

Methodology to Applying Sustainability Indicators for New Urban Communities in Egypt

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ABSTRACT

The role of new urban communities in the global system has become clear to the importance of the development process in addressing the obstacles and challenges of balanced and sustainable urban growth and human settlement issues, in order to provide solutions to the problems facing the countries of the world to create an international community based on fairness, justice and solidarity. Therefore, Egypt declared an interest in including the concepts of sustainability in the urban system and paid attention to the axes of sustainable development, but this was not addressed in the design and implementation of new governmental or private urban communities. Accordingly, the research paper addresses indicators of the sustainability of new urban communities through the basic pillars provided by the sustainability assessment programs of new urban communities, including (LEED, Breeam Communities, ESTIDAMA, CASBEE-UD). Where meeting points were found for the global development axes of the programs and clarification of urban planning systems with its various elements in addressing these axes. The research paper also discusses some approaches that can help planners address the urban challenges of urban communities, which in turn are reflected on the social and environmental levels in these communities, thus increasing economic returns and urban sustainability.



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1. Introduction

The urban planning process remained out of the sight of the parties responsible for the planning process in developing countries, which led to the cities of those countries falling under a barrage of urban challenges resulting from improper planning, specifically related to poverty, unemployment, poor distribution of population densities, environmental threat, decline and Quality of life, in addition to the housing crisis the failure to achieve the appropriate performance of sustainable urban

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planning systems at the methodological and applied level. Which began to accumulate continuously until it reached a point that could not be surpassed. Through the slow growth in the construction of these new areas, in contrast to the rapid population increase of existing cities. The policies that have been put in place have not yet fully realized the extent of the environmental problems resulting from unaccounted urban growth and the misuse of resources that will result in the inadequacy of these resources for future generations, which It led to countries around the world changing their planning approaches to urban agglomerations. Therefore, cities in the world, especially cities in the developing world, need to ensure the sustainability of these cities so that they can achieve living standards for future generations. This is by finding solutions to pressing problems and trying to reduce them, and sustaining these solutions in the future, which is what we prepared this study for, which seeks primarily to search for a continuous method to monitor and evaluate the urbanization movement in new areas. cities, thus searching for a continuous method of urban development. An alternative to the traditional method of drawing charts. public and start implementing them and creating a role for sustainable urban planning systems to draw future strategic directions for planning new urban communities. By addressing the obstacles and challenges of balanced and sustainable urban growth and human settlements issues, with the aim of providing solutions to the issues facing the countries of the world and creating an international community based on equity, justice and solidarity, specifically referring to poverty, unemployment, maldistribution of population densities, environmental threats, qualitative deterioration in the standard of living, the housing crisis, as well as the failure to achieve adequate performance of integrated urban management systems at the level of methodology and application.

2. Methodology

Through the theoretical information and data, as well as based on the comparative analysis of international approaches to assessing urban communities, the methodology used to measure the indicators of sustainability of new urban communities, which consists of four stages as shown in Table 1, and the following is the research methodology for studying the selected experiences to assess the sustainability of new urban communities.

Table 1. Methodology for the sustainability of new urban communities through sustainable urban planning systems.[1]

Methodology for the sustainability of new urban communities through sustainable urban planning systems				
Reconnaissance and documentation phase of the project and documentation of the project				
information gathering				
A general introduction to urbanization and the reasons for the study	Strategic studies for the urban community	Urban Sustainability Goals	Identify the parties involved in the sustainability of the urban community	
Recognize the nature of the urban community and create a comprehensive database of urban, economic, social, environmental and infrastructure aspects.				
The stage of studying the issues and challenges facing the urban community				
Urban Challenges Facing the Urban Community				
Urban and Population Challenges	Economic challenges	Social challenges	Environmental challenges	Infrastructure Challenges
Study phase of sustainable urban planning systems to meet the challenges of urban society				
Sustainable urban planning systems				
Integrated development	Design Innovation	Sustainable management	Infrastructure Sustainability	Living conditions
The quality of the spaces	Sustainable diets	Energy-Water Savings	Technical quality	Waste management

Reducing pollution	Public health	Economic prosperity
Sustainability Assessment Phase of New Urban Communities		
Access to an approach to measure the success indicators of the sustainability of the urban community through the application of sustainable urban planning systems.		

3. Concept of sustainable urban planning

Sustainable urban planning is a tool to achieve the public interest, for all segments of society, by developing visions of preferred future conditions through the distribution of community activities, visions, ambitions, strategic desires, resources and realistic capabilities of the comprehensive development sectors, political, economic, social and environmental, by developing strategies, general policies and urban plans at their various levels, national, regional and local developing and defining urban programs projects, within a clear and binding legal framework developing measures to protect the environment, through specific processes and procedures.[1]

4. Concept of sustainable urban communities

Sustainable urban communities are communities that apply the concept of sustainable development and develop long-term plans that take into account economic, environmental and cultural resources, such that these plans ensure the fulfillment of the needs of the current generation without prejudice to the rights of future generations to obtain their needs, through.[2]

- Economic efficiency in the use and development of resources, including goods, services and the environment Natural.
- Social justice in distributing development returns, especially regarding providing the needs of low-income income groups.
- Avoid anything that might affect development options in the future.

5. Evaluates the sustainability of new urban communities:

Urban community planning processes have a history, but tools for assessing the sustainability of urban planning did not emerge until the beginning of the 21st century, when planners and environmental scientists began designing them, preceded by sustainability assessment to evaluate policies programs, and strategic environmental assessment. There are currently many tools for assessing the sustainability of urban communities around the world, and the assessment is done by measuring the performance of an urban community according to indicators sets of criteria.[3]

5.1 Leadership in Energy and Environmental Design- Neighborhood Development (LEED-ND)

Issued by the US Green Building Council in cooperation with the New Urbanism Conference and the Natural Resources Defense Council, the pilot version was launched in 2007 and the latest version in 2009. Unlike other LEED-ND assessment tools that focus on green building practices and award few points for site selection and design, This tool is concerned with site selection, design, and construction elements that bring buildings and infrastructure together within the urban community and connects the urban community to the local and regional surroundings. LEED has evolved from a single standard for new construction to a comprehensive system of six standards covering all aspects of the development and construction process. The system addresses seven disciplines: (Sustainable Location, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environmental Quality, Innovation and Design, and Regional Priorities.) It addresses the three pillars: Economy, Environment, and Justice. The goal is to emphasize the empowerment of anyone who lives or works in a community, by providing employment opportunities or reducing health issues. One of its most important goals is to encourage healthy living, as shown in Table 2, 3.[4]

Table 2. LEED-ND Categories. [2]

LEED-ND Leadership in Energy and Environmental Design- Neighborhood Development
Smart Location and Linkage (SLL)
Neighborhood Pattern and Design (NPD)
Green Infrastructure and Buildings (GIB)
Innovation and Design Process (IDP)
Regional Priority Credit (RPC)
Energy and Atmosphere (EA)
Materials and Resources(MR)
Environment Quality (EQ)

Table 3. LEED-ND Rating Method Categories.

LEED –ND Rating	Score
Certified	40-49 points
Silver	50-59 points
Gold	60-79 points
Platinum	80 points and above

5.2 BREEAM Communities

It is an evaluation method that provides a means to improve, measure and certify the social, environmental and economic sustainability of large-scale development plans by integrating sustainable design into the master planning process.

It was issued by the British Building Research Foundation - the global sector in 2009 to help real estate planners and developers pay attention to a full range of issues that must be taken into account from the early stages of development, and to measure the sustainability of project proposals at the planning stage as an independent accrediting body. The BREEAM system addresses 9 areas (Administration, health, energy, conductors, water, materials, waste, land use and ecology, pollution), as shown in Table 4, Table 5. These areas are addressed to achieve sustainable urbanization and change planning policies that have an impact on development projects in the built environment .[5]

Table 4. BREEAM Communities Method Categories [4]

BREEAM Communities Building Research Establishment Environmental Assessment Methodology
Management
Project brief and design
Life cycle cost and service life planning
Responsible construction practices
Commissioning and handover
Health and wellbeing
Visual comfort
Indoor air quality
Safe containment in laboratorie
Thermal comfort
Acoustic performance
Safety and security
Energy
Reduction of energy use and carbon emissions
Energy monitoring
External lighting
Low carbon design
Energy efficient cold storage
Energy efficient transportation systems

Energy efficient laboratory systems
Energy efficient equipment
Drying space
Transport
Public transport accessibility
proximity to amenities
Cydist facilities
Maximum car parking capacity
Water
Water consumption
Water monitoring
water leak detection
water efficient equipment
Materials
Life cycle impacts
Hard landscaping and boundary protection
Insulation
Responsibel sourcing of materials
Designing for durability and resilience
Material efficiency
Waste
Construction waste management
Recycled aggregates
Operational waste
Adaptation to climate change Functional adaptability
Land use and ecology
Site selection
Ecological value of site and protection of ecological features
Minimising impact on existing site ecology
Adaptation to climate change
Long term impact on biodiversity
Pollution
Impact of refrigerants
NOx emissions
Reduction of night time light pollution
Reduction of noise pollution
Innovation
Innovation

Table 5. BREEAM Communities rating

BREEAM Section	Weighting	BREEAM Rating		Score	%
Management	12%	Outstanding		≥85	
Health and Wellbeing	15%	Excellent		≥ 75	
Energy	15%	very Good		≥ 55	
Transport	9%	Good		≥45	
Water	7%	Pass		≥30	
Materials	13.5%	Unclassified		<30	
Waste	8.5%				
Land Use and Ecology	10%				
Pollution	10%				
Total	100%				
Innovation (additional)	10%				
BREEAM Section	Credits Achieved (A)	Credits Available (B)	%of Credits Achieved (C)	SectionWeighting (fully fitted) (D)	Section Score
Management					

Health and Wellbeing	(A)	(B)	100XB/A	0.12	100XDX100/C
Energy	(A)	(B)	100XB/A	0.15	100XDX100/C
Transport	(A)	(B)	100XB/A	0.15	100' X100/C
Water	(A)	(B)	100XB/A	0.09	100XDX100/C
Materials	(A)	(B)	100XB/A	0.07	100XDX100/C
Waste	(A)	(B)	100XB/A	0.135	100XDX100/C
Land Use and Ecology	(A)	(B)	100XB/A	0.085	100XDX100/C
Pollution	(A)	(B)	100XB/A	0.10	100XDX100/C
Innovation (additional)	(A)	(B)	100XB/A	0.10	100XDX100/C
Final BREEAM score					
BREEAM Rating					

5.3 CASBEE-City (Comprehensive Assessment System for Built Environmen Efficiency)

Since the construction industry began moving towards promoting sustainable construction in the last half of the Eighties of the last century, many techniques have been developed to assess the environmental performance of urbanization.

In Japan, in April 2001, a joint government-academic industrial project was launched with the support of the Housing Bureau, the Ministry of land, the Ministry of infrastructure, and the Ministry of transport and tourism, which led to the establishment of a new organization, the Japan Green Building Council (JaGBC) and the Japan Sustainable Building Federation (JSBC), the secretariat of which is managed by the Institute for building environment and energy conservation (IBEC). today, the Japan Green Building Council and the Japan Sustainable Building Federation are working together on research and development of a comprehensive assessment system for the efficiency of the built environment (CASBEE) as shown in Figure 1,2 and Table 6,7 . [6]

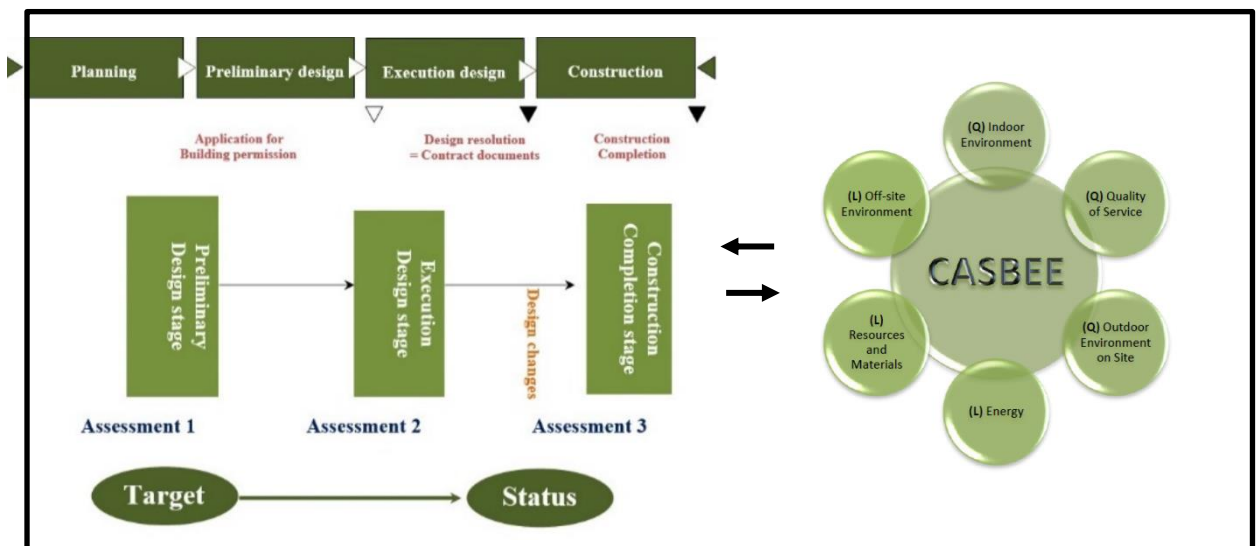


Figure 1. CASBEE Method Categories.

Table 6. CASBEE Method Categories- Comprehensive Assessment System for Built Environment Efficiency.

CASBEE-City (Comprehensive Assessment System for Built Environment Efficiency)
Ecology
Resources
Transportation
Place making

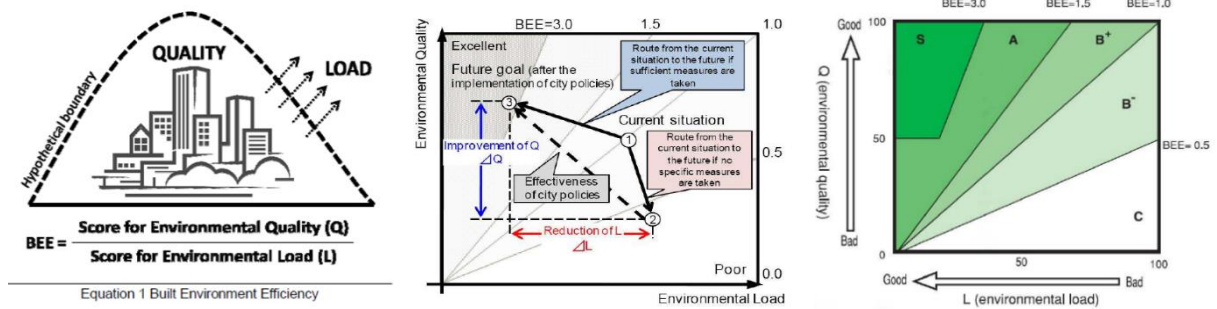


Figure 2. Virtual boundaries implemented by the CASBEE-City tool for urban communities

Table 7. Values evaluate the tool (CASBEE-City) for urban communities

Ranks	Assessment	BEE Value, Etc	Expressions
S	Excellent	BEE=3.0 OR More, Q50 Or More	*****
A	Very Good	BEE=1.5-3.0	****
B+	Good	BEE=1.0~1.5	***
B-	Fairly Poor	BEE=0.5~1.0	**
C	Poor	BEE=LESSTHEN 0.5	*

5.4 Green Star communities

This system was adopted in 2003 by the Green Building Council of Australia as shown in Figure 3, Table 8. [7]

- Creation of a common language and the development of a measurement standard for green buildings
- Enhance the overall construction design.
- Awareness of environmental leadership.
- Determining the effects of the life cycle of the building.
- Raising awareness of the benefits of green building.

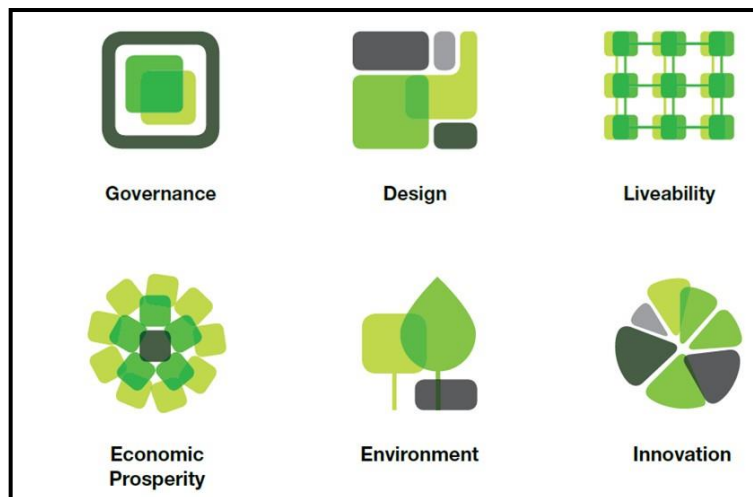


Figure 3. Communities Green Star Categories

Table 8. Elements of the Green Star community’s assessment of urban communities

Green Star communities
Enhance liveability
Providing diverse and affordable living
Creating healthy, safe and secure communities
Fostering inclusiveness and cohesiveness
Building community adaptability
Create Opportunities for Economic Prosperity
Promoting education and learning
Enhancing employment opportunities
Attracting investment
Promoting efficiency and effectiveness
Environmental Quality
Enhancing our natural
Reducing ecological footprint
Design Excellence
Adopting effective planning practices
Encouraging integrated design
Maintaining flexible and adaptable approaches
Creating desirable places
Creating desirable places
Demonstrate Visionary Leadership and Strong Governance
Establish coordinated and transparent approaches
Build a commitment to implementation
Incorporating performance evaluation, feedback and support mechanisms that provide opportunities for continual improvement Engaging with stakeholders
Fostering sustainable cultures and behaviors
Encouraging and rewarding innovation and behaviors

The classification of urban communities begins through the design and construction stages, the classification tool can be applied to various types of industrial, commercial and residential multi-use urban communities, and the classification as shown in Table 9. [7]

Table 9. Classification categories Green Star Communities

Ranks	Assessment	BEE Value,Etc	Expressions
S	Excellent	BEE=3.0ORMore,Q50 Or More	*****
A	Very Good	BEE=1.5-3.0	****
B+	Good	BEE=1.0~1.5	***
B-	Fairly Poor	BEE=0.5~1.0	**
C	Poor	BEE=LESSTHEN 0.5	*

5.5 DGNB – UD -stands for Deutsche Gesellschaft für Nachhaltiges Bauen eV-(German Green Building Council)

It is one of the leading systems in the field of assessing the sustainability of urban communities in the world due to the comprehensive concept that takes into account the equality between the economic, environmental, social and cultural aspects, and therefore it is possible to define sustainability goals starting from the planning stage.[8]

It was developed by the German Council for sustainable buildings together with the Federal Ministry of transport, construction and Urban Affairs (BMVBS) to be used as a tool for planning and evaluating urban communities in 2009. as shown in Figer 4,5.



Figure 4. Classification categories DGNB -UD System

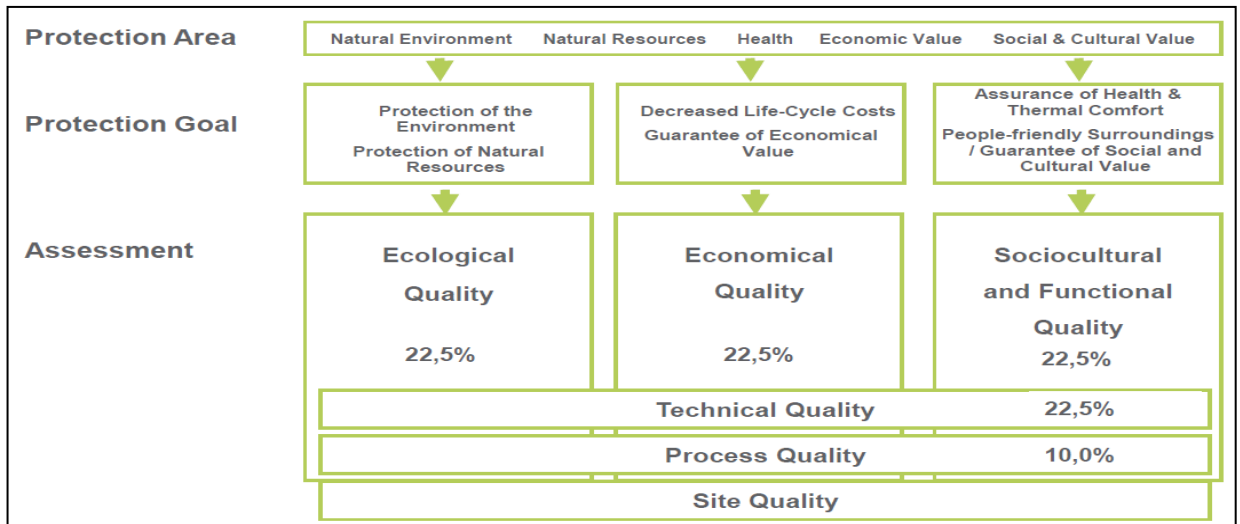


Figure 5. Classification elements of the DGNB – UD

In order for the DGNB evaluation system to be as complete and accurate as possible, there must be clearly defined goals for all the criteria based on which the evaluation is carried out in this system as shown in the Tabel 10.

Table 10. Evaluation categories of the (DGNB-UD)

Total performance index	Nominal performance index	Awards
From 50%	35%	Bronze
From 65%	50%	Silver
From 80%	65%	Gold

5.6 HQE (High Environmental Quality)

The association (HQE) was founded in 1995 and recognized as a non-profit organization in 2004, and this tool expresses the French concept of high-quality environment and that this tool aims to improve the quality of the environment and assess and monitor its impact on the cup of the Earth, it also aims to create open and closed environments to be healthy and comfortable for its customers, this tool works as shown in Tabel 11. [9]

Table 11. The HQE tool curriculum.

Method of the tool (HQE)	
First method	Environmental management system (EMS), which defines the necessary tools to follow up the work throughout the project period and structure the relationship between the parties involved
Second method	operational environment with quality (EBQ), which is built on the basis of 4 objectives divided into 4 main categories, which combines a wide range of environmental concerns around construction sites

The specific goals of the HQE certificate have been defined into 14 goals and these goals are divided into 4 main categories as follows as shown in Table 12.

Table 12. Elements of the HQE assessment of urban communities

HQE (Haute Quality Environmental)
Relationship of the building with its immediate environment
Integrated choice of products, systems and construction processes
Energy management
Water management
Activity waste management
Maintenance - Sustainability of environmental performance
Hygrometric comfort
Acoustic comfort
Visual comfort
Olfactory comfort
Sanitary air quality
Health Quality of water

The process of evaluating projects according to the (High Environmental Quality) Tool is carried out by assigning three levels of performance to each goal as shown in Table 13.

Table 13. Elements of the HQE assessment of urban communities.

Number of stars	Overall rating	Comment
1-4stars	Good	
5-8stars	Very Good	
9-12stars	Excellent	
12-16stars	Exceptional	As a minimum the building must conform to BBCenergy requirements

5.7 ESTIDAMA pearl building rating system

Launched by the Abu Dhabi Urban Planning Council (UPC) in May 2008, Estidama is an initiative to enhance the level of sustainability and improve the quality of life. This initiative represents Abu Dhabi's contribution to the momentum of the global dialogue on the best ways to create more sustainable residential communities, cities and global projects. The Estidama program is based on a clear vision of sustainability based on four pillars: Environment, Economy, Society and culture as shown in Figure 6. [11]



Figure 6. pillars of sustainability in the Estidama progra

The "Estidama" Pearl grading system is the first sustainability assessment standard in the Arab world. The Abu Dhabi Urban Planning Council (UPC) unveiled the system for the first time in 2009 to assess the degree of sustainability of all buildings, residential communities and villas. The "Pearl grading system for Estidama" includes "Pearl grading system for buildings" and "Pearl grading system for residential communities" in addition to "Pearl grading system for villas", and its criteria are applied starting from the design stage and extending through all stages of construction and use for development projects. [11]

The system provides a set of measurable guidelines to assess the sustainability performance of communities, buildings and major development projects through the four pillars of "Estidama": economy, environment, society and culture. To achieve the highest "sustainability" in buildings,

the Pearl grading system includes seven grades, namely, " the natural development process, communities and livable buildings, water, energy resources and innovative practice. [12]

The Pearl grading system is part of a major ambition to achieve a sustainable society in the long term. This system not only aims to promote technological leadership in the construction sector, but at the same time takes into account the achievement of many goals in the field of creating sustainable societies. The implementation of this effective system will lead to high efficiency results, especially in terms of conserving water and energy resources and creating more vibrant and comfortable communities that consume less energy and clean water with low rates of waste. [13]

The evaluation process is carried out by measuring the sustainability of the project by evaluating the Pearl, which is a system based on points that support the balances and fall under different and important categories, and therefore it is necessary to receive the most number of points to form a final total, which ranges from a minimum of one pearl and a maximum of five, [14] as shown in Table14.

Table 14. Evaluation according to the Pearl system.

Requirement	Pearl Rating Achieved
All mandatory credits	1Pearl
All mandatory credits +55Credit points	2Pearl
All mandatory credits +75Credit points	3Pearl
All mandatory credits +100Credit points	4Pearl
All mandatory credits +125Credit points	5Pearl

6. Results

Through the theoretical comparison of sustainability accreditation programs for urban communities, all key elements were summarized to develop a tool capable of measuring indicators of sustainability for new urban communities as shown in Table 15.

Table 15. Comparison between urban community assessment programs.

programs	LEED -ND
Developer &Year	the U. S. Green Buildings Council (USGBC) 2009
Categories	1- Smart Location and Linkage . 2- Green Infrastructure and Buildings. 3- Energy and Atmosphere. 4- Materials and Resources. 5- Environment Quality. 6- Neighborhood Pattern and Design 7- Regional Priority Credits. 8- Innovation and Design Process.
Rating	1- Certified (40-49 point) 2- Silver (50-59 point) 3- Gold (60-79 point) 4- Platinum (40-49 point)
Update process	As required
programs	BREEAM Communities
Developer &Year	the U. K. Building Research Establishment (BRE) 2009
Categories	1- Management 2- Health & Wellbeing 3- Energy 4- Transport 5- Water 6- Materials 7- Land Use and Ecology 8- Waste 9- Pollution 10- Innovation (additional)

Rating	1- Unclassified >30 2- Pass ≤30 3- Good ≤45 4- Very Good ≤55 5- Excellent ≥ 75 6- Outstanding ≤85
Update process	Annual
programs	CASBEE-City
Developer & Year	Japan Sustainable Building Consortium (JSBC) 2001
Categories	1- Ecology. 2- Resources. 3- Transportation 4- Place making
Rating	1- Poor (c) 2- Slightly Poor(B-) 3- Good(B+) 4- Very Good (A) 5- Superior (S)
Update process	As required
programs	Green Star Communities
Developer & Year	Green Building Council Australia (GBCA) 2003
Categories	1- Liveability. 2- Design. 3- Governance. 4- Innovation. 5- Environment. 6- Economic prosperity.
Rating	1-1 – 3 Stars 2-4 Stars 3-5 Stars 4-6 Stars
Update process	Annual
programs	DGNB-UD
Developer & Year	The German Sustainability Building Council and (BMVBS)
Categories	1-Environmental Quality. 2- Economic Quality. 3- Sociocultural and Functional. 4- Sociocultural and Functional. 5- TechnicalQuality. 6- Process Quality . 7- Site Quality
Rating	1- 35-50Bronze 2-50-65silver 3-65-80Gold
Update process	As required
Programs	HQE
Developer & Year	Association (HQE) France1995
Categories	1-Eco – Construction 2-Eco-Management 3-Comfort 4-Health
Rating	1- 1-4Good 2- 5-8veryGood 3- 9-12Excellent 4- 12-16Exceptional
Update process	As required
Programs	PCRS
Developer & Year	Abu Dhabi Urban Planning Council (UPC) 2009

Categories	1- Integrated Development Process. 2- Natural Systems. 3- Livable Buildings 4- Precious Water 5- Resourceful Energy 6- Stewarding Materials 7- Innovating Practice
Rating	1- 1 Pearl 2- 2 Pearl >55 3- 3 Pearl >75 4- 4 Pearl >100 5- 5 Pearl >125
Update process	Not available

7. Conclusions

The research is primarily concerned with effective practical practices for finding a role for sustainable urban planning systems in the developing world. He is also interested in how the developing world's cities can focus on achieving the Sustainable Development Goals for new urban communities by increasing awareness in prioritizing, integrating efforts, and serious follow-up and applying the necessary scientific, technical, administrative, and legislative means. In order to enhance the role of sustainable urban planning systems in meeting the challenges of urban communities and creating new sustainable urban communities. This was done by deducing fifteen key elements that have a direct impact on the assessment of the sustainability of new urban communities and comparing seven of the urban communities sustainability assessment programs, namely (Lead-Nd –Prime-Caspian-city-Green Star-DGNB-odd-HQ - press communities) as follows:

- processes of integrated development of the urban community
- strategy of management of natural systems of urban society
- living conditions of the urban community
- innovation and excellence in the design of the urban community
- the quality of the external spaces surrounding the users
- sustainable food systems
- creating opportunities for economic prosperity
- sustainable management of urban communities
- the urban community's energy use strategy
- urban community strategies to save water
- urban community waste management strategy
- urban community strategies to reduce pollution
- urban community strategy in promoting healthy communities.
- technical quality of the urban community
- urban community strategies for Infrastructure Sustainability

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