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Evaluation of the Green Egyptian Pyramid

Mohamed Gamal Ammar *

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

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Abstract In January 2009 was established the Egyptian Council for evaluating green building, then the Board issue a primary version of the Egyptian pyramid in 2010, and as a result of economic, social and political changes that happened in Egypt after the Arab spring period, the study of regional experiences of neighboring countries in Africa and Asia in the development of evaluation system for green buildings of global systems that can contribute to the development of the Egyptian pyramid to promote development of future construction in Egypt, and here was this research that uses the analytical comparative method, and according to the study, the Egyptian pyramid system is developed from the USA LEED despite the great difference between the two countries in economic and technology and the difference in social problems and quality between the two countries.

The research concluded to the need of developing the Egyptian pyramid system through studying more global systems, in addition to the need to benefit from the Egyptian experience stock of solutions and environmental treatments in ancient architecture.

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1. Introduction

The Green Pyramid Rating System was issued as a start to realize comprehension of green buildings in Egypt and the application of this comprehension increase its important to apply the complete economic development to go to the desert and to start construction and building and start a complete society

* Tel.: +20 35447477.

E-mail address: ammarconsultant@gmail.com

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in the desert to meet expected increase in the life needs as a cause of population development and increase, from that point, the use of environmental management to organize consumption of materials will be the first important need to realize development.

The comparative analysis of research course is used here and it is considered a try to evaluate the Green Pyramid Rating System through study of the construction system or knowing it from international no system comparing it with the system of constructing local systems in the nearby nations and starting to study the nations experiments to give a form or a symbol of local system from the international system and these experiments were selected on the bases of being tried and applied in the local market, and which are: the system of South Africa (SANS), and other two systems from Emirates: Leed, Estidama, and the system of Qatar – (QSAS), and the system of the Green Egyptian Pyramid, and all were studied through



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their specifications and goals and its standardization and its percentage weigh and the analysis of the whole frame of the system, then discuss the benefits of the system in false and defects then select the recommendations to develop the Egyptian system.

And we are going to study the comparative system according to the following measurements:

1. Weigh of selecting a system from the international evaluating systems.
2. The principal measurement forming the system and its goals.
3. The percentage weigh of measurement.
4. The whole system.
5. Participation of society in the application of the system.

2. The green architecture and rating system

The Green Architect is a way to design and execute and perform and manage buildings to limit and decrease the negative effects of the building on the environment to save the needs of today without neglecting the right of the coming generation from environmental resources, that means improving a design of the building to be more powerful and fit with minimum cost of performance and to keep more natural materials and sharing in the development of the interior environmental performance to realize increase of production and improve health of users and labors and that through realization the following design criteria [1].

Sustainable site, water efficiency, energy conservation, saving materials and resources, improve indoor environment quality.

Rating systems have been developed to measure the sustainability level of Green Buildings and provide best-practice experience in their highest certification level. With the given benchmark, the design, construction and operation of sustainable buildings will be certified. Using several criteria compiled in guidelines and checklist, building owners and operators are given a comprehensive measurable impact on their buildings' performance. The criteria either only cover aspects of the building approach to sustainability. like energy efficiency, or they cover the whole building approach by identifying performance in key areas like sustainable site development, human and environmental health, water savings, materials selection, indoor environmental quality, social aspects and economical quality. Furthermore, the purpose of rating systems is to certify the different aspects of sustainable development during the planning and construction stages. The certification process means quality assurance for building owners and users. Important criteria for successful assessments are convenience, usability and adequate effort during the different stages of the design process. The result of the assessment should be easy to communicate and should be showing transparent derivation and reliability [2].

Structure of rating systems: The different aspects are sorted in over all categories, like: energy, or quality groups: ecology, economy and social demands. For each aspect, one or more benchmarks exist, which need to be verified in order to meet requirements or obtain points. Depending on the method used, individual points are either added up or initially weighted and

then summed up to obtain the final result. The number of points is ranked in the rating scale, which is divided into different levels: The higher the number of points, the better the certification [3].

And with the development of consciousness to apply the sustainable development we find in the neighbor nations of Africa and Asia, we find local rating systems to apply the comprehensive Green Architect, and the important and care of environmental causes start in Arab countries but it was late and it comes up and out in the Gulf nations first, perhaps because they are related and in connection with the international system, and to increase the amount of development and increase of architect and population buildings witch help to be effected early with the permanent causes and which was parallel to the need of power to save the continuous cost to the buildings and make water available as it is rare and this area and that in Emirates and Qatar, in South Africa as it is enjoys economic and political stability more than other countries and thus these countries are considered the countries that created the system and build with it a suitable period from the year 2008 and at last came up the care to get out local systems in Egypt and Lebanon, Jordan, Morocco, Kuwait, Saudi Arabia but it was not applied and experienced very well and for that we are going to study the system in the following: South Africa, United Emirates and Qatar.

3. South Africa

On 2007, The Green Building Council was established in South Africa GBCSA, and on 2008, local system was established to evaluate and classify The Green Buildings. And that after the study of several international systems BREEAM (United Kingdom), LEED (United States of America), Green Star (Australia), and after the analysis and study of these systems and after consulting industrial businessmen and experts which are specialized The Green Star system was selected to be the suitable system because it is the easy one and also help to apply the system to reduce the consumption of electricity in the building up to half of it. And also in the uses of water, and it is expected to reduce consumption of power to come up to 40% in the commercial buildings [4].

3.1. Goals

The principal goal is to realize the comprehension of permanent building that results presentation of a lodging that never harms the environment in a simple calm, attractive way with suitable price for the citizen and that will be through four goals [5]:

1. To limit the environmental effects of the building during construction.
2. To limit the environmental effects of the building during operation of renting and lodging.
3. To limit the environmental effects at end of its existence.
4. Give occasion for this experiment and developing performance and accumulation of experiments of human beings.

3.2. The Rating categories

The Rating Tool makes use of eight categories (see Table 1).

Table 1 The Rating categories. *Source:* Towards Green Building in South Africa, 2009, p. 2.

	Categories	Points	Ratio (%)	
1	Management	14	9.5	This category addresses professional appointments, policies and procedures from project conception through design, construction, commissioning, tuning and operation. Core credits are provided for the appointment of a Green Star™ Accredited Professional; contractually binding commissioning clauses; requirements for building tuning during the commissioning period; the appointment of an independent commissioning agent; the production of a building user guide; environmental management during construction; and waste management during construction
2	Indoor environmental quality	28	19	The Indoor Environmental Quality (IEQ) category addresses occupant health, comfort, satisfaction and productivity through elements such as indoor air quality, thermal comfort and lighting. Core credits are provided for daylight glare control; the use of high frequency ballasts to avoid light flicker; electric lighting levels; access to external views; access to individual comfort control; and the provision of tenant exhaust risers
3	Energy	30	20	The energy category targets the reduction of greenhouse gas emissions from the building's operation; energy efficient solutions; and renewable, on-site energy generation. Core credits are given for energy improvement; peak energy demand reduction; electrical sub-metering; tenancy sub-metering; office lighting zoning; and office lighting power density
4	Transport	14	9.5	The transport category targets the reduction of individual automotive commutes by both discouraging it and simultaneously rewarding alternative transportation options. Core credits are given for the provision of car parking below the requirements of the town planning requirements; provision of parking for small cars; provision of cyclist facilities; and proximity to public transport
5	Water	15	10	The water category addresses the reduction of potable water consumption in the major areas of a building's demand: occupant amenity, landscape irrigation, evaporative heat rejection and fire systems; encourages demand reduction and by encouraging the use of recycled and rain water. Core credits are given for occupant amenity potable water efficiency; water metering; landscape irrigation water efficiency; cooling tower water consumption; and fire system water consumption
6	Materials	22	15	The material category includes the 'reduce, reuse and recycle' incentives that minimize environmental pressure from resource consumption. Core credits are given for recycling waste storage; reuse of facades; reuse of structure; shell and core or Integrated Fit-out; recycled content of structural concrete; recycled content of structural steel; PVC minimization; and the use of sustainable timber
7	Land use and ecology	9	6	The land use category addresses the project's impact on its immediate ecosystem by encouraging preservation and restoration of flora and fauna. Core credits are given for the ecological value of the site; the reuse of land; the reuse of reclaimed contaminated land; change in ecological value; and the avoidance of topsoil and fill removal
8	Emissions	17	11	The emissions category addresses point source pollution from the development to the atmosphere, watercourse and local ecosystems. Core credits are given for the use of refrigerants free of ozone depleting pollution (ODP); the use of refrigerant's free of global warming pollution (GWP) content; refrigerant leak detection; refrigerant recovery; avoidance of watercourse pollution; reduced flow to sewer; light pollution minimized; the avoidance of systems requiring cooling towers; and the use of insulation free of ozone depleting pollution
	Total	149	100	

3.3. The principal features of the Rating

1. The four principles of The Green Building design (water, materials, energy, inner environment) forms the principal skeleton of the system.
2. It was expressed for the permanent site in the environmental measurement and use of land and the transport measurement.
3. Importance and care of environmental management of the building in the stages of design and construction and execution were put in a suitable place in the system.
4. It is taken care of local question in the international order of environment through giving suitable value of necessity of limitation of emanations that cause local and international problems.
5. It is taken care of local question through giving percentage value greater than other measurements that serve local problems like energy and materials.
6. What is bad in the system, that it does not respond to the need of taking care and keeping the environment and natural systems and support of biological diversity and not only reducing the environmental effect of buildings.

3.4. Discussion around the system

After the study of several international systems, the Australian evaluation system was selected as it is clear that it is similar to the South Africa system and that in its nature, open land, and climate conditions, and natural resources and metals of the two nations or countries and also its possession of very wide, and so the Australian system is considered a suitable way to be developed to realize the privacy of place in South Africa, while there is very big inheritance of social problems and a great percentage of poor people in South Africa because of long periods of the rule of racial discrimination that results now the wish of the country to try to realize social luxury for people and give them suitable lodging with cheap price through comprehension of The Green Building.

The South Africa experiment was distinguished for the sharing of different sections or groups of the society that effects The Green understanding, so the private sector established the council which issued the system of evaluation of green buildings, then it starts to industrializes articles to help to realize that like equipments to generate power from the sun rays and the authorities of the country supported towards green buildings by giving loans to build building that save power then some of those who study and centers of researches presented researches to evaluate the performance of the system and present advices and consultation of how it is developed, and this is what we need to realized the green building, co-operation of all to support and complete and help all firms and groups of society to apply this idea.

In the study for evaluating the system done by environment unit affiliated to scientific and industrial research center in South Africa, the system was evaluated and the result was success in achieving general goals for green building, in general. It is not sufficient for achieving sustainable building goals and social welfare in countries in which many poor and needy lived. The report recommends that the system is suitable as start or first step with recommendation by its development as follow [6]:

1. To be able to preserve the environment and natural system.
2. Controlling green house gases where the building works were considered responsible for 22% from emissions of green house gases in South Africa.
3. Introducing bonus and incentives for contracting companies which adopt green building.
4. Use researches and statistics system in South Africa for developing the system of green building for facing environmental challenges (see Fig. 1).

4. United Emirates

There are two rating systems in the UAE to assess green buildings, namely: UAE – LEED (Dubai). Estidama – Pearl Rating System (Abu Dhabi).

4.1. UAE – LEED

Thirty-nine engineering companies made a study to apply a green building concept in Emirates; the result was establishing Emirates Council for green building and was registered in global council for green building on 2006. Some of systems of

evaluating accredited green building in developed countries have been compared like United States (LEED System) and Austria (RATS NEERG system), then a proposal was prepared for evaluating green building system in Emirates depending on evaluating system of green building for United States Leed, the necessary modifications have been determined to complies with environment requirements and the position of labor market in Emirates. The basic modification which has been carrying on the evaluating system of green building for United States is concentrating on water sector for its scarcity in area with other modifications on using the materials to make the system more suitable for applying in Emirates. The proposed system has been submitted to the United States council of green building for revising it by its technical committee, the first edition has been published in 2008 [7].

4.1.1. Goals

The system aims to apply green building concepts in general, with interest of rationalization of energy and water. Those represent the basic problems in area [7].

4.1.2. The Rating categories

The Rating was divided into six categories similar to the LEED system are as follows (see Table 2).

4.1.3. The principal features of the Rating

1. The system of (Emirates Leed) has been derived directly from the system of Leed, and contains on the same six system standers.
2. The five principals of designing green building (site, water, energy, materials, internal environment) form the main structure for the system.
3. The relative weight for stander has been changed for serving the local problems as water scarcity.
4. The system is characterized by simplicity of use and ease of application.
5. The bad thing in this system is its stressing on building management thus its negative effects is decreased on environment comparing with other building, or the building becomes (greener) not to be (real green building).
6. The bad thing in system is focusing on efficiency use – rationalizing or reducing consumption – energy which depends on fossil fuel not using renewable energy.
7. The bad thing in this system is its stressing on final produce apart from environmental damage in manufacturing stage.

4.2. Estidama – Pearl Rating System

Abu Dhabi urban planning council has been established on 2007, and the full authority is given to it to be the responsible authority for the future of urban environment in state, then the council has released a sustainable system for evaluating green buildings in co-operation with number of governmental authorities and real estate specialists and this system is evaluated by grades which so called Pearl grades [8].

4.2.1. Goals

The system aims to apply the concepts of green architecture in general with emphasis on the rationalization of energy and



Figure 1 The cultivation of surfaces and walls in South Africa. Source: Green Building in South Africa, 2009, P. 14

Table 2 The Rating categories. Source: Environmental Center for Arab Towns, < <http://www.ecat.ae/ar/news/51.aspx> > .

Categories	Points	Ratio (%)	
1 Sustainable site	13	18	Aim to achieve sustainable site, 13 points instead of 14 points in LEED
2 Water-use efficiency	12	17	To reduce water consumption, 12 points instead of five points in LEED
3 Energy and atmosphere	16	22	Energy saving and conservation measures, 16 points instead of 17 points in LEED
4 Materials and sources	11	15	To provide material consumption, and conserve natural resources, 11 points instead of 13 points in LEED
5 Indoor environmental quality	15	21	Seek to provide an environment appropriate internal check comfort to the user, and maintains his health, 15 points in both
6 Innovation	5	7	Extra points awarded for innovation and creativity in providing processors verify the concept of green architecture, five points in both
Total	72	100	

water, and represent the most important problems in the area [9].

4.2.2. The Rating categories

The Pearl Rating System is organized into seven categories that are fundamental to more sustainable development (see Table 3).

4.2.3. The principal features of the Rating

1. The system is characterized inclusiveness in promoting the application of sustainability concepts which represent a broader concept and more comprehensive concept of green architecture, through the integration environmental local and global problems, while reducing the environmental impact of the building, in addition to achieving communication with the society and expressing about through addition of three criteria its (perfect development, natural systems, realizing local societies) and give it weight that represents about 40% of the weight of the total system.
2. Criteria for integrated development seeks to achieve integration in teamwork from all specializations and suggestion the systems used in the building, with the environmental management, with emphasis on cultural social characteristics, and economic, and that since the early start of the project in the first stages of design, implementation and operation.
3. Standardization of natural systems cares about preserving natural systems on natural and environmental characteristics of the region and support biological diversity with compatibility and local production for food.

4. Livable Communities aims to support the application of social aspects of sustainability, culture and economy, and that through the formation of distinct societies expected to be available Enough for social and the population development, and taking into account the customs and the traditions and express personal identity and the cultural aspect of the country.
5. The three principles of green architecture design (water/energy/materials) constitute part of the main structure of the system.
6. Environmental quality has been achieved as part of the internal standard to achieve local societies. And sustainable location as part of the standard integrated development and standard integrated systems, natural systems.
7. The Interest of the local dimension by giving greater relative weight standards that serve local problems, Special the two problems of energy and water, and relative which about 50% of the total weight of the system standards.

4.3. Discussion about two systems

Clearly the increasing development and big urbanization and the globalization think and global level of architecture that is currently underway in the United Arab Emirates, especially Dubai which reached a new global levels in design and technique which used all that and put the idea of green architecture as a competing distinct in the building huge market a form of modernity, give the building a form of modernity, globalization and excellence which helps to add fame to help building

Table 3 The Rating categories. *Source:* The Pearl Rating System for Estidama, 2010, p. 2.

Categories	Points	Ratio (%)	
1 Integrated development process	10	6	Encouraging cross-disciplinary teamwork to deliver environmental and quality management throughout the life of the project
2 Natural systems	14	9	Conserving, preserving and restoring the region's critical natural environments and habitats
3 Livable communities	38	23	Improving the quality and connectivity of outdoor and indoor spaces
4 Precious water	37	23	Reducing water demand and encouraging efficient distribution and alternative water sources
5 Resourceful energy	42	26	Targeting energy conservation through passive design measures, reduced demand, energy efficiency and renewable sources
6 Stewarding materials	18	11	Ensuring consideration of the 'whole-of-life' cycle when selecting and specifying materials
Innovating practice	3	2	Encouraging innovation in building design and construction to facilitate market and industry transformation
Total	162	100	158 points + 3 innovating

market. In addition to providing the continuous costs for building operation energy consumption, resources and water, it is also in major office buildings reduces the cost continuing to operate the building, and create pleasant working environmental comfortable, and improve the health of users and raise productivity rates, also raise the value of ownership of the building and lease revenues. And this is what led to the Coming together 39 companies to establish a reference of green concept to benefit from the advantages of the application of this concept.

System has been devised (Emirates – LEED) directly from the study of one global system, and maybe this agrees with the thinking of globalization followed by the United Arab Emirates from a long time. And it opens horizons to bring or reduce the distances between the social and intellectual aspects and cultural relations between the united state and United Arab Emirates, and characterize Emirates large expansion in the use of modern technology with the major economic power which increases the similarities between the two countries. But the difference between the two countries in some respects such as weather conditions has been processed to change some point internal sub-systems standards and modify the weights. But wrong with the process of developing a local system is defected because the new local system often gets the same disadvantages and advantages of the original system.

The great Renaissance extensive construction Resulted of the presence the spirit of the competition between the various components of the United Arab Emirates and specially the two

big emirates Abu Dhabi and Dubai for the emergence of sustainable system to assess green buildings. And this is evaluated by loloa grades which express the nature of old Emirates society which has depended on fishing, Which gives a sense that its suggestion that the opposite direction of globalization that produced the system (United Arab Emirates “LEED”) and may be first system appeared as looking for excellence from the second system, this is what was evident in the differences in the two systems, even though the two emirates are considered neighbors and with small surfaces, the objectives of the system (sustainability) is the broader and more comprehensive of the objectives of the system (United Arab Emirates “LEED”), it is also characterized by the their interest of the cultural and social aspects, which makes the sustainable system is more comprehensive and acquainted with different aspects of life, and thus more suitable for privacy of place.

Under public sector support for the application of the concepts of green architecture Dubai Electricity & Water Authority of Dubai municipality issued in 2012, manual materials and green buildings products and testing labs all materials founded. And in it all the material and place of its test [10] (see Figs. 2 and 3).

5. Qatar

To devise a system, 140 systems studied to evaluate green buildings, and then selected 40 systems integrated evaluation systems, then evaluated in six evaluation systems which are:



Figure 2 “Echo” Towers, UAE, environmentally friendly and certified LEED Platinum. *Source:* <http://www.dralhaj.com/>.



Figure 3 Sheikh Zayed Centre for Desert Learning, fifth pearl sustainability system. *Source:* <http://www.estidama.org/pearl-rating-system-v10/>.

Prem (United Kingdom) LEED (United states of America) Green Globes (Canada) CASBEE (Japan) GP Tool (international, and Sebas (Hong Kong) and from it Qatar system – Qasas was selected, The system has been developed by Barwa & Qatari Diar Research Institute (BQDRI) in collaboration with T.C. Chan Center at the University of Pennsylvania – USA [11].

5.1. Goals

Goals define values to be achieved to lower impact on the environment, and provide [12]:

1. [UC] The building's planning shall incorporate urban considerations.
2. [S] The building's development in relation to the existing site conditions shall be controlled.
3. [E] The building's depletion of fossil energy over its service life shall be controlled.
4. [W] The building's impact on the overall water resource shall be controlled.
5. [M] The impact of the building's use of materials on the environment shall be controlled.
6. [IE] The building's indoor environment shall be controlled.
7. [CE] The building's cultural and economic value shall be maintained or enhanced.
8. [MO] The building's management and operations plan shall be defined.

5.2. The Rating categories

The Rating Tool makes use of seven categories (see Table 4).

5.3. The principal features of the Rating

1. The systems is characterized inclusiveness in promoting the application of the concepts of social, cultural sustainability, economic development and culture, and that through the addition of three criteria, social communication standard, values and standard of culture, values and standard management and operation, and give its weight with an average 29% of the total system standards.
2. The five of green architecture design (location, water, energy, materials, internal environment) constitute part of the main structure of the system.

Table 4 The Rating categories. *Source:* Qatar Sustainability Assessment system (QSAS), 2010, p. 6.

Categories	Points	Ratio (%)	
1 [UC] Urban connectivity	8	8	Consists of factors associated with the urban environment such as zoning, transportation networks and loadings. Loadings on the urban environment include traffic congestion and air, noise, and light pollution
2 [S] Site	9	9	Consists of factors associated with land use such as land conservation or remediation and site selection, planning and development
3 [E] Energy	24	24	Consists of factors associated with the energy demand of buildings, the efficiency of energy delivery, and the use of fossil energy sources that result in harmful emissions and pollution
4 [W] Water	16	16	Consists of factors associated with water consumption and its associated burden on municipal supply and treatment systems
5 [M] Materials	8	8	Consists of factors associated with material extraction, processing, manufacturing, distribution, use/re-use, and disposal
6 [IE] Indoor Environment	14	14	Consists of factors associated with indoor environmental quality such as thermal comfort and air, acoustic, and light quality
7 [CE] Cultural and economic value	13	13	Consists of factors associated with cultural conservation and support of the local economy
8 [MO] Management and operations	8	8	Consists of factors associated with building design management and operations, such as sub-metering of energy usage, leak detection, and commissioning
Total	100	100	

3. The interest of The local dimension through giving greater relative weight for standards which serve local problems, special the problems of energy and water whose relative weight represent approximately 40% from total weight of system standards.
4. The disadvantage of the system is it gives limited attention to global problems such as global emissions of green house gases in the light of its focus on local depth.

5.4. Discussion about system

It is clear that Qatar is wishing and longing to make a global distance center for her and which had created effects of making wide and great renaissance building of special international distinct feature, keeping in the mean time the social and cultural traditions of the country, and which reflected on each way of selection of the system of the green buildings, thus its wish to establish the best global local system make it to work on three principles axes:

1. Forty international systems have been studied to evaluate the green building and that from more than 140 systems then six complete system were selected and so the local system was from it after study and an analysis and consulting the experts and this way or doing that makes the new local system avoids the defects of global systems and realizes the most distance feature them.
2. This system makes study from the real problems and local needs and the environmental conditions, and also the study of local real-estates from the specialists firms, and places then they make new system to meet the special status of the place, with adding branch standardizations to overcome local problems and increasing value of any building question to its local priorities.
3. To care the realization and keeping the local social and cultural depth of one part and be sure of local building feature from the other part.



Figure 4 Kahrm Garden for Development, QSAS award for the Sustainable Building 2011. Source: <http://www.skyscraper-city.com/>.

4. Then we find that the local building way is mixed with the global experiments to arrive to local system which is very elastic and easy to apply and possibility of application (see Fig. 4).

6. The Green Egyptian Pyramid

The Egyptian Green Building Council was established in 2009 encouraging the implementation of already existing codes aiming to preserve the environment, combat desertification, and reduce energy consumption in buildings. For this purpose, the council developed the Green Pyramid Rating System at 2010 [13].

6.1. Goals

The goals of the Green Pyramid Rating System are [14].

1. To provide a benchmark for good practice that enables buildings in Egypt to be assessed for their green credentials through a credible, challenging and transparent environmental rating system.
2. To enable building designers, constructors and developers to make reasoned choices based upon the environmental impact of their decisions.
3. To stimulate awareness of, and demand for sustainable green buildings.
4. To allow informed dialogue with interested parties and contribute to wider debate on Green Building in Egypt over the coming years.
5. To encourage the design and construction of sustainable green buildings, and contribute significantly to a better, more sustainable building stock for the Nation.

6.2. The Rating categories

The Rating was divided into seven categories similar to the LEED system are as follows (see Table 5).

6.3. The principal features of the Rating

1. The system is derived directly from the system of Leed, consequently there are six similar standers between the two system.
2. The five principals of designing green building (site, water, energy, materials and internal environment) form the main structure for the system.
3. The relative weight for stander was changed for serving local problems as water scarcity.
4. The system is simply used and easily applicable.
5. The bad thing in this system is its stressing on the building management, thus its negative effects is decreased on environment comparing with other building, or the building becomes (more green) not to be (real green building)
6. The bad thing in this system is focusing on efficiency use – rationalizing or reducing consumption – energy which depends on fossil fuel not using renewable energy
7. The bad thing in system is lack of comprehensiveness in achieving the remains of social, cultural and economic sustainable goals.

Table 5 The Rating categories. *Source:* The Green Pyramid Rating System (GPRS), 2011, p. 9.

Categories	Points	Ratio (%)	
1 Sustainable site	15	14	To encourage development in desert areas, redevelopment in informal areas and avoid projects which negatively affect archaeological, historical and protected areas
2 Energy	25	24	To reduce energy consumption and carbon emissions by incorporating passive design strategies
3 Water-use efficiency	30	29	Helping professionals across the country to improve the quality of our buildings and their impact on the environment Develop and implement a comprehensive water strategy Minimize indoor and outdoor water demands Reduce potable water use
4 Materials and sources	10	10	To encourage selection of materials with a low environmental impact and cost over the full life cycle of the building
5 Indoor environmental quality	10	10	To provide a building and its systems that support the wellbeing and comfort of occupants by providing sufficient outside air ventilation and indoor air quality. to encourage use of low-emission adhesives, sealants, paints, coatings, flooring and ceiling systems and to mitigate the health risks associated with formaldehyde in building products. to promote thermal, visual and acoustic comfort of occupants
6 Management	10	10	To encourage development in desert areas, redevelopment in informal areas and avoid projects which negatively affect archaeological, historical and protected areas
7 Innovation	3	3	Bonus
Total	103	100	100 + 3 bonus

6.4. Discussion around the system

The Egyptian pyramid is considered as first step on the right path for achieving sustainable concepts and green building, according to team work in discussion seminar of final draft for the system on 15/12/2010, the basic idea has been preparing simple and easy system to encourage specialists to adopt it and this system will be developed and improved during work, asking different authorities and specialists to submit their perceptions or participations to develop the system and improve its performance. From this respect, this research is trying to submit a vision for developing the Egyptian system.

with non-existing any support from levels of society, unlike other international rating system and this called at the high level from certificates (green) instead of (platinum), for example, to raise consciousness and emphasizing that the final goal is reaching the green.

The motto of the system is designed as symbolic form like green pyramid which represent the oldest green buildings in the world, with louts which represent the relation with local environment. The green circle outside frame refers to preserving on environmental balance and sustainable. In addition to the philosophy of green building is expressed as truth, as soon as ending from building, this becomes as integral part from surrounding environment (see Fig. 5).

7. The summary of systems comparison

1. The system studied on the base of four standards represent the principals of designing of green building, those are efficient use of water, energy, rationalizing material and sources, existing internal environment and disproportionately stander of sustainable site among evaluating system, with difference of relative weight of standard according to each vision of system.
2. Systems of South Africa, Qatar and Qsas are characterized by its comprehensiveness – with disproportionately in applying sustainable concepts which represent wider con-



Figure 5 The first village and the low cost producer and environment friendly in Egypt, on 800 acres in Fayoum. *Source:* <http://egypt-gbc.org/events.html>.

- cept and comprehensive than concept of green building through achieving social networking, taking into account cultural, economic, social properties and traditions and customs and expressing identity and local character.
3. Most of systems are characterized by the interest of standard of environmental management; this is from starting the project in the first stage of designing then implementing then operating.
4. The Estidama system is characterized by preserving on natural system and natural environmental for area, enhancing biodiversity and integrated development which seeks to achieve integration in teamwork in all development specializations with selection of the systems of constructing, implementing and sustainable operating.
5. Systems are characterized by its interests with various degrees to the local dimension through giving more relative weight to the criteria which serve the local problems.
6. South Africa system is characterized by the interest of the treatment of the global environmental problems through adding a main criteria which gives degrees to limit the gases emissions which create the retention warming.

Table 6 The rating comparison 1. *Source:* Author.

Green Pyramid Egypt	QSAS Qatar	Estidama The United Arab of Emirates Rating Systems	UAE – LEED The United Arab of Emirates LEED	SANS South Africa	Place
LEED 2010	CASBEE- Green Globes – GSTool - BREEAM –LEED 2009	2008	2008	2008	Developed From Date
Management	10 Management	8 Integrated development process	6 Livable communities	Management	9.5 Categories
Sustainable site	14 Site	9 Cultural and economic	23 Urban connectivity	Land use and ecology	6
Water-use efficiency	29 Water	16 Site	9 Natural systems	Transport	9.5
Energy	24 Energy	24 Water	23 Precious water	Water	10
Materials and sources	10 Materials	8 Indoor environment	26 Resourceful energy	Energy	20
Indoor environmental quality	10 Indoor environment	14 Materials	11 Stewarding materials	Emissions	11
Innovation	3 Innovation	100%	Innovating practice	Indoor environmental quality	15
					19
					100%
					100%
					100%
					Total

- Most systems are characterized by adding degrees of innovation, creativity and excellence to present treatments to achieve the green architecture.
- The difference between Leed Emirates and sustainability system is clear. The last one is created to the place privacy and more inclusive and to achieve the needs and the treatment of local problems (see Tables 6 and 7).

8. Recommendations

Obviously, to deriving a local system, it should be taken in consideration the privacy of the place and the big difference between economics of countries which have the global classification systems and Egypt as a country of the third world, therefore the difference between the technology and the awareness degree of people, and make way for the privacy of the Egyptian experience, and its richness by several natural treatments which reduce the energy consumption and resources and therefore to limit the negative effects of the building on the environment, and in this context the Egyptian pyramid system is considered as the first step to achieve the green architecture concepts in Egypt, and it can be used as a start with studying the achievement of the following recommendations:

- The necessity of developing The Egyptian pyramid system through studying more than one global system, and this is to avoid defects of Leed System and to obtain the majority of advantages of others systems.
- The necessity of developing the system to be a complete thought which includes all the elements which participate in the project from the design phase up to the phase of the construction, processing and maintenance, it needs the integration of the constructional, electrical, mechanical and medical systems with the architectural design, and with the environmental administration to all project phases.
- The necessity of promoting the application of the sustainability concepts which represent a larger and more comprehensive concept than the green architecture concept, and this through the achievement of the cultural, economic and social axes.
- The necessity of developing the system to treat the international environment problems through giving degrees to limit gases emission which create the retention warming.
- The necessity of doing expanded studies by the responsible agencies to know the fact and the local problems and the environmental effects of the buildings and study the climatic conditions of the zone, and then integrate it into the study of the international systems to deriving a local system which corresponds with the privacy of the place in Egypt.
- Obviously, it's clear from analyzing the Ancient Egyptian Architecture its success in the construction that reduce the climatic effects which result from the desert nature of the place, and achieve the comfort for users, by relieving the pressure on the environmental resources, and this is the main purpose to the green architecture concept, and that's why it should be integrated into the new local system to achieve the Egyptian personality in the application of

Table 7 The rating comparison 2. *Source:* Author.

	South Africa – SANS	UAE – LEED	UAE – Estidama	Qatar – QSAS	Egypt – Green Pyramid
Rating development	The local system has been developed from a global system of Australia, because of the similarity between the conditions, climate and the general features	It has been developed from the global system (LEED), the two countries are similar in heavy use of the means of modern technology and economic power, the globalization used in Dubai pulled a social and cultural cooperation between the two countries, for the differences in climate and problems (such as scarcity of water) the weights of the criteria has been changed	(Estidama) expresses the concept of sustainability, which is more comprehensive than concept of green architecture, so it is more sustainability than (UAE – LEED), and more expression of the cultural and social aspects	Been deduced from six global systems, after determine the problems and needs of local environmental conditions, and then add sub-criteria treats local problems, and Increase the weight of the points according to local priorities, and confirm the identity and character of the local architectural, and expression of the social cultural aspects	It has been developed from the global system (LEED), although the difference in economic and technological and social and cultural aspects between the two countries, as there is no benefit from the experience ancient Egyptian architecture, and was not addressing local problems such as mismanagement and lack of Awareness and Training
Community participation	It was created by commercial real estate companies. Been manufacturing green architecture products. The state by giving the advantages and loans to build energy efficient buildings. The research centers provide research for the evaluation and development of the system. Been concerted efforts and integration sectors of society to achieve green architecture	System has been produced by private companies. Dubai Municipality has issued in 2012, Material and Products Green Building and testing laboratories	It has Been created by governmental body. A decision has been taken to make the pearl requirements as a condition for all projects in the new urban complexes. It has Been integrated with the code of Abu Dhabi international building	System has been produced by two large companies. System requirements will be a condition for the construction of large projects	It has Been created by governmental body, with the absence of any support from other segments of society

the green architecture concept (design, guidance, the outer envelope, backyards, courtyards, face opening and stretches, rattle, cooling towers) which correspond with the current needs and the contemporary environmental conditions.

7. The necessity of the combination of the efforts and the participation of the segments of the society influencing to achieve the green concept, the public sector has to do the legislation laws and to present facilities and taxes exemptions with the possibility of giving advantages and credits to build green buildings, and the private sector produce materials and products and the necessary industry to the application of these concepts, and to facilitate and publish the using of modern technology ways which operating on measuring and rationalizing the consumption of materials and resources and the control of energy and industrial systems of the building, and the civil society organizations and researches centers have to present the technical support and researches to evaluate the system performance and to present recommendations how to develop it, and also the institutions and associations and organizations present how to use materials and local products, and give certificates to the products and materials which are proved they are green corresponding to the environment, which facilitate the application of the idea and the media has its role to raise awareness of the public and the publishment and marketing of the idea, and by that the institutions and society segments shall be integrate to achieve the green architecture concept.
8. The necessity of adding points to treat the problems which characterized the Egyptian society, especially in enormous projects, such as the quality of the environmental management of the building starting from the design up to execution and processing and maintenance, and the necessity of existing programs to awareness people and publish the environmental thought until he accept the idea, if the public did not understand the idea and it is not convinced of it, he will not do it and may hostile it, and also set programs of training staff to the application and the importance the green concept, and this from the first phase of the design and execution by training minor engineers and contractors,

up to processing and management phases, by the continuous training to all workers and employees according to the need and the necessity to achieve the communication with the local society.

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