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Research Article

A Study of the Development of Egyptian Urban Sustainability Assessment Mechanisms from the Perspective of the United Kingdom

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ABSTRACT

Along with the increasing prominence of urban sustainability, there has been a surge in developing indicators, assessment methods, and tools to evaluate sustainability and integrate it into urban planning and development. This is reflected in the extensive research conducted over the past three decades. Given the subjective nature of sustainability, these efforts encompass wide ranges and address various scales, from individual projects to entire city regions.

The significant interest in assessing urban sustainability stems from its numerous advantages, including monitoring progress toward sustainability goals, enhancing transparency and accountability in urban planning, raising public awareness, as well as enabling more informed decision making by planners and policymakers.

This research explores the factors influencing the process and outcomes of urban sustainability assessment in Egypt. Recognizing the growing importance of urban sustainability and the diverse range of assessment approaches, the study investigates relevant indicators, data sources, and assessment methods. Through a multi-method approach involving surveys, expert interviews, and comparisons with United Kingdom's practices, the research identifies gaps in current Egyptian practices. It concludes by proposing a comprehensive model for urban sustainability assessment in Egypt, including a set of indicators, and emphasizes the need for a bottom-up organizational structure to effectively implement sustainable development principles across all sectors.

Keywords: Urban sustainability, assessment, indicators

1. INTRODUCTION:

The importance of achieving sustainability in cities has been widely acknowledged since the 1987 Brundtland Report [1]. This recognition has been consistently emphasized through major international agreements like the 1992 Rio Declaration [2] and subsequent reports from the Intergovernmental Panel on Climate Change (IPCC) [3] demonstrating the strong linkage between urban sustainability and climate change adaptation [4]. Another major pillar in the enforcement of urban sustainability concepts was the publication of the New Urban Agenda [5] and the development of urban sustainability policies and frameworks such as the *Sustainable Development Goals* (SDGs) [6]. The prioritization of cities in sustainable urban development arises from the fact that 54 % of the world's population resided in cities in 2014, a percentage which is expected to further rise to around 66 % by 2050. Moreover, cities are responsible for nearly 70 % of the global CO2 emissions [7].

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A crucial component of achieving sustainability is setting clear goals and measurable targets and tracking the progress towards achieving these targets. Accordingly, sustainability assessment initiatives have been introduced to provide frameworks for guiding and understanding this complex practice. While urban sustainability assessment is a rapidly growing subfield of sustainability assessment, the literature is still more elaborated for sustainability assessment in generic terms.

Given the intricate nature of cities as complex systems interconnected with ecological, social and economic environments, and considering the distinct cultural and historical contexts that define each city, selecting a global standardized set of indicators for assessing urban sustainability becomes a significant challenge. The sheer volume of potential indicators can reach hundreds or even thousands, further adding to the complication of this endeavor [8]. Thus, a more effective approach might involve determining a common set of guiding principles for urban sustainability assessment. These principles would then serve as a framework for each city to develop its own unique set of criteria and indicators, tailored to its specific context. In such cases, sustainability assessment is constructed around guiding principles that enable planners and practitioners to establish specific goals, objectives, and measurable indicators to track progress.

The main problem highlighted in this research is the significant gap between countries worldwide in terms of achieving urban sustainability, and the inability of several countries to achieve urban sustainability. The significance of the study stems from the necessity of urban sustainability as a vital approach for development in our rapidly changing world. The pace of development and change demands that countries, organizations, civil society institutions, and individuals adapt to keep pace and achieve the social balance required to address globalization and its negative impacts. This study aims to answer the following questions:

- How can urban sustainability assessment improve urban planning in Egypt?
- What types of policies/principles are initially involved in the urban planning process to develop sustainability assessment mechanisms?
- What types of sustainability assessment mechanisms are more suitable to implement in Egypt?"

This study aims to explore the enhancement of the theoretical framework to develop a better understanding of urban sustainability assessment mechanisms, based on the specific national and local characteristics of the Egyptian context. To achieve this aim, it was essential to:

- Conduct an in-depth review of the United Kingdom’s experience and achievements in urban sustainability assessment in terms of its indicator systems, data sources, and assessment methods and techniques.
- Re-evaluate the preliminary proposals and draw the conclusion of the study through gathering feedback from academics, practitioners, policymakers, and decision-makers through a survey-based questionnaire and interviews in Egypt.
- Explore urban sustainability assessment mechanisms in Egypt including indicators, data sources, and assessment techniques.
- Develop a comprehensive sustainability assessment mechanism for Egypt which integrates indicator system, data sources, and assessment techniques.

The contribution of this study lies in its systematic investigation of the principles and frameworks for developing an urban sustainability assessment mechanism in Egypt, based on the United Kingdom's experience and achievements in this field. It also explored various weaknesses and barriers in Egypt's current urban planning and development system, which essentially require reforms in the current planning and development structures. Furthermore, the results of this study provide insights into the issues that policymakers and practitioners need to consider when developing programs and efforts that address urban sustainability assessment challenges. Thus, enhancing the theory and literature within the knowledge base of urban sustainability assessment, addressing prominent issues, and providing suggestions that will assist in developing suitable Egyptian urban sustainability assessment mechanisms, considering the three fundamental pillars of sustainability: environment, society, and economy. The study also proposes a detailed proposal for developing an urban sustainability assessment model, including a comprehensive set of urban sustainability indicators.

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2. LITERATURE REVIEW:

Since the introduction of the *Environmental Impact Assessment* (EIA) in the 70's, there has been a substantial growth in the attempts to assess sustainability. Examples of new generation assessment protocols include the US's Leadership in Energy and Environmental Design LEED-ND, Building Research Establishment Environment Assessment Method (BREEAM) of the UK, Arup-developed 'Sustainable Project Appraisal Routine' (SPeAR), Comprehensive Assessment System for Built Environment Efficiency (CASBEE-UD), Australia's Green Star [9], as well as Egypt's Green Pyramid Rating System (GPRS). However, such adequacy in assessment approaches indicates that individual areas require their individual customized assessment tools [10].

Moreover, most of these approaches primarily focus on the built environment which is not sufficient for the holistic assessment of urban sustainability since it should encompass the cities' diverse elements, including neighborhoods, population demographics, land use patterns, urban spaces, resource consumption (water, energy), environmental quality (air, water). In response, many renowned assessment tools have actively sought to broaden their scope, transitioning from solely assessing buildings to evaluating urban settlements' sustainability such as BREEAM Communities (2011-2012), LEED -ND for neighborhood development (2007), CASBEE–UD for urban development (2007), SBTool PT – UP (2013).

2.1. The theoretical notion of urban sustainability assessment:

As argued by Gibson [11], sustainability assessments must be 'integrative', simultaneously considering environmental, social, and economic factors to guide decisions in a comprehensive manner. This holistic approach should seek to avoid 'ugly trade-offs' and foster a harmonious balance among the three major pillars of sustainability. Several other scholars and researchers [11, 12, 13, 14] have also raised concerns about the trade-offs inherent in sustainability decision-making, highlighting the need for comprehensive sustainability assessment processes to effectively address such challenges. Dovers [15], for example, argues that "environmental and social issues matter, until it matters economically", whereas Gibson [11] and Morrison-Saunders & Therivel [14], claimed that prioritizing economic concerns in sustainability decision-making should not come at the expense of social and environmental aspects emphasizing the need for more sophisticated sustainability assessments that explore a wider range of solutions, minimizing "ugly trade-offs" – situations where one aspect of sustainability is significantly compromised to favor another. In the same essence, James [16] assumes that sustainability should be fundamentally identified as a social condition. Within this framework, economic factors are regarded as just one aspect of the broader social sphere, rather than a separate and potentially dominant priority.

Accordingly, Gibson [11] proposed seven key design components to guide the development of effective sustainability assessments as shown in table (1). Moreover, Morrison-Saunders and Therivel [14] emphasized that the effectiveness of sustainability assessment depends on the alignment between the decision under question and the assigned assessment approach, as illustrated the assessment model shown in figure (1).

Table 1: The seven key components of a comprehensive sustainability assessment framework (Gibson, 2006)

No.	Key component	Rationale
1	**Governance Framework**	Integrate sustainability assessment into a comprehensive governance framework to address the complex relationships between various issues, goals, actions, and their consequences. This holistic approach should encompass the entire sustainability process, from initial agenda-setting to ongoing results evaluation and succeeding adjustments.
2	**Iterative assessment process cycle**	Design assessment processes as iterative cycles, beginning with initial conceptual assessment and extending through to post-completion evaluation to maximize the combined positive outcomes by carefully selecting, designing, and adaptively implementing the most beneficial option for each major strategic initiative or project.

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3	**Regular revision of primary goals and objectives**	Revise the primary objectives and accordingly adjust the evaluation and decision-making criteria. This revision should move beyond the traditional categorization to ensure that often-overlooked sustainability factors are adequately considered. The goal is to ensure the attainment of multiple, interconnected benefits.
4	**Avoid trade-offs**	Set clear, fundamental guidelines to eliminate the need for trade-offs whenever possible. For unavoidable trade-offs, these guidelines should provide a framework for successfully making informed decisions.
5	**Adapt to contextual characteristics**	Develop mechanisms to adapt and apply these general criteria and trade-off rules to specific contextual situations. This adaptation should account for unique case characteristics, contextual factors, individual objectives, priorities, and available prospects.
6	**Comprehensive assessment tools**	Focus on comprehensive methodologies, and tools to effectively address the practical challenges of sustainability assessment. This involves identifying crucial interconnections between issues and factors, evaluating the significance of expected impacts, and comprehensively assessing the overall advantages and disadvantages of different alternatives.
7	**Transparency and Public Participation**	Ensure that the decision-making process is transparent and encourages meaningful public engagement and participation.

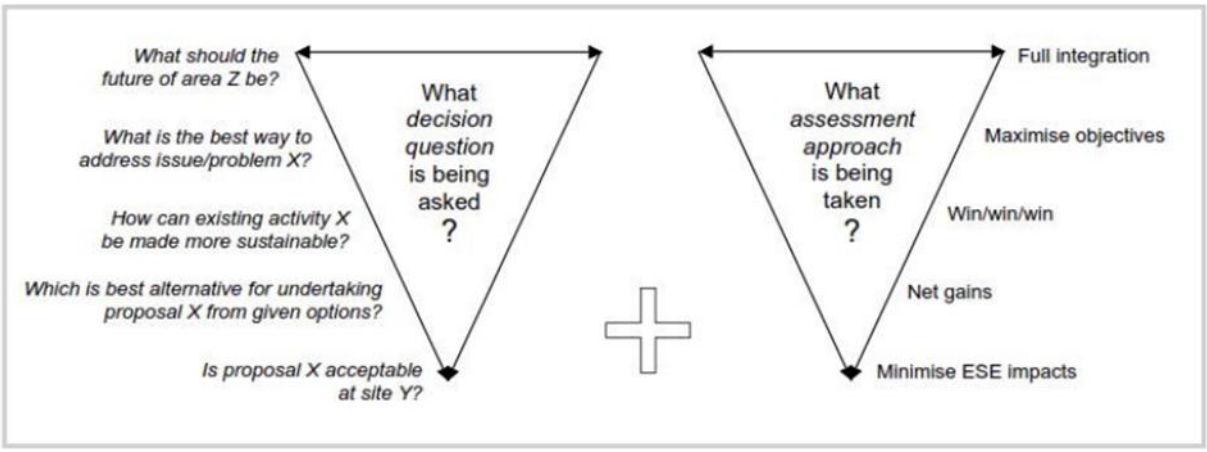

Figure (1): Model for understanding the basic characteristics of sustainability assessment process

Source: Morrison-Saunders and Therivel, 2006

2.2. The role of sustainability assessment in spatial planning and urban design:

Dempsey et al. [17] argue that urban sustainability emphasizes the inherent interrelations between physical and social factors. The term '*Urban*' encompasses both the built environment (physical) and the people who inhibit it (social). While social sustainability emphasizes non-physical factors like health, education, and social capital within urban society, physical sustainability focuses on the built environment's physical factors, such as urban form, public spaces, and accessibility, recognizing their interconnectedness.

Table (2): Factors affecting urban sustainability (Dempsey et al. 2011).

Non-physical factors	Physical Factors
- Education and training	- Urban management
- Social justice across different generations	- Attractive public realm
- Local democracy and community participation	- Proper housing facilities

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- Human well-being, health, quality of life	- Environmental quality
- Social inclusion	- Accessibility to basic services (local facilities, employment, green/public spaces)
- Social capital	- Sustainable urban design
- Safety and security	- Neighborhood services
- Fair income distribution	- Walkability
- Social cohesion	
- Social order	
- Social interactions and networks	
- Sence of community and belonging	
- Residential stability (lower residential turnover)	
- Shared cultural values	
- Active community organizations	
- Employment	

Also, while the basic concept of 'urban sustainability assessment' aims to address the inherent incompleteness and uncertainty that characterizes sustainable urban development. However, simply conducting an assessment is insufficient to achieve this goal. Assessment must have a significant impact on the decision-making process. This is where the crucial connection between urban planning and evaluation becomes evident [16].

3. METRICS AND INDICATORS:

Assessment can be defined as the systematic process of collecting and analyzing information to gain valuable insights into specific issues. It inherently involves the quantitative or qualitative evaluation of a system or phenomenon's current state. Urban assessment is particularly important due to its direct impact on quality of life, human well-being, and the preservation of natural environments and ecosystems [18]. Accordingly, local and national governments worldwide have developed indicators to assess and improve urban sustainability performance. These indicators encompass environmental, economic, and social factors, designed to track progress towards environmental and socio-economic and sustainability goals. The selection of urban sustainability indicators should follow specific criteria since they serve as practical guides to translate sustainable development concepts into applicable action plans; decision-making tools to inform policies that support sustainable development; evaluation tools to assess the effectiveness of sustainability initiatives and interventions [19]. Table (3) summarizes the main criteria for urban sustainability indicators selection [20].

Table 3: The main criteria for sustainability indicators selection (Caroline H. Gebara et.al 2024).

	Criterion	Description
1	**Relevance to scope**	The selected indicator should be relevant to the contextual scope in terms of spatial and temporal scales as well as target population.
2	**Measurability**	The indicator should be measurable either quantitatively or semi-quantitatively using a binary or categorial scale
3	**Performance based**	The selected indicator should assess the performance of the area under study towards achieving the targeted goal. For indicators to comply with this criterion, they must measure performance outcomes, rather than driving factors or responses.
4	**Scientifically verified**	The selected indicator must rely on a scientifically rigorous assessment method.
5	**Comparability**	The indicators should be comparable across different temporal scales, regions and disciplines, considering a suitable method for normalization.
6	**Availability of data**	The data required for measuring the indicators should be easily accessible through available financial and human resources.

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7	**Quality of data**	The data should be reliable and obtained from trustworthy sources. It should also be effectively documented.
8	**Clarity**	The indicator must be clear and easily understandable for different users, stakeholders and policy makers.
9	**Transparency**	The selected indicators should be self-explanatory and have a well-documented assessment methodology that can be easily replicated.

3.1. Types of Urban data:

Data are the fundamental blocks to informed decision-making, especially for advanced solutions like models, forecasts, predictions, planning, and decision support systems (DSS). The accuracy and reliability of any urban analysis primarily depend on the quality and relevance of the input data. Urban performance modeling and monitoring projects typically start with the acquisition or collection of data specific to the study area. Such data and their corresponding sources must therefore be relevant and consistent with the projects' main objectives. In general, urban data typically incorporates attributive, spatial, and/or temporal variables, providing practitioners and decision makers with valuable insights into '*what*' phenomena occur, '*where*' they occur, and '*when*' they occur, facilitating context-specific urban analyses [21], as illustrated in figure (2).

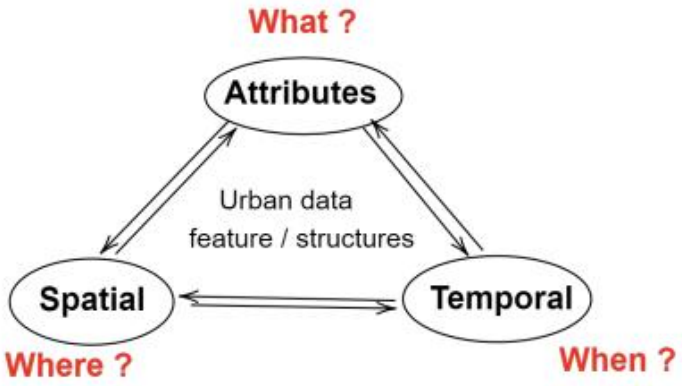

Figure (2): Features of urban data and their corresponding

Source: Stéphane C. K. Tékouabou, et.al.2022

Within the urban planning domain, datasets encompass three major types: qualitative, quantitative, and geospatial. Qualitative data provides descriptive insights into human perspectives, while quantitative data offers numerical measurements. Geospatial data, on the other hand, identifies the geographic location and characteristics of features on Earth [22], which is focal for sustainable urban development. This data is represented by points, lines, and polygons, and can be derived from any data collected with a geographic location. For instance, geospatial analysis can be utilized to visualize and analyze the level of deprivation across neighborhoods using the Index of Multiple Deprivation (IMD) [23].

The spectrum of urban data sources is diverse, typically including traditional statistical surveys (such as official statistics and census data), sensor networks, and recently the emerging category of user-generated data content [24]. These sources typically generate raw data which are subsequently structured to conform to well-defined formats.

4. METHODS OF SUSTAINABILITY ASSESSMENT IN THE UNITED KINGDOM:

The UK possesses several well-established and legally delegated systems for assessing urban sustainability, which are widely applied in urban development projects and planning processes. Major systems utilized in the UK:

- Sustainable Development Indicators (SDIs)
- Environmental Impact Assessment (EIA)

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- Strategic Environmental Assessment (SEA)
- Sustainability Appraisal (SA)
- Building Research Establishment Environmental Assessment Method (BREEAM)
- Index of Multiple Deprivations (IMD)
- Quality of Life (QoF)
- Standard Assessment Procedure (SAP)
- Sustainable Project Appraisal Routine (SPeAR)

This study explores the structure and assessment methodology of 2 main methods: Sustainable Development Indicators (SDI) and Sustainable Project Appraisal Routine (SPeAR).

4.1. Sustainable Development Indicators (SDI):

The first set of Sustainable Development Indicators (SDIs) launched in the UK consisted of 68 indicators encompassing 126 variables. Later, this set of indicators was repeatedly revised and modified until a final framework was introduced. The revised framework restructured the number of indicators, cutting it by approximately 50%. Accordingly, 12 headline indicators and 23 supplementary indicators were employed, consisting of 25 and 41 variables respectively. The selected indicators were categorized into three main domains, namely, economy, society, and environment, resulting in a total of 35 indicators and 66 variables [25].

Individual variables are assessed using a *"Traffic Light"* system (shown in figure 3), which uses *green* to indicate improvement, *amber* to indicate inaction, and *red* to indicate deterioration or decline in sustainable development measures. In case of unavailability of data for a certain period, the system uses *white*, which means 'Not Assessed'. To evaluate the change of a certain measure, the value at the end of the specified time frame is compared to its value at the beginning of the assigned period. Given the availability of data, two assessment time frames have been employed:

- Long-term: Which evaluates the long-term changes since the earliest data available, which usually dates to the 1990s.
- Short-term: Which assesses the level of change over the most recent period of five years.

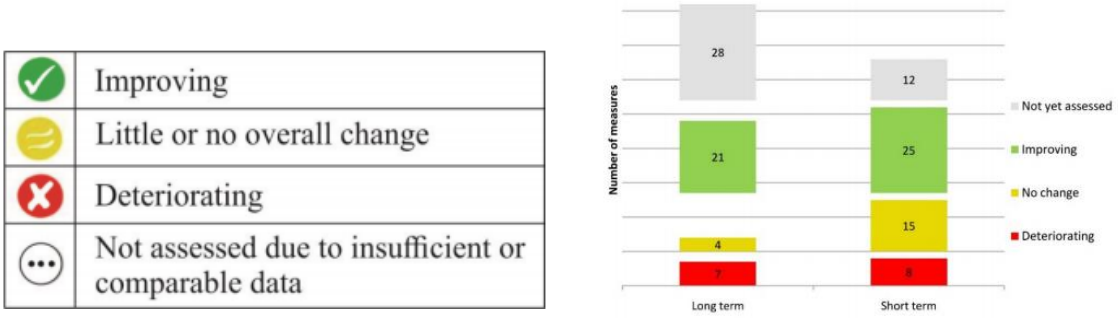

Figure (3): The Traffic Light system

Source: Defra, 2013

Since data sources are inherently diverse, including administrative reports and surveys for measuring subjective judgements, it is found infeasible to assess change across all indicators using a single consistent method. Therefore, to assess the 66 indicators six different methods were employed: confidence intervals, standard errors, the 3 % rule, recognized targets, the 3-percentage point rule, and expert opinion supported positive/negative change [26]. The following table points out the differences between the six listed methods.

Table 4: SDIs methods of change assessment (Lofts and Macrory, 2015).

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	Method of change assessment	Description
1	**Confidence Intervals method**	Results of surveys are considered estimate values that are subject to degree of uncertainty. This level of uncertainty is referred to as the *sampling error*. To quantify this sampling error, multiple surveys samples within the same period are modelled to determine a range of reasonable values. This range is called the *'confidence interval'*. A confidence interval of 95% indicated that there is a 95% probability that the true population value is within this range.
2	**Standard Errors method**	*Standard Error* stands for the standard deviation of the statistics of a certain sample. The standard error of the mean – for instance- refers to the standard deviation of the distribution of mean values for a given population.
3	**The 3 % Rule**	In case of unavailability of confidence interval or standard error methods, a 3% change threshold is used to determine if an indicator is improving or declining, where changes less than 3% are considered irrelevant.
4	**Recognized Target method**	In this method, indicators' values are assessed against recognized thresholds. Examples of such target thresholds include EU 2020 recycling target or the Public Health England goal to cut smoking among adults. For a certain indicator to be considered improving, it should exceed the target goal or a its progress trends indicate that it is expected to reach the target goal within a specific date. If an indicator shows insufficient progress towards meeting the goal, it is assessed as showing little or no overall change. On the other hand, indicators showing negative progress are classified as deteriorating.
5	**The 3-percentage point rule**	In some cases, when an indicator is evaluated using the percentage rule, it can lead to an exaggerated level of change. To avoid such misleading evaluations, a more accurate method is applied for such indicators, using a change of 3 percentage points.
6	**Expert opinions**	The assessment of change in Median Income is based on a direct evaluation of its increase or decrease, informed by the expertise of collaborators within the Economic Well-being branch.

To illustrate the construction of the SDI, the headline indicator of Economy is shown in the table below:

Table (5): illustration of SDI's headline economy indicator and its measures (Defra, 2013)

Headline Indicator of Economy		
Main Indicators	**Sub-indicators**	**Description**
Indicator 1: Economic Prosperity	1.1. Gross Domestic Product Indices (GDP), GDP per head and median income	Economic prosperity is a signal of a healthy economy where most individuals have sufficient income. Insights into economic prosperity levels can be attained though comparing GDP and median income levels.
	1.2. Income distribution among population before housing costs	

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Indicator 2: Long-term unemployment	2.1. Proportion of economically active adults unemployed for a period over 12 months	Prolonged periods of unemployment can affect individuals and families causing loss of income, social isolation, deteriorated self-worth among other challenges. Employment allows people to fulfill their needs and enhance their living standards. Moreover, it offers an effective and sustainable method to reduce poverty and social exclusion.
Indicator 3: Poverty	3.1. Proportion of children in relative and absolute low-income households before housing costs.	Since poverty can persist through consecutive generations, with children poverty as key issue, poverty is measured by the proportion of children living in families with incomes lower than 60% of the median.
Indicator 4: Knowledge and Skills	4.1. Human capital stock (£ trillion) and human capital per head (£ thousand)	This indicator focuses on the value of Human Capital (£). However, the notion of human capital encompasses a wide scope of various personal attributes, such as health conditions. In practice, this indicator primarily focuses on knowledge, skills and abilities such as formal education and training programs. The significance of the human capital indicator also arises from the proven correlation between increased human capital and economic growth.
	4.2. Employed human capital (£ trillion) by age group	

4.2. Sustainable Project Appraisal Routine (SPeAR®):

SPeAR is a robust and adaptable tool for assessing sustainability developed by Arup's team of sustainability experts and software developers. It serves as a decision-making framework to support project development and clearly communicate results. SPeAR provides a comprehensive sustainability assessment tool, integrating both qualitative and quantitative analysis through 24 core indicators classified into four categories [27], as summarized in the following table.

Table (6): SPeAR's main categories and core indicators

Environment	Air quality
	Water quality
	Land use
	Ecology and cultural heritage
	Design and operation
	Transportation facilities
Natural resources	Energy consumption
	Water consumption

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	Materials
	Land utilization
	Waste management
Societal	Health and wellbeing
	User satisfaction
	Form and space
	Accessibility
	Amenity
	Inclusion
Economic	Social benefits and costs
	Employment and skills
	Competition effects
	Viability

The key steps of SPeAR are illustrated in figure (4).

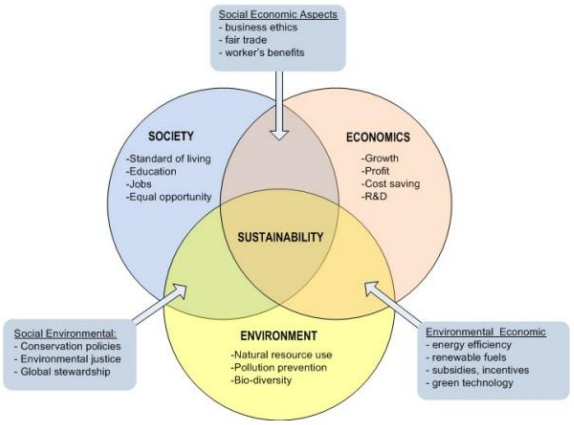

Fig. 2.1 Three dimensions of sustainability

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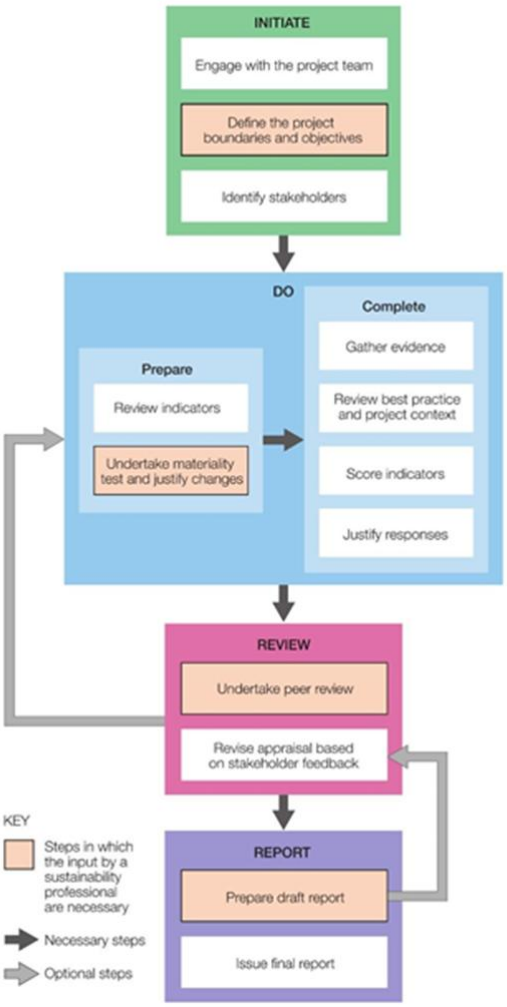

Figure (4): The SPeAR process steps

Source: https://sustainabilitytoolkit.arup.com/assets/support/SPeAR_manual.pdf

To assess the performance of indicators, the SPeAR system utilizes a five-scale scheme, using a traffic light system, that ranges from a strong positive performance (+3) to a negative performance (-1), as illustrated in figure (5).

Figure (5): The SPeAR traffic-light rating system

Source: https://sustainabilitytoolkit.arup.com/assets/support/SPeAR_manual.pdf

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The results of the assessment process are graphically represented by the SPeAR diagram, an example of which is shown in figure (6), encompassing environmental factors, natural resources, as well as social and economic factors. The SPeAR diagram enables users to identify areas of poor application of sustainability principles, allowing for the exploration of potential enhancement measures through integrating best practices and employing new innovative technologies [28].

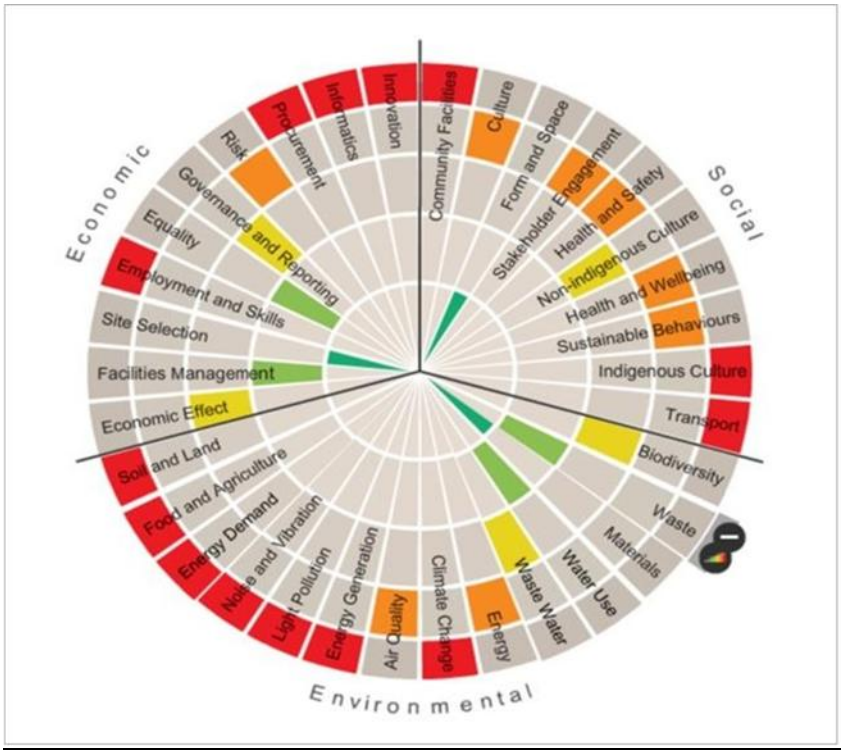

Figure (6): The SPeAR Diagram

Source: Arup, 2012

Although SPeAR is considered a comprehensive framework that evaluates environmental, social and economic attributes of the project's sustainability throughout its life cycle, some concerns have been raised about its limitations and potential misuse since it is an in-house tool originated by Arup and not a commercial software, in addition to its over-simplification. Nevertheless, it can be argued that its simple nature and user-friendly interface can facilitate the implementation of sustainability principles across various sectors [29].

5. PROPOSING URBAN SUSTAINABILITY INDICATORS IN EGYPT:

Naturally, in many developing countries, including Egypt, the application of evaluation tools developed by other countries without considering the specificities, constraints, and nature of urban development in the Egyptian context often leads to the failure of these tools. Accordingly, the field study for the research proposed an evaluation system consisting of a set of indicators that align with the Egyptian context. The field study was based on several steps as follows:

1- Developing a clear methodology, which was achieved by reaching a preliminary list of indicators as a basis for conducting a survey with a group of experts and practitioners, aiming to determine a final list of indicators that are best able to address the realities of the Egyptian context and to identify the relative weights of the proposed sustainability indicators.

2- Selecting a sample of participants for the survey that includes a group of experts and specialists in the field of housing and sustainable development. The sample consisted of 64 participants including experts, scholars, practitioners as well as senior government officials of ministries, municipalities and local authorities, to combine academic expertise with practical experience.

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3- The questionnaire was designed using a preliminary list of indicators categorized into three main dimensions: environmental sustainability, social sustainability, and economic sustainability. In addition, relative weights were assigned to the indicators.

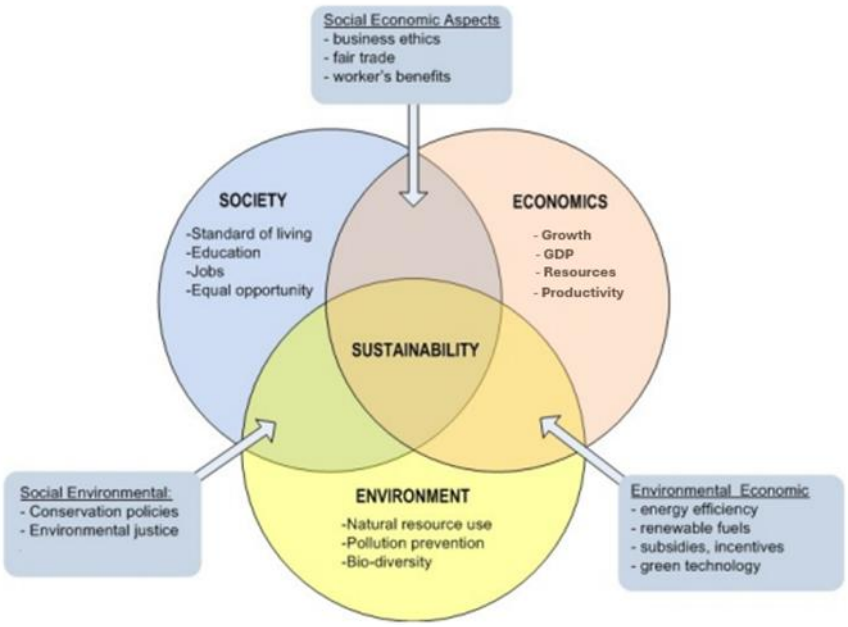

Figure (8): An Illustration of the main dimensions of the proposed urban sustainability assessment tool

Source: Researcher

In conclusion, the proposed urban sustainability indicators and their calculated relative weights are listed in the following table. The table also summarizes the reflective policies and measures to be adopted to fulfill the proposed indicators.

Table (8): The proposed urban sustainability indicators in Egypt

	Indicator		W	Suggested metrics	Reflective Measures
Economic Sustainability	**E 1**	Strengthening economic growth and contributing to the Gross Domestic Product (GDP)	83.75	- GDP growth rates - GDP per person	Identifying allocated areas for employment and new investment zones, a plan to develop local businesses to create incentives for city development.
	E 2	Economic Diversity	77.75	Diversity of economic sectors (industry- agriculture - commerce- tourism-)	
	E 3	Increased Productivity	76	- City product per capita - Employment rates	Developing labor laws to support employment, offer incentives and increase productivity
	E 4	Diversity of jobs & new job opportunities	80.25	% of new jobs generated over a definite period + diversity of work sectors	Creating a collaborative plan with all civil society groups and non-governmental organizations and supporting small businesses and entrepreneurship.

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	E 5	Compliance with the requirements of international trade agreements	57.5	No. of regional / international trade agreement + volume of traded products/ services annually	Increase no. of regional / international agreements
	E 6	Efficient employment of financial and human resources	81	Economic stability	Laws and regulations to support economic stability and improve skills of working populations in various sectors
Social Sustainability	**S1**	Improving the status of workers and work conditions	75.25	- Rate of work turnover	Imposing new labor laws to support employees and improve working conditions
	S 2	Social Equity	70.75	% of population covered by social insurance programs	Increasing and supporting social security and social insurance programs.
	S 3	Enhancing human well-being and quality of life and achieving	71.25	- Human Development Index (HDI) (A Composite index of income, life expectancy & education) - % of public, green and recreational spaces	Accessibility and affordability of housing, health care and education. In addition to social cohesion and inclusiveness.
	S 4	Social independence and self-reliance	68.75	- Urban connectivity - Mass transportation network length in Km^2 per total area of city in Km	Accessibility to public transport, workplace and public services
Natural & Environmental Sustainability	**N 1**	Local environmental laws and regulations	76.75	- Energy usage - Share of Renewable Energy	Creating a roadmap for sustainable energy consumption reduction and enhancing local/regional production via optimized renewable energy utilization.
	N 2	The environmental impact of industries	78.5	Degree of compliance with air pollutants average levels with allowed limits (Pb, PM 10, T.S.P and SO2)	Create a climate adaptation action plan focusing on reducing harmful emissions and protecting high-density urban areas.
	N 3	Regional and international environmental laws and regulations	61	Environmental and climate change adaptation policies	Regulations regarding improved air quality, water quality and reduced noise pollution in urban areas
	N 4	Industrial waste management	81	Efficiency of waste management systems	Imposing laws and regulations that support proper disposal of industrial wastes.
	N 5	Efficient management of energy consumption in manufacturing processes	80.75	Energy consumption in manufacturing processes	Regulations for efficient energy consumption and incentives such as tax reduction
	N 6	Efficient use of available natural resources	74.25	- Natural resources management - % of recycled / reused materials	Regulations for efficient management of resources and encouraging recycling and reuse

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6. CONCLUSION AND DISCUSSION:

Following a brief explanation of the concept of sustainable development, the research provided a description of the issue of assessing urban sustainability. It then elaborated on the role of sustainability assessment in spatial planning and urban design processes, followed by a review of the three main elements of urban sustainability assessment: indicators, data, and assessment methods. Two assessment methods that have been widely implemented in the United Kingdom were selected and discussed. These methods include Sustainable Development Indicators (SDIs) and the "Sustainable Project Assessment Routine" (SPeAR). The research highlights the importance of identifying appropriate indicators for post-implementation assessment to understand the current state of sustainability. By comparing these methods, the study provides a comprehensive overview of sustainability assessment practices in the UK.

However, the contextual nature and challenges in the Egyptian case requires a strong commitment to sustainable development and cooperation among local governments, NGOs, professional bodies, and the public. The region has much to learn from the successful experiences of other developing countries that have embraced sustainable development, but it will ultimately have to chart its own course and develop its specified set of sustainable development indicators. The study concluded six key challenges facing developing countries, or 'emerging markets and developing economies,' hindering them from achieving sustainability. These challenges and opportunities for sustainable development in the Arab region in general and in the Egyptian context in particular are listed below:

- Economic challenges: slow economic growth, a shortage of financial resources and direct investment.
- Social challenges: such as high population growth rates, poverty and debt, illiteracy, and ineffective education systems.
- Environmental Challenges: These include climate conditions and changes, limited and depleting natural resources, environmental pollution, and natural hazards/disasters.
- Urban challenges: These include rapid urbanization and urban growth.
- Governance and administrative challenges: These include ineffective institutional and organizational frameworks, and inadequate legal and legislative frameworks.
- Awareness and knowledge challenges: These include lack of awareness challenges and a deficiency in decision-making tools.

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