities. The research concludes with a structure for the final principles of sustainable new Egyptian cities in the future by generating knowledge via action.

KEYWORDS: Sustainability, New Cities, Development, Participation, Quality of life, Sustainable Development Goals (SDGs).

1. PROBLEM BACKGROUND

The political and economic conditions have changed radically in Egypt during the twentieth century. This had an abundant impact on the country's policies and developmental strategies. The trend towards establishing new cities and societies in Egypt was not an autonomous objective, but was a tool in the framework of national objectives towards accomplishing the holistic strategy for the development of a

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comprehensive urban plan in Egypt, the most important of which is raising the standard of living of the Egyptian citizens economically and socially. Law No. 59 of 1979 was issued governing the establishment of the new Urban Communities Authority, which formulated a set of general objectives for the development of new cities and communities, which is logically a result of the objectives of the National Strategy for Urban Development in Egypt; these objectives could be summarized as follows:

- Relieving population pressure from prevailing cities by drawing up a new urban map.
- Granting the opportunity for various economic and investment activities by establishing new agricultural, commercial, industrial, and tourism projects with the objective of investing the available resources in the deserts of Egypt and its coasts while encouraging foreign investments. This will have a great role in increasing national output and creating new job opportunities.
- Resolving problems of inadequate services and infrastructure.
- Addressing the problem of pollution caused by overcrowding in existing cities.
- Protecting the agricultural land in both the Nile Valley and Delta from the urban intrusion.

Since 1979 the new Urban Communities Authority endorsed three generations of new cities, completing the implementation of 26 new cities so far. These decisions had been made on 15 new cities in the fourth generation, rather than 5 cities being sanctioned. Also, current studies are underway for the development of more new cities. However, problems appeared in the new cities in Egypt, contrary to the achievement of the set objectives. This resulted in weak of performance of these cities as poles to attract the required population. For example, the city of 6th of October reached an occupancy rate of only 30%, which is the highest new city achieving the target of occupancy [1].

Hence, the research questions emerge and evolve around the problem statement, specifically, questioning: is there any comprehensive framework for all aspects of development (urban/non-urban) in Egypt that drives the planning of new cities towards sustainability? The research emphasizes the concept of sustainability, not only from environmental aspects, but also from urbanization, economy, society, and management aspects. The research will study the status of the new Egyptian cities, assessing the

relevant theoretical literature and analyzing case studies in order to enhance the outcomes.

2. RESEARCH STRUCTURE

To reach the proposed objective the research follows the structure shown in Fig.1.

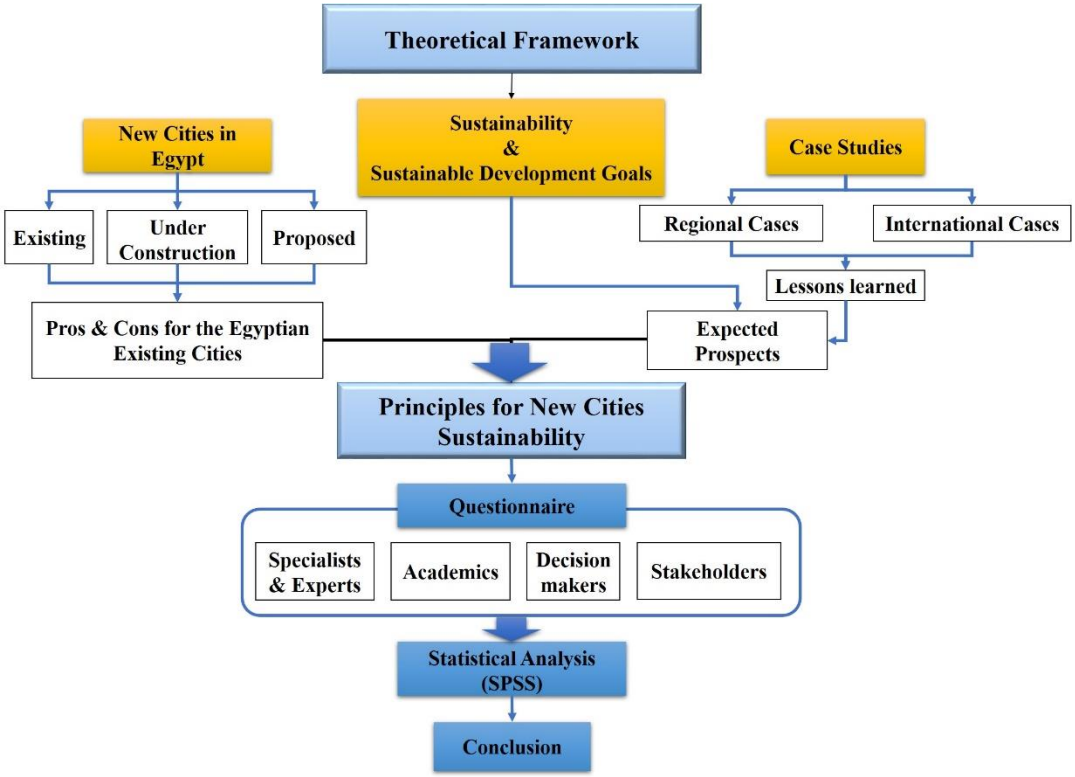

Fig. 1. Research structure.

3. THEORETICAL FRAMEWORK

The factors of success for new cities, sustainability, and comfort of their inhabitants will be highlighted.

3.1 New Cities in Egypt

3.1.1 The motives behind establishing new cities in Egypt

Different motives and/or reasons led to the establishment of new cities as new poles attracting growth away from the narrow strip of the Nile Valley and Delta. Some of the reasons for the construction of other non-urban cities are as follows:

- Demographic: population group in terms of number, distribution and characteristics (increasing population, high rates of rural-urban migration rates where urban population jumped from 17% in the early 20th century to 44% by its end) [2].
- Urban/Environmental: there were, obviously, many urban issues (lack of housing units, inadequate infrastructure networks, slums, erosion of agricultural land, and high urban environmental pollution).
- Economic: its effect started in the early seventies of the last century by directing national income sources for military areas (low standard of living, population, discrepancy between population size and available economic resources).
- Political: post the 1973 war, Egypt began a new era, these reasons emerged with political orientations towards openness to push the Egyptian economy forward (building an economic base that contributes to increasing national income, elevating living standard and developing citizens social lives).

3.1.2 Laws and regulations

Law No. 59 of 1979 governing the establishment of the new community of urban communities was issued in the late seventies of the twentieth century, written on a set of foundations and rules, the most important of which are as follows [3]:

- The new Urban Communities Authority shall be established in accordance with the provisions of this Law and shall be the sole body of the State responsible for establishing new communities, selecting the new urban communities, and their location.
- The Authority shall prepare, in accordance with the general plan of the State, detailed plans for these new gatherings.
- The Commission may establish/set up development bodies for the new urban communities to perform the functions assigned to them.
- Prohibiting the establishment of new urban communities on agricultural or reclaimed land and moving towards the desert for establishing new cities.
- New cities should have their own strong economic rules that create new job opportunities.

The law also provides for some tax and customs exemptions for various activities that emerge in the new societies.

3.1.3 Principles of new cities

The New Urban Communities Authority developed a strategy for the reconstruction of new urban communities on the basis of a set of fundamental principles to serve as basis for the new city plans as follows:

- Scaling services: to provide facilities and public services when needed, so that investment can be made in facilities and services.
- Deployment regulations: ensuring the reconstruction of land and development.
- Urban fabric resilience: as in new planned communities, there may be more population density, so reserve areas are to be added with new facilities to be used once the fabric changes.
- Swift growth: for the areas that extended the services, making it a new urban environment suitable for short-term living.

3.1.4 Current and future generations of new cities in Egypt

A development and reconstruction map in Egypt was prepared by the Ministry of Housing covering the future horizon ending in 2030. The most suitable sites for the establishment of new urban communities were identified through new development axes that could be established by a number of new communities. Up to 46 different urban communities were envisaged offering new jobs for about 14 million people [1].

To date, the new Egyptian cities were categorized into four generations. Of these cities, what has been implemented, including under construction and what is currently being adopted as opposed to former or prevailing studies and proposals.

3.2 Sustainable Development

3.2.1 Definition of sustainable development

The definitions of sustainable development have varied and are constantly renewed to cover all areas of development. The most reliable definition is by the United Nations

Development Program (UNDP) which is "the process that enables individuals to enhance the quality of life without compromising future generations quality of life." [4].

3.2.2 Sustainable development goals (SDGs)

The United Nations endorsed 17 sustainable development goals of the 2030 sustainable development plan although the goals are not legally binding. Governments have undertaken to develop national frameworks to achieve them [5]. The 11th goal of the sustainable development goals by the United Nations action in 2015 was to make cities inclusive, safe, resilient, and sustainable [6]. The study is concerned with goal number (11), which deals with sustainable cities and societies with their ten purposes, as shown in Fig. 2.

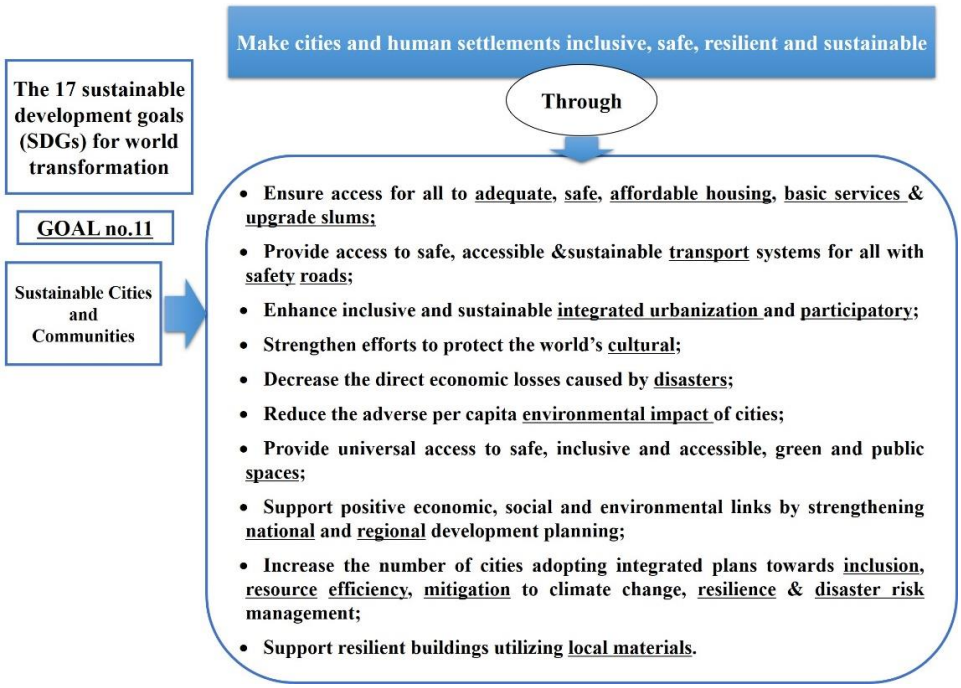

Fig. 2. Targets to achieve goal no. (11) of the sustainable development goals.

4. CASE STUDIES

This study analyzes both International & Regional case studies (United Arab Emirates, Netherlands & South Korea). The objective of this section is to illustrate and assess the concluded theoretical principles. The following Table 1 demonstrates a matrix that reflect on case studies of new cities whose work through the four main axes of sustainability [7-12].

Table 1. International case studies for new cities.

New city	Urban and Environmental Sustainability	Economic Sustainability	Social Sustainability	Administrative Sustainability
Masder - AUE	• Considering climatic conditions. • Selecting location features by accessibility within region. • Linking city to surrounding communities. • Green Zone belt around city. • City planned depended on walking & public transportation. • City-level waste management . • Establishment "Masder Institute of Science and Technology".	• City achieved 40% reduction in demand for water & energy through smart design. • Diversity of renewable energy • Enforce requirements of obtaining buildings at least 3 degrees compared to certificate "Led". • City adopted several energy-saving transport options that are zero carbon	• Urban characterized by the ancient Arab character, which emphasized the original identity of the local inhabitance. • The city has many corridors & open spaces that increase group. gatherings & support city's community structure.	• The work in the city was divided into seven phases. • The new city was planned according to the Abu Dhabi Development Plan in order to integrate development processes in the region.
Almere - Netherlands	• Encourage innovation through use of new design visions. • Determination of extension sites & future needs from early phases . • Diversity of housing types (current and future needs). • Considering Ecosystems & Nature Conservation using (Cradle to Cradle) method. • Linking with region through providing mutual benefits • Review ability of approved plans & programs to adapt the requirements of present also facilitate future opportunities	• The vision of Netherlands government included Almere as one of economic centers • Economic entities adopted the "Economic Cycle" approach • Reliance on renewable natural resources • Shortness / Minimize the use of raw materials (non-renewable) of nature	• Making the first contact with the future. • Inhabitance & involving them in the planning and design. • Almere is designed to be based on " A Social City approach". • local community has participated in activities & initiatives, that rise responsibility • Raising awareness among citizens when dealing with natural elements	• Support the exchange of knowledge & experience through "INTI" • The local authority allowed to citizens participate in the strategic visions in cooperation with decision-makers • The city is managed from the bottom up with the principle that "Citizens are the force for the success"

Table 1. International case studies for new cities, (Cont.).

New city	Urban and Environmental Sustainability	Economic Sustainability	Social Sustainability	Administrative Sustainability
Sejong – South Korea	• Supporting the principle of decentralization of services and government bodies. • Encouraging innovation, the designer exploited all the available surfaces. • Public buildings ensured the maximum exploitation of natural energy sources as a model. • It was planned that the city would be reconstructed in phases • City was connected to Seoul by a high-speed train, a bus system (BRT). • All city parties have been connected to an integrated network of roads supported by an integrated network of public transport. • Green areas accounted for 52% of the total area with a central area (irrigation is treated water) • Solar Cells at the main roads, highest buildings & some open areas.	• The Sejong Plan was developed as a part of the " National Economic Plan". • Smart cities are important for all countries, resulting in many benefits such as evidence of ways, reducing accidents and saving time and effort. • A smart transport system (ITS) was established, increasing the population's use of public transport. • Government has supported the city with a global economic entity, which providing jobs & learning opportunities. • City's economic plan included a central trade zone as well as multi-functional nuclei distributed throughout the city in direct contact with public transport axes.	• Ensuring the safety of the cycling network . that encourages users • Support the city serviced in a way that reduces travel & immigration. • Provide a safety system using FRIDs that give automatic warning signals at hazard situations. • Provide opportunities for social interaction through joint activities • Sejong has adopted a plan to build mixed communities. • Strengthening identity & belonging (choosing the name of the city, streets and main squares, using popular sculptural elements).	• The city's management system has relied on e/government systems. • A monitoring system has been established for all areas of the city so that the authorities can intervene in a suitable time.

5. CONCLUDED PRINCIPLES FOR DEVELOPING SUSTAINABLE NEW CITIES

From the theoretical studies and the historical background of the new Egyptian cities since their inception, monitoring the pros and cons of these cities is necessary, while addressing the global trends towards achieving sustainability for human development and welfare. It is to be noted that several concepts have been drawn to the values of urban and environmental principles, social, administrative and institutional principles, all of which work as a driving force in our new cities towards sustainability in an extensive and integrated way.

Studying some international experiences that have worked in the field of new cities will help in achieving this goal. Table (2) highlights the principles that have been agreed upon and approved for conducting the questionnaire. The most significant ones can be assessed and the degree of their impact on achieving sustainability in the new Egyptian cities could be determined. Statistical analysis of the data collected from the questionnaires will be carried out. The sequence of the research stages is shown in Fig.3.

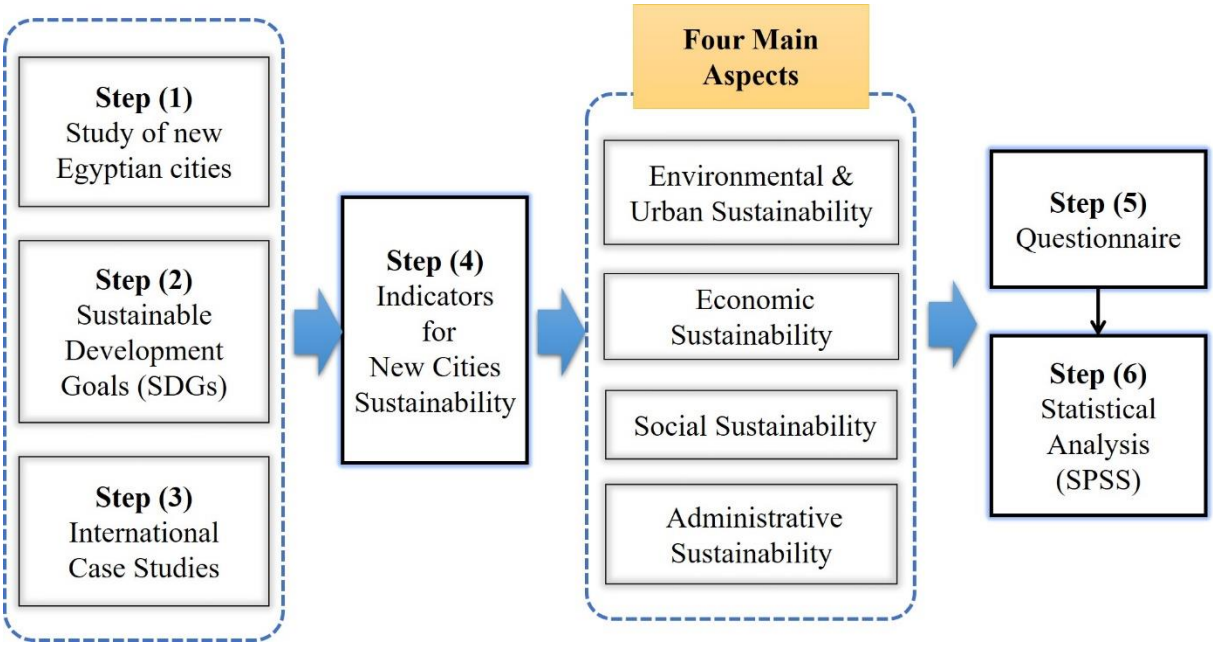

Fig. 3. Steps to reach the results.

Table 2. Concluded principles for sustainable new cities.

A- Urban and Environmental Sustainability Principles

A1 Formulation of national urban policy in accordance with defined special studies.	A2 Integration with new city's region (following the regional plan).	A3 The city is reliance on services (self-sufficient city).
A4 Selecting easy access and connectivity site with regional highways, supported by gradually integrated inner road networks.	A5 Working through Action plan, short- and long-term plans.	A6 Development, revision and modification of plans to be compatible with changes (periodic updates).
A7 Compatibility of urban structure with the nature of site.	A8 Supporting innovation in planning and design in line with local contexts.	A9 Existence of city planning research networks to materialize exchange of info and experiences
A10 City plan aims to develop walking distances (Walkable City)	A11 Separating vehicle networks. Allocation of cycling lanes and secured parking zones.	A12 Preserving environment through adopting principle of green building and green economy.
A13 Considering per capita rates of recreational zones, services and open spaces.	A14 Utilization of clean energy resources of city, reducing emission values (lower pollution rates).	A15 Proper use of design items to reduce demand on resources and energy.
A16 Flexible urban design to support the city to be able to deal with needs and future problems .	A17 Provision of integrated solid waste management system.	A18 Recycling and reuse of wastewater.
A19 Compatibility with coastal and marine environmental protection plans.	A20 Creating areas of distinct & unique urban character.	A21 Reduce mobility / travel (by provision all services & comfort for new city).Quality of Life.
A22 Utilization of green elements with low irrigation and maintenance requirements.	A23 Diversity of housing levels in new city with emphasis on the need for integration & merging.	A24 Achieving Diversity in City (Job, Entertainment, Service, etc.), Value of Diversity.
A25 Planning the new city based on mixed use.		

Table 2. Concluded principles for sustainable new cities, (Cont.).

B- Economic Sustainability Principles		
B1 Providing economic base for new city that ensures an acceptable level of competitiveness	B2 Preparing investment strategies to attract investments (local / foreign)	B3 Providing high-efficiency infrastructure networks
B4 Compatibility with natural characteristics of site, that reduces construction & maintenance costs.	B5 Functional and economic integration at the regional level	B6 Control of land and real estate market & Setting control mechanisms on real estate market (control of speculation)
B7 Participation of the private sector in providing (utilities, job opportunities, etc.).	B8 Participatory Budgeting	B9 Promoting vocational education with support for creativity & innovation
B10 Adopting economic entities on the Economic Cycle & Green Economic.	B11 City has shifted to scope of energy production not just rationalization of consumption.	B12 Diversity of job opportunities in the city (aiming to reduce daily trips to and from the city).
B13 Adopting on local resources, raw materials to reduce transportation needs		
C- Social Sustainability Principles		
C1 Participation as a core & facilitating channels of communication with city's developments.	C2 Maximizing the use of media to support participation and social empowerment.	C3 Achieving social security in public spaces and inter-areas of the city.
C4 Affordable cost of living in the new city (accommodation, services - means of transport).	C5 Support economic & middle-income policies with appropriate financing for target groups.	C6 Appropriateness of employment opportunities for all categories of city population
C7 Consideration of disabled and elderly groups	C8 Providing basic services to guarantee the survival and continuity of city's inhabitants.	C9 Creating a better health & psychological environment for population.
C10 Enhancing the social structure and creating opportunities for integrating population into their communities - Social interaction.	C11 Improving cultural awareness of the environment (natural and built) and preserving it and the need for compatibility with it.	C12 Enhancing the sense of belonging and connecting the city’s population to emphasize the identity and sense of place.
C13 Providing transportation systems suitable for all social groups in the city.	C14 Creating balanced networks among inhabitants, maintaining social relations.	C15 Adopted the idea of initiatives and empowering social responsibility.

Table 2. Concluded principles for sustainable new cities, (Cont.).

D- Administrative Sustainability Principles		
D1 Future national vision to include the "development of new communities".	D2 Giving priority to city administration for the public welfare on the private.	D3 Financial independence of local authorities in new cities .
D4 Support of electronic systems in issuance of licenses, approvals and permits.	D5 Transition from centralization to decentralization.	D6 Creating channels of communication between officials & civil society for coordination
D7 Development of relevant legislation (integration / avoiding conflict).	D8 Improve capabilities of the administrative staff.	D9 Establish specialized unit for research in the New Urban Communities Authority.
D10 Availability of an accurate / comprehensive / up-to-date database for transparency.	D11 Providing evaluation studies for successive generations to correct tracks if necessary.	D12 Exploiting powers of the Board of Trustees in the new cities.
D13 Exploitation of high percentages for occupier's union in new cities.	D14 Encourage city administration to compete and innovate among all elements of the new city.	D15 Connecting city administration to civil society in an interactive manner to build trust.
D16 Coordination between new city administration & environmental impacts.	D17 Development in phased manner with a flexible schedule to facilitate and control.	D18 Establishing a special unit equipped for risk management (monitoring systems & reporting).
D19 Supporting opportunities for competition & innovation in different fields of management.	D20 Establish sub departments for sustainability at the level of each new city authority.	D21 Defining roles, tasks, and responsibilities in a detailed and informed manner.
D22 Inclusion & activation of sustainability assessment systems.	D23 Eliminate routine and facilitate the role of the client's representative (investor).	D24 Providing consultancy services before submitting various projects to save money/ time.
D25 Coordinating with real estate developers through organized meetings to arrange work.	D26 Taking care of the periodic reports of different projects in the new city.	D27 Coordinating with city authorities on transferring final contracts / follow-up reports.
D28 Automated systems with start of work in public buildings, companies & private projects.	D29 Providing technical support to construction, development and infrastructure sections	

6. DATA COLLECTION AND ANALYSIS: QUESTIONNAIRE

6.1 Preparing for the Questionnaire Phase

In order to achieve the principles of sustainability in the new Egyptian cities in all aspects (urban/environmental, economic, social, administrative/institutional) within the local context, the questionnaire forms were prepared. Different visions are presented as follows:

- Agree or disagree with sustainability principles attached to the form.
- Determine the degree of impact of each principle in reaching cities with the highest sustainability level in new Egyptian cities.
- In case of absence of clarity, the principle is rephrased.
- Propose more principles from practical experience and associated fields.
- Record any notes that should be considered.

6.2 Target Groups of the Questionnaire

The focus groups consisted of 129 target groups, with the aim of extracting diverse experiences and backgrounds with a different perspective from the subject of the study to achieve the highest possible use of the questionnaire.

7. STATISTICAL ANALYSIS

Based on the data collected from the questionnaire, statistical analysis was performed by using an Excel Spreadsheet and the Statistical Package for Services Science (SPSS) program. The data collected deals with four main axes. Each axis contains several internal principles for specific sustainability types. For the urban and environmental sustainability axis (A), 25 principles are considered. Axis (B) economic sustainability, includes 13 principles, axis (C), social sustainability, includes 15 principles and finally axis (D), administrative sustainability, covered 29 principles.

The results of the principles were 82 principles that were agreed or disagreed with on whether they directly impact achieving sustainability in new cities, in the local

context in Egypt. The impact of each principle was agreed on ranging from 10% to 100%.

The SPSS generated numerous analyses in order to discover the distinct interactions, the extent of correlation and tracking weights of various elements. The following are the main results of these different analyses.

7.1 Reliability Statistics Test

This test measures the reliability coefficient of the various responses given in the questionnaire forms, reflecting the validity that was dealt with in evaluating the sustainability principles included in the four study axes. Reliability coefficients vary between 0 and 1 to indicate the amount of error in the scores. The closer the coefficient is to the correct one, the greater the stability of respondents who evaluated the principles in advance, as well as the low error rate in the data. Bearing in mind that the minimum allowable factor is 0.7. The results were formulated as follows:

- All axes exceeded the value of the coefficient of acceptable reliability of 0.70.
- The lowest reliability coefficient values for the main sustainability indicators were 0.89, while the highest values were 0.96.
- In contrast to reliability coefficients the lowest values of the validity coefficient were 0.94, and the highest recorded value was 0.98.

The results indicate a rise in the coefficients of reliability and validity, indicating a good understanding of the principles included in the questionnaires by the respondents, in addition to neutralizing their opinions, their credibility and their steadfastness in the various answers as shown in Table 3.

Table 3. Reliability statistics test.

Developing Sustainable New Cities Axis/Egypt	No. of principles	Beta Coefficient	Validity
Urban & Environmental Sustainability (A)	25	0.898	**0.947**
Economic Sustainability (B)	13	0.890	**0.943**
Social Sustainability (C)	15	0.919	**0.959**
Administrative Sustainability (D)	29	0.959	**0.979**

7.2 Duplications

In this type of analysis, monitoring percentages of agreed or disagreed rates of questionnaire target groups assessment, in the presented principles derived from which the new cities sustainability in Egypt, whether existing or planned. The results indicated the following:

- Axis A, Urban and Environmental Sustainability Principle:
- Unanimously agreed with 100% on A12, the principle of preserving environment through adopting principle of green (building and economy).
- The rest of the principles of same axis received great acceptance with an agreement rate between 99.2% and 83%.
- As for the degree of influence of these principles, statistical analysis of data revealed agreement of respondents with an approximate rate of 70% that increased the influence ratios of principles A14, A7, A19, and A12 (competitively salary) in achieving urban and environmental sustainability in Egyptian new cities, ranging from 81% to 100%.
- Axis B, Economic Sustainability Principle:
- Most of the principles were accepted but at varying rates.
- The analysis showed that principle of B3 (of providing high-efficiency infrastructure networks) recorded the highest agreement of 99.2%.
- As to the degree of influence of other principles, 65% of participants agreed that principle B3 is the most influential one in achieving economic sustainability of its high- financial value in exchange for the financial allocations in case of faulty or leaking networks.
- This principle reached a significance or effect ratio ranging from 81% to 100%. B11, followed by B12, in descending order in terms of their impact on achieving economic sustainability, with 55% of the participants agreeing on the proportion impact of these principles, also ranged from 81% to 100%.
- Axis C, Social Sustainability Principle:
- Various number of principles were widely accepted and agreed.

- C7, C8 and C9 had 100% agreement.
- As for the degree of influence, results showed that about 70% of the participants of C8 “Providing basic services to guarantee the survival and continuity of city's occupants”. Followed by principle C7 “Considering of disabled and elderly groups”. This is followed by principle C13 “Transportation systems suitable for all social groups in the city” whether economic, medium or distinctive) that these principles have a strong influence ranged between 81% to 100%, which indicates that proportion of different levels of incomes of population are most important elements of reconstruction of new cities in Egypt.

- Axis D, Administrative Sustainability Principle:

- Consists of 29 principles, that met most of the principles of acceptance and agreement in a different manner. In terms of impact ratios, D4 supports for electronic systems in the issue of licenses, approvals and permits recorded the highest assessment rate as recommended by about 75% of the participants and was given a very strong index in achieving administrative and institutional sustainability in the new cities, by 81% and 100%.
- In addition, 62% of respondents to D10 and D18 with a very strong degree of influence on the functioning of administrative system in new cities: the principles of a comprehensive / updated database for the principle of transparency; Reporting) respectively.
- Strong correlation between D10 and D18 principles are obtained also, pre-mentioned principle D4 where the updated comprehensive micro database / monitoring systems support issuance of approvals and permits in a precise and practical manner.

7.3 Factor Analysis

This type of analysis achieves weighting for each of the main sustainability axes A, B, C and D as shown in Table 4. In comparison, administrative and institutional sustainability index has the highest value in terms of weight, reaching 0.270, followed by Social Principles weight of 0.267 then urban / environmental axes with an equal weight of 0.266.

Table 4. Factor Analysis.

Main Axis	Principles of sustainability	Weights
A	Urban and Environmental Principles	0.266
B	Economic Principles	0.266
C	Social Principles	0.267
D	Administrative Principles	0.270

7.4 Correlation Analysis

The significance of the regression and correlation test results between the different principles was established. However, results showed a statistically significant relationship at 99% confidence level. It also indicates an inverse relation between the main sustainability axes a total asset has a very strong positive correlation with the fourth category (from 0.821 to less than 0.833) as shown in Table 5.

Table 5. Correlation matrix results.

	Urban and Environmental Sustainability Principles	Economic Principles	Social Principles	Administrative Principles
Urban &Environmental Sustainability Principles	1	0.833**	0.821**	0.832**
Economic Principles	0.833**	1	0.817**	0.833**
Social Principles	0.821**	0.817**	1	0.865**
Administrative Principles	0.832**	0.833**	0.865**	1

**Correlation is significant at the 0.01 level (2-tailed).

7.5 Multi-Label Regression (Stepwise) Analysis

The explanatory power of the regression model was 0.771, indicating that 77.1% of any change in urban and environmental sustainability principles which is a high interpretation ratio of 22.9% due to other unconsidered factors. The results also showed that the quality of the model is at 99% confidence level. The calculated value of F test is equal 140.070, which is greater than the numerical value. This indicates that one or more independent variables have a real impact on the principles of urban and environmental sustainability as shown in Table 6.

Table 6. Multi-label regression results.

Model	R	R Square	Adjusted R Square	F Test	P Value
3	0.878	0.771	0.771	140.070	**0.000**

R = Total correlation of the independent variables in the model with the dependent variable

It is clear that the three independent variables (economic, social, administrative/institutional) have a real impact on the principles of urban and environmental sustainability.

8. CONCLUSIONS

The final results of the study were extracted after completing the theoretical studies, studying the experiments, conducting the questionnaire and applying the statistical analysis program SPSS on the obtained data. This enables the proposal of an action plan that is intended to formulate a number of principles that lead our new Egyptian cities towards sustainability, as follows:

- That the decision-makers should fully understand the importance of parallel work for all aspects of the development of the new city system, whether urban or non-urban, considering the comprehensive and integrated sectoral and spatial distribution.
- The study has proven the strong relations between the main axes of the study, which indicates that the success of the management system is linked to the stability and social sustainability of the new cities, which is the center for the reconstruction of these cities.
- The overall analysis proved that the administrative and institutional sustainability pillar has the highest value in terms of weight. It reached 0.270 and shows a better performance as it is the key chain, organizable, operational and follow-up component of all plans for the other axes.
- Focusing on the applied approach, which supported and agreed with the proposed action plan. The SPSS incorporated the impact of the principles developed from the regression analysis as follows:

- Urban and Environmental Sustainability Principles = 2.316 + 0.335 (Economic Sustainability Principles) + 0.271 (Administrative and Institutional Sustainability Principles) + 0.244 (Social Sustainability Principles).
- The economic sustainability principles ranked first in terms of its impact.
- The second rank in terms of its impact was the administrative and institutional sustainability principles.
- Finally, social sustainability principles ranked third.

9. RECOMMENDATIONS

The study recommendations can be summarized as follows:

- Using clean energy sources are the main pillars of achieving urban and environmental sustainability, also preservation of the environment through adopting the principle of green building considering the structural configuration of the site's nature, in addition to the development of characterized urban distinctive.
- One of the most important pillars of achieving economic sustainability, are employment levels diversification and preparing investment strategies to attract investment and developing more areas of energy production with the availability of infrastructure networks with a high level of efficiency.
- Another important pillar to reach social sustainability, is creating employment opportunities in the city, considering those with special needs and the elderly, creating social interaction opportunities, and finally the transport systems compatible with all target groups in new cities.
- However, electronic systems in issuing licenses, approvals and permits with the availability of accurate / comprehensive / updated database, as well as the need of establishing a special unit for risk management plus, sustainability sub-departments.

DECLARATION OF CONFLICT OF INTERESTS

The authors have declared no conflict of interests.

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منهج مطور لاستدامة التنمية بالمدن الجديدة في مصر

تكمن أهمية البحث في ضـــرورة إيجاد إطار شـــامل لكافة الجوانب التنموية (عمرانية/غير عمرانية) يقود عمليات تخطيط المدن الجديدة نحو الاسـتدامة، وذلك عن طريق نهج مكون من دراسـة نظرية وتحليلية وتطبيقية. اســتعرض المنهج النظري المتغيرات المســتخلصــة من الادبيات والنظريات في مجال تنمية المدن الجديدة. وتم تحليل تجارب بعض الدول (الإمارات، هولندا، كوريا الجنوبية) بنفس المجال. وبناء عليه تم اســتخلاص ٨٢ مبدأً مقسمين على أربعة محاور رئيسية (عمرانية وبيئية، اقتصادية، اجتماعيه، إدارية ومؤسسية) لتعمل جميعها بشكل شـامل ومتكامل كقوة دافعة بمدننا الجديدة نحو الاسـتدامة. وقد تم تصـميم اسـتبيان كأداة بحثية لتقييم تلك المبادئ على المسـتوى المحلى كما تم تجميع الاسـتبيان وتحليله عن طريق برنامج SPSS الذي أرسـى أهم تلك المبادئ. وتعد الإضـــافة العلمية التي تميز هذا البحث هو اســـتنتاج إطار عمل يســـاعد صـــانعي القرار على توجيه قاطرة التنمية بالمدن الجديدة المصرية نحو الاستدامة.