RELEVANCE OF INTERIOR ARCHITECTURE WITH ASSESSMENT SYSTEMS OF SUSTAINABLE DESIGN

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ABSTRACT

RELEVANCE OF INTERIOR ARCHITECTURE WITH ASSESSMENT SYSTEMS OF SUSTAINABLE DESIGN

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This study discusses relevance of sustainable design from the point of view of interior architecture. It introduces two recognized sustainable building rating systems, LEED and BREEAM; and it analyses the role of interior architect within these assessment systems. Additionally, this study questions the status of interior architecture within national and international laws and regulations concerning sustainability. In light of these examinations, it suggests strategies for improving the role of interior architecture in sustainable design in Turkey.

Keywords: Sustainability, Ecological Architecture, LEED, BREEAM, Sustainable Architecture, Interior Architecture

ÖZ

İÇ MİMARLIĞIN SÜRDÜRÜLEBİLİR TASARIM DEĞERLENDİRME SİSTEMLERİ İLE İLİŞKİSİ

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Bu çalışmada iç mimarlık mesleğinin sürdürülebilir tasarım ile ilişkisi tartışılmıştır. Kabul edilmiş sürdürülebilir bina değerlendirme sistemlerinden ikisi olan LEED ve BREEAM Değerlendirme Sistemleri tanıtılmış ve iç mimarlığın bu sistemler üzerindeki rolü analiz edilmiştir. Buna ek olarak iç mimarlığın sürdürülebilirlik ile ilgili ulusal ve uluslararası kanunlar ve yönetmelikler içerisindeki durumu sorgulanmıştır. Bu incelemeler ışığında, Türkiye'deki iç mimarlık mesleğinin sürüdürülebilir tasarımdaki rolünün gelişmesi üzerine önerilerde bulunulmuştur.

Anahtar Kelimeler: Sürdürülebilirlik, Ekolojik Mimari, LEED, BREEAM, Sürdürülebilir Mimarlık, İç Mimari,

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CHAPTER 1

INTRODUCTION

1.1 Scope of the Study

In our world one of the most important problems is environmental pollution. Unconscious usage of natural resources causes unreturnable effects and permanent impacts on world. There are various attempts searching for solutions to this issue, yet nature continues to be destroyed. As we are destroying our environment the future of the world gets in danger. Many branches of industry pollute nature for their profit. Construction sector is one of the main fields which should consider natural awareness and sustainability.

Creating the built environment in ideal is based on people's comfort and healthy living conditions. To achieve this comfort, the actors of construction industry may use natural resources without thinking of the future. Water, air and forests are the main resources consumed unconsciously. All these resources are related to one another, as one is getting polluted the other gets harmed as well.

Today, many new organizations are started to cut down the usage of these resources and many new buildings are designed referring to the policies of those organizations. The precautions are mainly focused on the usage of electricity, water and nature based materials. The aim of those precautions is to reduce the unconscious consumption of resources and to propose less nature based materials by providing new solutions.

In order to lower down natural pollution and diminishing of natural resources, not only the materials but also the design principles should be given significance. It is

through these principles of sustainable design that the buildings acquire the notion of 'ecological buildings'.

In past years, many countries developed strategies for the design of environmental friendly and sustainable buildings. Those countries have made exclamations on the phenomenon to enhance such applications through specific laws, regulations, criteria and ratings. The construction phase of any building includes many professions working as a team. The professionals included in the construction business consist of interior architects with high priority. Capacities and limits of the discipline of interior architecture are mentioned through laws and regulations as well. However in Turkey, the role of interior architecture in ecological design is not fully recognized yet. This study is prepared to answer those questions: What is the role of interior architecture in the accomplishment of sustainable environments? What is the role of interior architecture in the internationally accepted green building rating systems such as LEED and BREEAM? How can the significance given to the discipline of interior architecture be improved by being more integrated with those rating systems?

In light of these questions, this thesis aims to understand the status of interior architect in the evaluation process of the worldly recognized sustainable building rating systems of LEED and BREEAM. The activation of ecological certification, primarily by BREEAM and LEED has encouraged the employment of sustainable design principles in architecture. Sustainable approaches are supported with international and national laws of various countries as well. . The role of interior architects in sustainable design is introduced in those laws and regulations as well.

Aiming to clarify the role of interior architects in the sustainable design process, this study discusses the international green building rating systems of LEED and BREAM within the context of interior architecture.

1.2 Method of the Study

This study is composed of five chapters. Next chapter introduces specific concepts related to sustainable design. Ecological approaches are discussed within the context of interior architecture. International laws, regulations and organisations defining the status of interior architecture in sustainable design are discussed.

The third chapter introduces two assessment systems of sustainable design, LEED and BREAAM. LEED and BREEAM are the two of the worldly recognized rating systems that qualify and register sustainability of a building at highest extend all around the world. These systems are discussed with selected architectural examples and compared with reference to the role given to interior architecture.

In the fourth chapter, status of sustainable design in Turkey and the role of interior architects are discussed. The employment of the rating systems in the current architectural context of Turkey is evaluated and the status of interior architects within the laws and regulations is discussed.

At the end of this study, certain policies are proposed in order to improve the role of interior architecture in sustainable design in Turkey.

CHAPTER 2

SUSTAINABLE APPROACH IN BUILT ENVIRONMENT AND INTERIOR ARCHITECTURE

2.1 Ecological Design and Sustainability

Ecology itself is the science of the relationship between all living organisms and their surroundings. Through time people progressed deeply into technology and architecture which formed superior results of unique design. But, as all these technology and products compensate more and more resources from nature, the danger of extinction grows in our natural surrounding (Van der Ryn and Cowan, 2007).

The necessity for achieving a sustainable world derives from the faulty applications of various forms of architecture, engineering, technology and products of agriculture. According to Van der Ryn and Cowan (2007), these practices should be worked more deeply in order to achieve sustainable surroundings. The designer is urged to form a combination of the product, architectural and environmental design with an extensive knowledge of ecology.

At our present time sustainability is one of the most important elements of design. Van der Ryn and Cowan (2007) question difficulties concerning creation of such matter as:

> How can we design our products and manufacturing processes in order to produce completely reusable materials? How can we create wastewater treatment systems that enhance, rather than damage, their surrounding ecosystems? How can we design buildings that produce their own energy and recycle their own wastes? How can we create agricultural systems that are not dependent on subsidies of pesticides, fertilizers and fossil fuels? In order to successfully integrate ecology and design, we must communicate within nature's deep interconnections through our own epistemology of design. We should stop designing in light of worn-out-mechanical metaphors and start designing in a way that honors the complexity and diversity of life itself (Van der Ryn and Cowan, 2007 p.14).

Van der Ryn and Cowan (2007) determine a definition of ecological design as a completetion of design forms and progression of living in content with evaluation of subversion of nature. Concerning ecology as a preliminary approach to design, systemizes various routes of reducing consumption and diminishing pollution to pave the way for protecting the living, developing and nourishing the society in connection with aesthetics and health. The contribution of these ideas to design defines a new point of view (Van der Ryn and Cowan, 2007).

Yang and Freedman (2004) describe the history of development of the concept of ecological design (or eco-design) in seven principles, which can be summarized as:

1. The need to meet the inherent needs of humans and their economy;
2. The requirement to sustain the integrity of the structure and function of both natural and managed ecosystems;
3. The appropriateness of emulating the inherent designs of nature in anthropogenic management systems;
4. The need to make progress to a sustainable economy through greater reliance on renewable resources and more focus on recycling, reusing, and efficient use of materials and energy;
5. The use of ecological economics (or full-cost accounting) to comprehensively take resource depletion and environmental damage into consideration and thereby address issues of natural debt;
6. The need to conserve natural ecosystems and indigenous biodiversity at viable levels; and
7. The desirability of increasing environmental literacy to build social support for sustainable development, resource conservation and protection of the natural world (Yang and Freedman, 2004 p.101).

The commencements with the applications concerning ecological design have much to contribute to the instantly important claim to provide quick and tactile advance for an economical sustainability for humanitarian benefits (Yang and Freedman, 2004).

In their work “Ecological Design”, Van der Ryn and Cowan (2004) introduce five basic principles in order to create a more sustainable future.

The first principle, “Solutions Grow from Place,” states that solutions grow from the unique cultural and physical characteristics of place, which are so often ignored by standardized designs.
The second principle, “Ecological Accounting” is becoming a major force in architecture and construction through the remarkably successful voluntary rating system developed by the United States Green Building Council (USGBC) called Leadership in Energy and Environmental Design (LEED) which we will discuss in further chapter in detail.
The third principle “Design with Nature” states that living systems has become am extremely popular metaphor, model, and measure for the built environment, technologies and even social institutions.

> The fourth principle, "Everyone Is a Designer" explains that everyone in the community can collectively design in light of an open source movement which is a new way of collaboration between stakeholders and designers.
> Finally the last principle, "Making Nature Visible" which states that each building and site becomes a educational opportunity for the exploration of water, energy, food, materials, waste and biodiversity. It is essential for people to access natural systems and processes easily (Van der Ryn and Cowan, 2007 p.3).

According to Van der Ryn and Cowan (2007), the primarily irresistible subtopic concerning ecological design is to establish micro to macro scaling for the purpose of providing sustainable systems in unification. Over several years, more than a thousand leading scientists form The Millennium Ecosystem Assessment to discuss the current situation. Ecological design hopefully promise that even as politics and economy slowly aligned with sustainability, architects, landscape architects, planners, product designers, chemical engineers and those in kindred disciplines could develop comprehensive, integrated, and culturally sensitive design frameworks (Stitt, 2000).

The architectural environments which are designed with ecological concerns are definitive in case of shaping and evaluating the progress of ecological thinking with human values. Aside the natural advantages, the built environment established with ecological design concerns, provide many advantages from efficient energy use to the sustainability in cultural means. The effect upon the feelings and personal acquaintance of the user must be the main concern of the designer while establishing the built environment. The judgement and the replies of the user are of fastidious concern to the foresight for sustainability (Stitt, 2000).

According to Steele (1995), the terms sustainable, ecological and green are often used interchangeably to describe environmentally responsive architecture. Infact the concept of sustainability is not limited within the field of architecture. It is a multi-faceted issue including social, political, cultural and financial aspects. Bromberek (2009) says that the precise origin of the term 'sustainability', in relation to the built environment, makes it less ambiguous than other terms such as 'ecological' or 'green' that are used to describe environmentally responsive architecture. In Our Common Future, the proceedings of the Brundtland Commission, sustainability is claimed to be the application to perform answering the requirements of the contemporary without endangering the prospective advancement of the future to provide self sufficiency (Steele, 1995).

The Brundtland Commission states that, because of this theoretical basis and the institutional origins of the term, sustainability includes the following eight issues:

1. Resource Equity
2. Embodied Energy
3. Global Community
4. Economics
5. Renewability
6. Traditional Wisdom
7. Institutional Change
8. Technology (Steele, 1995 p.6).

Bromberek (2009) says that the precise origin of the term 'sustainability', in relation to the built environment, makes it less ambiguous than other terms such as 'ecological' or 'green' that are used to describe environmentally responsive architecture. Bromberek (2009) also states that many practitioners change into experts in one night due to some clients wish to utilize the tax opportunities also the results of these projects formed self-contained, self-sufficient solutions, completely lacking the global sensibility of sustainability, or even the reality of the networks evident in ecology itself.

There are many different opinions about the state of earth's ecological system. Paul Marthers and Amir Rahnamay-Azar claim that our planet is in grave danger and further study for saving her is crucial. It is proved by the scientists all over the world that the situation is critical (Marthers and Rahnamay-Azar, 2006).With this idea, ecological design become more important in respect to architectural approaches.

A leading barrier in the way of designing sustainable green building is the expenses it requires. As there is a growing market for sustainable applications this seems not validly actual. Going green can save money. Green projects must be considered between long and short-term thinking. The shortsighted view claim that the initial costs of green projects are considerable and the adverting of green projects base their ideas on only the preliminary expenses. (Bromberek, 2009). It may be a fact that the initial cost of the application of sustainable buildings but the life span expenses of maintenance and life expectance are definitely high.

There had been debates on the costly applications of sustainability in built environment in recent years, but the analyses of natural consumption and life enhancing

qualities of such buildings are proven right to be healthy and environmental friendly. Comparatively poor discussions and debates on ecological design were made in context of sustainability which focused on residents and how they are able to live within the building with higher efficacy. The other important factor for the residents is that they would develop a considerable understanding of the crisis ecologically and naturally (Bromberek, 2009).

2.2 Status of Interior Architecture in Sustainable Approach

Profession of interior architecture is a licensed discipline which performs between the architects and the end user. While architects are concerned with buildings and how they interact with their environment, interior architects focus more on how the buildings interact with people living and working inside of them. Interior architects work with interior structure and surface, coordinating all elements that make up an interior space, from walls and windows to color, lighting, furnishings and textures, everything that makes up what is otherwise called as a "total space."

Considering total space, the interior architect has to consider the human experience and the way people really operate at work, at home and in public life at first hand. The interior architect should expert in the safety, function and physiological aspects of spaces as well as psychological responses to color and texture and depending on the project, individual preferences in case of aesthetics (International Federation of Interior Architects/Designers, 2010).

The practice of interior architecture is becoming more and more global. Many construction firms including architectural design groups pursue foreign markets and the creation of regional entities such as the European Union has removed long-standing barriers to practice in large multinational regions (European Commission, European Union, 2010).

The organization of the construction industry varies widely from nation to nation, with profound consequences for design. National and local governments have put stress on creating regulations, laws and directives in order to compete and connect with the international laws of application and practice. They also have not removed the barriers they have erected to protect local business and artists from foreign competition.

The profound aim is to explore the challenges and opportunities of international practice for architects and other design professionals concerning global attempts towards eco-design and green design. It is critical that the business, legal, and cultural issues facing an architect to be a part of global design evaluation for an environmental friendly application.

The definitions of 'design' and 'product' are inseparable notions corresponding to those in the EU directive. Defining 'design' as the appearance of the whole or part of a product which results from its features or decoration where the 'product' stand as any industrial or handcraft item (European Commission, European Union, 2010). Design is also qualified as a non-disconnectable part of a product. Since the product of any architectural design is a building with an interior space, they are supposed to be interconnected and inseparable. So application of rules to any part of the product is relevant to its whole in case of practice, rating and certification.

The interior architect and architect is certified and calibrated in two main schemes. Firstly a Certified Interior Designer/Architect is a person who prepares and submits nonstructural or nonseismic plans in consistency with local departments responsible of regulations that require the skills of a licensed contractor to implement them. Responsibility of an interior architect/designer -as certified- is to engage in programming, planning, designing, and documenting the construction and installation of nonstructural or nonseismic elements, finishes and furnishings within the interior spaces of a building, and he is responsible of protecting and enhancing the health, safety, and welfare of the public and natural environment (International Federation of Interior Architects/Designers, 2010).

The second certification principle is through rating systematic to encourage the interior architect/designer to create environmental friendly designs. . Interior architect is not only concerned with spaces within the buildings but also with the products they happen to use in the spaces they create. In many countries green or eco friendly products are introduced through interior design projects to enhance and develop environmental conditions and preserve natural resources.

It is very important for an interior architect to focus on the economical advantages of environment friendly products which can be easily promoted as low-priced solutions yet with same effectiveness. There are examples like power saving lighting fixtures and

water saving faucets that would save a great deal of energy and a vital natural resource such as water. There are other solutions concerning window treatments that prevent heat exchange between interior and exterior environments thus indirectly save energy consumption required for warming up or cooling surroundings.

The international approach to eco design principles found its way through councils and unions, mainly European Union, enhancing the application within parliaments of various countries and European Parliament primarily. The EC adopted the revised "Eco-design Directive" (3663/09, 13329/09 ADD 1 REV 1) following a first reading agreement with the European Parliament. The new directive extends the scope of the existing Directive (2005/32) by covering in principle all energy-related products. The products which are proposed and recognized are going to be used in interior space and built environment to enhance environmental friendly approaches (European Union Design Directive, 2010).

Energy-related products are defined as all goods 'having an impact on energy consumption during their use' which are placed on the market considered to be put into service. This includes items intended to be inserted in energy related products those are recognized as individual items for final users, where their environmental performance can be evaluated independently (European Union Action Plan, 2010).

It is foreseen that, this approach has the power to diminish the consumption of energy and natural resources. The efficiency of a definitely wider range of products and the demand on natural resources should not be underestimated so that the contribution to the security of energy supply will be enhanced. The built environment is settled to include these products during the design phase so that the end user will achieve full efficacy and produce less pollution.

It is also obliged for the Commission to create additional working groups to study possible design requirements and to present draft implementing measures to the Eco-design Regulatory Committee and to Parliament for final approval of energy-related products. The including of such implementations to international law should present an example to countries like ours to take precautions hastily.

The following table may give an example of discussions and changes in acts and laws by some of the countries which are the members of EU to design and define new approaches to their laws concerning the built environment and architectural design.

Table 1: The Contributing Accepted Laws of Ecological Design Applications in Europe (http://ec.europa.eu)

Country	Law
Denmark	Implementing Law no. 1259 of 20 December 2000, supplemented by Administrative Regulation no. 819 of 18 September 2001
France	Decree 2001-670 of July 25, 2001
Greece	Presidential Decree 161/02 in force from 26 June 2002, amending Presidential Decree 259/97 in force from 19 September 1997
Hungary	Act XLVIII of 2001 on the legal protection of designs promulgated on 3 July of 2001. Part one, Design and Design Protection
Italy	Design Law 95/2001 of 2 February 2001, supplemented by Legislative Decree No. 164 of 12 April 2001
Norway	Entered into force 1 May 2003
Slovakia	Act No. 444/2002 Coll. on Designs
Sweden	SFS 2002:570 of May 30th, 2002
Switzerland	The Federal Design Protection Act of October 5, 2001, which came into force on 1st of July 2002
UK	The Registered Designs Regulations 2001 (SI 2001 No. 3439) and the Registered Designs Regulations 2003 (SI 2003 No. 550) supplemented by the Registered Designs (Amendment) Rules 2001 (2001 SI No. 3950)

The directive mainly focuses on uses of products listed (especially the highlighted ones) below which happen to be in interior architects responsibility in case of application and choice. It is obvious that professionals are responsible for choosing such products and they should be trained and be certified.

According to EU Design Directive the product groups are listed as below.

- Heating and water heating equipment
- Electric motor systems

- Lighting in both the domestic and tertiary sectors
- Domestic appliances
- Office equipment
- Consumer electronics
- HVAC (heating ventilating air conditioning) systems (European Union Design Directive, 2010).

It is also obligatory and required for the interior architect to be fully comprehensive on the 'Documented Environmental Management System (Annex V)' and 'Internal Design Control (Annex IV)' so that the application and choice of the products above will be appropriate (European Union Design Directive, 2010).

The Architects Council of Europe together with the European Concrete Platform and Future Conversations had organized a conference on Sustainable Construction which is to be held on 20 May 2010 in Brussels. The conference is planned to enhance the ecological architectural applications in respect to sustainability. The supporting organizing committee primarily includes ECIA; the European Council of Interior Architects (The Architects Council of Europe, 2010).

The focus of EU is mainly on sustainable development issues across the Union. The main initiative is on sustainable construction as a sub-set of sustainable production and sustainable consumption. A plan to promote the benefits and develop skills and capacities for the future is also backed-up by Energy Performance in Buildings Directive being revised to make progress on new European standards (European Union Action Plan, 2010) .

"Common Language for Sustainable Construction" is aimed to be produced through events and conferences for the purpose of ensuring a binary understanding of the terminology which is used within the basis of sustainable construction. The terminology is expected to be efficiently used within the sector of construction. The policy-makers with different grades in national and European sense and for communicatory and educational purposes in the sectors are positively concerned. It is obvious that the worldwide actions are applied and precautions are taken to establish a more environmental friendly built environment which is to be straightened and fixed by law. The aim is to achieve low/zero energy; low/zero carbon buildings; homes and offices; low carbon infrastructure; recycling of buildings and materials; design of buildings,

interiors and space between buildings; the design of passive house buildings and the use of recycled materials; embedded energy in materials; the use of marks to recognize responsibly sourced materials. (European Union Design Directive, 2010).

As it is foretold that there are commissions, associations and ministries which claim that the design phase and application of the built environment should be bound by law and directives all around the world. Not only national or continental but also worldwide, organizations make this aspect to be a preliminary act to be applied.

IFI, "International Federation of Interior Architects/Designers" which is a partner of IDA "International Design Alliance" develops requirements for the protection of lifestyle and the environment as we know it. The interior architects role and participation in regard to sustainability is stressed on interior design professionals to "design green" to maximize the positive impact of design in the development of buildings, products and spaces that minimize environmental harm, as well as enhance the quality of life and protect the health, safety, and welfare of the public. The supportive proclamation of IFI policy reinforces main principles of environmental stewardship: including the use of safe products and services; protecting the atmosphere and use of environmentally safe energy sources; and the use of sustainable materials and resources (International Federation of Interior Architects/Designers, 2010).

IFI supports and defines the belief and the necessary rules of application and certification of professionals to use Interior Architecture/Design as a tool to improve the quality of life and uphold human dignity for all. IFI also encourages professional designers to use their best abilities as creators and innovators to solve social and environmental problems (International Federation of Interior Architects/Designers, 2010).

American Society of Interior Designers (ASID) is a community consisting of designers, industry representatives, educators and students who are committed to interior design profession and application. The Society serves ad acts in United States and Canada. The action of the society is to bind education, professional application and industrial application under one consortium to provide the analysis and act to be in content with each other. The providing of principles for sustainability and supporting them by the laws that enhance it are the primary goals of the Society. It is clear that, sustainability and environmental health is not only defined in professional practice but

also in production phase and education as directed by ASID (American Society of Interior Designers, 2010).

IDC, Interior Designers of Canada, is concerned with the growth, recognition and respect of the profession in government, industry and the public sector, locally, nationally and internationally. The main objective is to provide healthy and environmental friendly applications due to practice and products in use. The education and certification of the designer is encouraged and recognized as in many examples all around the world (Interior Designers of Canada, 2010).

The AECB, The Sustainable Building Association is a network established for individuals and companies to create and encourage a common aim of promoting sustainable building. It is like a union aiming to bring the constructors, building architects, interior architects, traders and manufacturers and authorities together to enhance, collaborate, define, detect and establish best practice in sustainable buildings with environmental qualities. The Associations like AECB not only define but collaborate the professionals and the buildings to be certified and rated for a better application of eco-design (The Sustainable Building Association, 2010).

Another association, The Ecological Design Collaborative has experience in environmentally-friendly projects varying in size and function. They explore worldwide applications, laws and regulations and provide consultancy services for professions in the construction business. The consultancy includes providing green specifications, landscape value engineering and construction administration with sustainable development planning, 'green' entitlements process and acquainting updated knowledge on environmentally-friendly building and landscape design under the light of uniform, international and national laws (The Ecological Design Collaborative, 2010).

International Interior Design Association (IIDA) is one of the strongly abbreviated associations which are in favor of encouraging and creating licensed interior architects/designers. The IIDA works to enhance quality of life through excellence in interior design. The other aim of the association is to advance interior design through scope of information, society and valuation. Starting from the day IIDA was found, the association has been a strong supporter for the Interior Design profession. The International Interior Design Association detects and endures the acceptance of enactment of laws that provides individuals as licensed, registered and certified interior

architects. This process establishes the profession in determining and upholding regulations to provide with the enhancement of the living conditions of the society (International Interior Design Association, 2010).

IIDA defines the Interior Design laws being in favor of helping to establish and maintain professional standards that protect the health, safety and welfare of the general public. “IIDA firmly believes that legal recognition, achieved through licensing, registration, and certification brings uniformity to the profession, defines responsibility, and encourages excellence in the Interior Design industry” (International Interior Design Association, 2010). IIDA presents services to encourage the use of interior design strategies that reduce negative impacts on the environment and to educate the public and the design community on the role of sustainable design in promoting the health and well-being of the people who inhabit the spaces designed (International Interior Design Association, 2010).

The worldwide action towards interior architects’ credibility and certification on certain subjects as in ecological and green design is considered to be of great importance, not only within the range of local registrations and amenities but also worldwide rating systems. The rating and its provisions are of great importance to the interior design community and the supportive agencies and associations. The space in which people create actions are supposed to be delicately and intensely evaluated in case of sustainability. This is by national and international law that the use of sustainable and ecological products and design principles are encouraged, registered and stressed on the architectural design community.

CHAPTER 3

ASSESSMENT SYSTEMS OF ECOLOGICAL BUILDINGS AND THE ROLE OF INTERIOR ARCHITECTURE

3.1 Sustainable Building Rating Systems

"Green" is the term that is associated with anything considered environmentally friendly. Green buildings are designed and constructed with consideration for the protection of the environment and comfort and health of the inhabitants. Although, green buildings are not completely sustainable, they are certainly a step toward achieving sustainability. Sustainable design is a general state of combining with nature (Bromberek, 2009). It is also the capacity to maintain a certain process or state indefinitely. Sustainable design in the construction industry is often used to describe green building design.

Worldwide there are numerous tools for building evaluation. These tools contain and evaluate different types of projects concentrating on sustainable development. These tools focus on evaluating the assessment of life cycle focalizing also on costing, energy systems design, evaluation of performance, analysis of productivity, assessments on indoor environmental quality, optimization of operations and maintenance, total building design and tools for operations, and various other concerns. Sustainable building rating systems are determined as tools established for the purpose of examining the performance or performance expected for a 'whole building' and bear the results of this examination into a global assessment that predicts comparisons towards other buildings (Fowler, 2006). In order for a rating system to precise signification to sustainable design and a building to operate, it is a must that it offers a worthy, terminal basis for detection and comparison for evaluating sustainability (Fowler, 2006). These tools show differences in regard to geographical/climatic areas covered, detail of environmental

information required, competitive methods for application, user-friendliness and implementation cost (Bromberek, 2009).

BREEAM and LEED are the two most representative building environmental schemes in world (Burnett and Lee, 2007). Considering the content of the environmental issues; the variety of buildings that are covered; and the difference between assessment headlines of schemes, these two rating systems become the most popular and relevant within many others (Burnett and Lee, 2007). Many of the international rating systems developed their origins from BREEAM and LEED Rating Systems. There are also other rating systems that are originally formed within their principles. CASBEE (Comprehensive Assessment System for Building Environmental Efficiency), GBTool, Green Globes™ US are one of the examples of rating systems that are formed originally. From the concepts of relevance, measurability, applicability and availability, LEED and BREEAM Rating Systems are the most important ones through them.

3.2 LEED Rating System

There is a continuous and a rapid development in the built environment. This requires more effective measures aimed at reducing the ecological footprint of buildings. There are various schemes for this purpose. The majority of people that work or are associated with green are trying to prevent global warming or trying to simply save the forest. According to Curtatone (2008), no matter what is thought about the ecological condition of our planet, there are several reasons to support the green building concept. The green building concept is associated with any structure designed, built, renovated, operated, adapted or reused with those objectives:

(1) Protect occupant health;
(2) Improve employee productivity;
(3) Wisely use natural resources; and
(4) Reduce the environmental impact (Curtatone, 2008).

Within the concept of these objectives, in order to calculate the approach of green building movement Leadership in Energy and Environmental Design system is used in the industry. It is the standard rating system for green buildings. This system is more commonly referred to as LEED. It was created by the United States Green Building Council (USGBC). LEED is a relatively new rating system and it still has some issues to work out.

LEED is not the only green building rating system. Other countries have their own versions of green building rating systems. The U.K. environmental performance assessing measure is BREEAM (Building Research Establishment Environment Assessment Method). This system was the first environmental certification system. It was developed by the British Research Establishment in 1990. Korea, Italy and Brazil are developing their national green building rating tools. They are based on a spreadsheet tool called GB Tool. It was developed by a collaboration of more than twenty countries in 1998. Australia utilizes a system called Green Star Certification. Canada developed a variation of BREEAM called Green Globes. It is used both in Canada and in the United States. But LEED is more established in the United States.

3.2.1 History of LEED Rating System

In order to understand the LEED green building rating system better it is essential to learn how USGBC started. The USGBC was founded with a formal agreement between David Gottfried and Rob Watson. Gottfried, being a real estate developer and Watson being a senior scientist who works for the Natural Resources Defense Council has formed an alliance in the aim of attracting the interest of businessmen. The CEO of the USGBC, Richard Fedrizzi claimed that, the scope of the environmental organizations is confined within certain areas. He also mentioned that Gottfried developed a different point of view to advance the standards in relation with building performance towards sustainable applications. (Kamenetz, 2007).

The USGBC is a non-profit organization aiming to enhance sustainable building applications. It is consists of over 13,500 organizations in various areas within construction sector. These organizations work to produce responsible, environmental friendly, healthy and profitable places to occupy. USGBC contains members from various fields including end-users, real estate developers, building owners, architects, engineers, general contractors, facility managers, subcontractors, designers, manufacturers, and government agencies (About USGBC, 2009).The USGBC's mission is to convert the way buildings are designed, built and finally operated. In order to serve this purpose it formulates to enable an environmentally responsible and healthy environment so that the product would improve the quality of life. The USGBC's Board of Directors has articulated "guiding principles". The aim of these principles is to improve the decisions made every day about USGBC and its programs. In an industry

based on innovation, the principles provide clarity and continuity. They also give the flexibility to grow and respond to a rapidly changing market. (Johnson, 2005).

The USGBC officially was started in 1993 and LEED certificate was announced to the public after three years. The LEED rating system is simple in concept. Architects and engineers attempt to accumulate points in six different categories. Once a building is complete a representative from the Green Building Council reviews the documentation – plans, engineers' calculations. This representative awards points out of a possible 69 point. The points are totaled. If enough points have been gathered the project is then given one of four levels. Those levels are defined as: certified, silver, gold, or platinum. (About USGBC, 2009)

The following two figures show the extent of LEED certification and registration in the United States. Figure 1 shows how every state has certified commercial LEED projects. As of September 2008 there are 1,819 certified commercial LEED projects.

Figure 1: Certified & Registered Commercial LEED Projects by State
(U.S. Green Building Council, 2008)

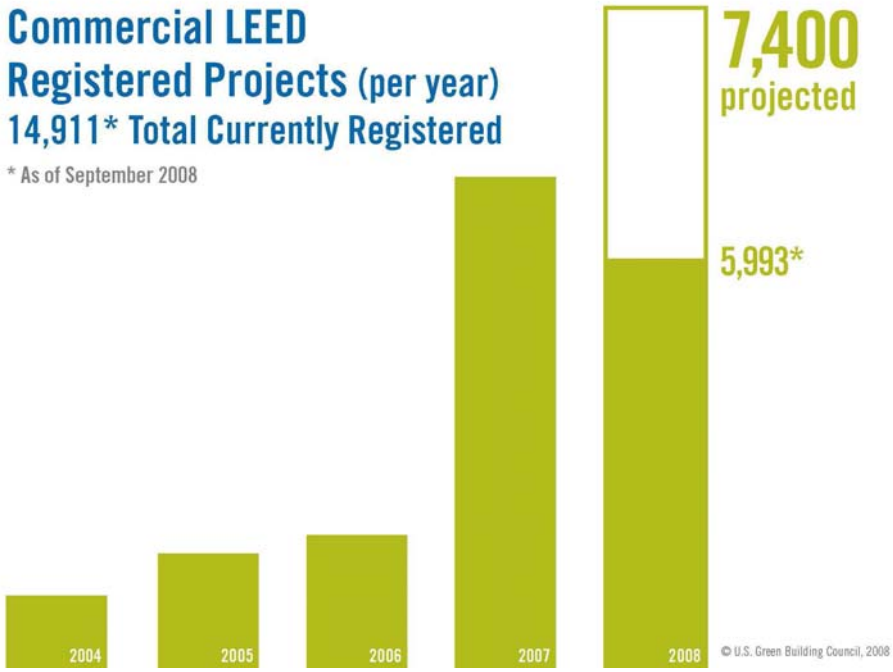


Figure 2: Commercial LEED Registered Projects (per year)
(U.S. Green Building Council, 2008)

The LEED Green Building Rating System accelerates and encourages worldwide application and acceptance of sustainable green building and practices of development. In order to do that it creates and implements universally understood and accepted tools and performance criteria (LEED Rating Systems, 2009). LEED provides the tools need to visualize immediate and measurable impacts on the buildings performance for building owners, constructors and operators by promoting an advance towards a whole-building approach to sustainability. LEED appreciates performance in five preliminary accepted areas concerning human and environmental health. These can be listed as energy efficiency, indoor environmental quality, materials selection, water savings, and sustainable site development. LEED defines a route for calibrating and certifying trophies for every phase of a building continuity, building variety and sustainability (What is LEED, USGBC 2008).

The USGBC maintains 75 regional chapters. All these chapters have a common purpose of transforming the way buildings are designed and built in an environment friendly way (Granger, 2007). The primary responsibility of LEED Committees is the development, implementation and revisions of LEED. They also recommend policies to the USGBC Board.

LEED rating system committees are responsible for the development and implementation of LEED rating systems either in development or undergoing revisions. They remain in existence until their rating system is fully implemented. In order to harmonize and align credits across LEED, the LEED committee structure is transitioning. It will include three core committees to supervise the certification process, market responsiveness, and technical exactness of LEED (LEED Certification, 2009).

There are seven different committees, including:

· LEED Steering Committee
This governing body of all LEED committees is responsible for direction and decisions for the LEED program in both the U.S. and internationally.
· Certification Committee
Ensures that the LEED certification process continues to be technically rigorous, consistent and responsive to the needs of LEED customers.
· Market Sector Committee
Oversees market transformation through LEED and ensures that LEED continues to be responsive to the markets that it addresses.
· Technical Committee
Ensures that all LEED standards are technically rigorous, scientifically valid and cost-effective. Also manages the Technical Advisory Groups (TAGs).
· Technical Advisory Groups
Advise on credit interpretation requests, credit rulings and credit ruling appeals. Assure consistency and technical rigor in the development of LEED.
· Technical and Scientific Advisory Committee (TSAC)
Provides advice and support for all LEED projects, serving as an independent and impartial forum for vetting technical issues when they are potentially difficult to resolve or involve significant controversy.
· Rating System Committees
These committees are responsible for the direction and decisions of LEED rating systems currently undergoing development or major revisions (LEED Committees, 2009 p.1750).

LEED is concerned with all types of buildings and pronounces one of a kind scheme for sustainable development for sites and buildings, indoor environmental quality assessments, resources selection, materials and energy efficiency and water savings strategies. LEED is tool for a practical rating scheme in creating green building design and construction. LEED supplies constant, instant and calibrating consequences for end users, occupants and owners (About USGBC, 2009).

3.2.2 LEED Rating Categories

LEED certification is based on the number of "points" (Table 3) that a building is able to get in each of six areas. The specification of how points are distributed is based on the city and/or USGBC chapter.

Table 2: LEED NC Rating Categories and Associated Points
(LEED Reference Guide, 2000 P.9)

Category	Points
Sustainable Sites	14
Water Efficiency	5
Energy & Atmosphere	17
Materials & Resources	13
Indoor Environmental Quality	15
Innovation & Design Process	5
Total	69

3.2.2.1 Sustainable Sites

In this category, reuse of existing buildings and sites, protection of the land use and reduction of the adverse environmental impact of new developments are encouraged. The intent of the prerequisite and credits is this. The design needs to incorporate a sediment and erosion control plan as a prerequisite. Site selection could provide three credit points. These three points depend on the nature of site redevelopment or restoration. Additional credits can be obtained for storm water management, and reducing heat islands and light pollution. "Credits also are available for providing bicycle stands, alternative-fuel refueling stations and parking spaces for carpools. To obtain many of these credits, these features need to be incorporated in the design development. The design drawings are the primary documentation" (Johnson, 2005 p.10).

3.2.2.2 Water Efficiency

The category of water efficiency is concerned with reduction of water-use and waste water technologies including reuse of waste. There are no previously required criteria that are defined for this category. The requirements are determined and should not exceed the demands of the Energy Policy Act of 1992. “Typical documentation and performance calculations involve calculating the total water demands of the facility and the level of water use reduction demonstrated by the design” (Johnson, 2005 p.11). A spreadsheet template is available from USGBC to assist designers with these calculations.

3.2.2.3 Energy and Atmosphere

The main scope of this category is to credit the renewable energy, ozone protection, and energy efficiency. A total of 17 points and three prerequisites of credidation by meeting the credit requirements can be entitled in this category. For additional credits to be obtained the design should demonstrate, exceeding the “Standard 90.1-1999” requirements. The additional credits are based on the accumulation of the percentage of energy saving. It is defined that two points of rating can be obtained for every 10% of reduction of energy-use in designs of new buildings. The required tools are for energy simulation to calculate the 10 points that is the maximum grade. “The prerequisites aim at implementing building commissioning, meeting minimum energy performance and using non-CFC (chlorofluorocarbon) equipment. ANSI/ASHRAE/IESNA Standards are used for calculation. ..... If on-site renewable energy technologies are provided, up to three additional credit points can be claimed. They depend on the percentage of renewable energy provided toward the total building energy consumption. Credits are available for not using HCFCs, use of green power and for additional commissioning” (Johnson, 2005 p.11).

3.2.2.4 Materials and Resources

This category is aimed at reducing the life-cycle environmental impact of materials. It provides credits for waste reduction, materials reuse and recycling. A prerequisite in this category requires all buildings to contain a storage area. No specific performance calculations exist for obtaining credits in this category. A spreadsheet can document the amount of materials used, calculate the percentage of recycled content, local materials

used, etc. to determine the levels to claim the credits. “The aim is collecting and storing recyclable materials generated by building occupants. This requirement can be incorporated during building design and documented in the building drawings. If the new building retains and reuses an already existing building shell, up to three points can be claimed. Additional points can be obtained for recycling construction waste, using recycled materials in construction and for use of local or regional materials” (Johnson, 2005 p.11).

3.2.2.5 Indoor Environmental Quality

The crediting in this category is based on reducing indoor pollutants, with the following requirements of improving the thermal comfort, indoor lighting and air quality. “One prerequisite in this category requires that the building design meets ANSI/ASHRAE Standard 62–1999, Ventilation for Acceptable Indoor Air Quality, for ventilation. Another prerequisite provides the means for environmental tobacco smoke (ETS) control” (Johnson, 2005 p.10). The other previously required scheme is to be met by building designated as nonsmoking. The required use of adhesives with low-emitting qualities, composite wood, carpets, sealants, and paints are calculated to provide up to four credits. Each material requires a “Material Safety Data Sheet (MSDS)” for the documentation to obtain these credits. It is systemized to emphasize the limits of volatile organic compound (VOC). “Additional credit points are available for installing a permanent CO2 monitoring system, individual occupant controls, increased ventilation levels, providing day lighting, and for building flush-out before occupancy. Several credits require design documentation in drawings and construction specifications” (Johnson, 2005 p.12).

3.2.2.6 Innovation and Design Process

Five points are available for innovative features and for incorporating green building categories not addressed by the LEED rating system. One point can be claimed for retaining a LEED Accredited Professional on the design team. No set standard exists for claiming the credits in this category. However, documentation of the design intent, benefits and approaches used for claiming the credit should be provided (Johnson, 2005 p.12).

Once these prerequisites are met, a project can potentially obtain the LEED certification. A lot of flexibility exists in the LEED rating system. So designers can benefit by focusing on specific credit categories applicable to each design situation (Johnson, 2005). The LEED rating process urges the projects to establish and propose a "scorecard" indicating the preliminary requirements and claimed credits, and the required documentation for each of the prerequisites and credits. A LEED calculator can assist designers with this process. The documentation requirements have changed from submission of detailed drawings and performance calculations to letter templates. In these letter templates the designer should certify meeting the requirements for claiming a credit. USGBC has instituted this process, to accelerate the certification process (Johnson, 2005).

The total points achieved will determine the level of LEED certification of the project. There are 69 possible points and four certification levels. BASIC LEED certification requires 26 to 32 points, LEED certified SILVER level requires 33 to 38 points, LEED certified GOLD level requires 39 to 51 points, and LEED certified PLATINUM level requires 52 to 69 points.

· **Certified**—40-50 percent of non-innovation points attained
· **Silver**—50-60 percent
· **Gold**—60-80 percent
· **Platinum**—over 80 percent.

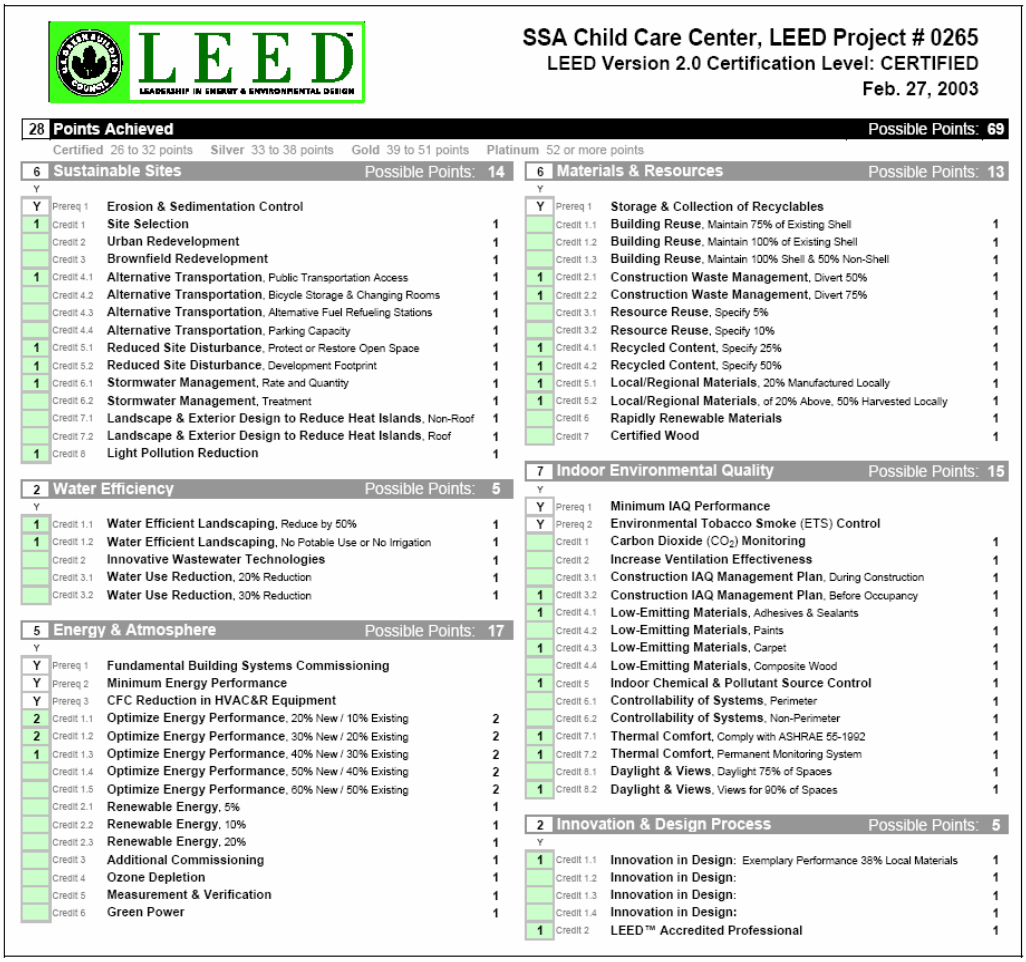
Prior to beginning the certification process, a firm must first determine under which LEED program the project is eligible (LEED Rating Systems, 2009). Below is a list of the current LEED programs:

· New construction
LEED for new construction and major renovations is designed to guide and distinguish high-performance commercial and institutional projects.
· Existing buildings
LEED for existing buildings: operations and maintenance provides a benchmark for building owners and operators to measure operations, improvements and maintenance.
· Commercial interiors
LEED for commercial interiors is a benchmark for the tenant improvement market that gives the power to make sustainable choices to tenants and designers.
· Core and shell
LEED for core and shell aids designers, builders, developers and new building owners in implementing sustainable design for new core and shell construction.

· Schools
LEED for schools recognizes the unique nature of the design and construction of K-12 schools and addresses the specific needs of school spaces.
· Retail
LEED for retail recognizes the unique nature of retail design and construction projects and addresses the specific needs of retail spaces.
· Healthcare
LEED for healthcare promotes sustainable planning, design and construction for high-performance healthcare facilities.
· Homes
LEED for homes promotes the design and construction of high-performance green homes.
· Neighborhood development
LEED for neighborhood development integrates the principles of smart growth, urbanism and green building into the first national standard for neighborhood design (LEED Rating Systems, 2009 p.222).

Once the construction design firm has determined that the project is a viable candidate for a specific program, the certification process involves four steps:

1. Project registration: The first step towards earning LEED certification is registering the project. Registration establishes the project's contact with the USGBC and gives the construction design firm access to LEED-Online and the LEED Credit Interpretations Database, which provides essential information, software tools and communications. There is a standard fee for project registration. Certification fee structure is based upon specific programs applied to and project square footage. The USGBC fully refunds certification fees for any project awarded a LEED Platinum rating.
2. Documentation submittal: Once the project is registered, the Project team must prepare documentation and calculations to satisfy the prerequisite and credit requirements as of the registration date. This can be done online with user-friendly templates developed by USGBC.
3. LEED technical reviews: Once all documentation has been completed and submitted, the USGBC LEED Certification Team will review the projects application. During this period, the construction design firm may be asked to supply additional supporting documentation. The review process can be expedited for an additional fee.
4. Certification award: The Certification Team delivers a final LEED review, and if certification is granted, the project team is given 25 days to appeal the rating. If the rating is appealed, an appeal LEED review will be issued. After acceptance of the rating, LEED certification is final, and the project team receives an award letter, certification and LEED plaque indicating the certification level - Certified, Silver, Gold or Platinum (LEED Rating Systems, 2009 p.64).



LEED

LEADERSHIP IN ENERGY & ENVIRONMENTAL DESIGN

SSA Child Care Center, LEED Project # 0265
LEED Version 2.0 Certification Level: CERTIFIED
Feb. 27, 2003

28 Points Achieved — Possible Points: 69

Certified 26 to 32 points Silver 33 to 38 points Gold 39 to 51 points Platinum 52 or more points

6 Sustainable Sites — Possible Points: 14

Y	Prereq 1	Erosion & Sedimentation Control	
1	Credit 1	Site Selection	1
	Credit 2	Urban Redevelopment	1
	Credit 3	Brownfield Redevelopment	1
1	Credit 4.1	Alternative Transportation, Public Transportation Access	1
	Credit 4.2	Alternative Transportation, Bicycle Storage & Changing Rooms	1
	Credit 4.3	Alternative Transportation, Alternative Fuel Refueling Stations	1
	Credit 4.4	Alternative Transportation, Parking Capacity	1
1	Credit 5.1	Reduced Site Disturbance, Protect or Restore Open Space	1
1	Credit 5.2	Reduced Site Disturbance, Development Footprint	1
1	Credit 6.1	Stormwater Management, Rate and Quantity	1
	Credit 6.2	Stormwater Management, Treatment	1
	Credit 7.1	Landscape & Exterior Design to Reduce Heat Islands, Non-Roof	1
	Credit 7.2	Landscape & Exterior Design to Reduce Heat Islands, Roof	1
1	Credit 8	Light Pollution Reduction	1

2 Water Efficiency — Possible Points: 5

1	Credit 1.1	Water Efficient Landscaping, Reduce by 50%	1
1	Credit 1.2	Water Efficient Landscaping, No Potable Use or No Irrigation	1
	Credit 2	Innovative Wastewater Technologies	1
	Credit 3.1	Water Use Reduction, 20% Reduction	1
	Credit 3.2	Water Use Reduction, 30% Reduction	1

5 Energy & Atmosphere — Possible Points: 17

Y	Prereq 1	Fundamental Building Systems Commissioning	
Y	Prereq 2	Minimum Energy Performance	
Y	Prereq 3	CFC Reduction in HVAC&R Equipment	
2	Credit 1.1	Optimize Energy Performance, 20% New / 10% Existing	2
2	Credit 1.2	Optimize Energy Performance, 30% New / 20% Existing	2
1	Credit 1.3	Optimize Energy Performance, 40% New / 30% Existing	2
	Credit 1.4	Optimize Energy Performance, 50% New / 40% Existing	2
	Credit 1.5	Optimize Energy Performance, 60% New / 50% Existing	2
	Credit 2.1	Renewable Energy, 5%	1
	Credit 2.2	Renewable Energy, 10%	1
	Credit 2.3	Renewable Energy, 20%	1
	Credit 3	Additional Commissioning	1
	Credit 4	Ozone Depletion	1
	Credit 5	Measurement & Verification	1
	Credit 6	Green Power	1

6 Materials & Resources — Possible Points: 13

Y	Prereq 1	Storage & Collection of Recyclables	
	Credit 1.1	Building Reuse, Maintain 75% of Existing Shell	1
	Credit 1.2	Building Reuse, Maintain 100% of Existing Shell	1
	Credit 1.3	Building Reuse, Maintain 100% Shell & 50% Non-Shell	1
1	Credit 2.1	Construction Waste Management, Divert 50%	1
1	Credit 2.2	Construction Waste Management, Divert 75%	1
	Credit 3.1	Resource Reuse, Specify 5%	1
	Credit 3.2	Resource Reuse, Specify 10%	1
1	Credit 4.1	Recycled Content, Specify 25%	1
1	Credit 4.2	Recycled Content, Specify 50%	1
1	Credit 5.1	Local/Regional Materials, 20% Manufactured Locally	1
1	Credit 5.2	Local/Regional Materials, of 20% Above, 50% Harvested Locally	1
	Credit 6	Rapidly Renewable Materials	1
	Credit 7	Certified Wood	1

7 Indoor Environmental Quality — Possible Points: 15

Y	Prereq 1	Minimum IAQ Performance	
Y	Prereq 2	Environmental Tobacco Smoke (ETS) Control	
	Credit 1	Carbon Dioxide (CO_2) Monitoring	1
	Credit 2	Increase Ventilation Effectiveness	1
	Credit 3.1	Construction IAQ Management Plan, During Construction	1
1	Credit 3.2	Construction IAQ Management Plan, Before Occupancy	1
1	Credit 4.1	Low-Emitting Materials, Adhesives & Sealants	1
	Credit 4.2	Low-Emitting Materials, Paints	1
1	Credit 4.3	Low-Emitting Materials, Carpet	1
	Credit 4.4	Low-Emitting Materials, Composite Wood	1
1	Credit 5	Indoor Chemical & Pollutant Source Control	1
	Credit 6.1	Controllability of Systems, Perimeter	1
	Credit 6.2	Controllability of Systems, Non-Perimeter	1
1	Credit 7.1	Thermal Comfort, Comply with ASHRAE 55-1992	1
1	Credit 7.2	Thermal Comfort, Permanent Monitoring System	1
	Credit 8.1	Daylight & Views, Daylight 75% of Spaces	1
1	Credit 8.2	Daylight & Views, Views for 90% of Spaces	1

2 Innovation & Design Process — Possible Points: 5

1	Credit 1.1	Innovation in Design: Exemplary Performance 38% Local Materials	1
	Credit 1.2	Innovation in Design:	1
	Credit 1.3	Innovation in Design:	1
	Credit 1.4	Innovation in Design:	1
1	Credit 2	LEED™ Accredited Professional	1

Figure 3: Sample LEED Evaluation Sheet (LEED Rating Systems, 2009)

The next version of LEED may include the following changes:

·Ability to "customize" LEED from a 'bookshelf of credits' for particular geographic and climatic locations and to meet particular project needs.

·Increased minimum standards and improved method of measuring energy efficiency, which will focus on reducing carbon dioxide emissions from buildings, moving away from a "one-size-fits-all" system toward one that is more appropriate to bioregional issues.

·Commissioning, ventilation and indoor air quality are all likely to be increased in importance.

·Certain prerequisites will be dropped that represent standard practices

·More recognition of competing standards

·There will be more of a focus on LCA of materials used in buildings

·There may be a move to allow certification by professional auditors and by local government agencies, rather than having only a few national certification review teams (LEED Rating Systems, 2009).

3.2.3 Examples of Successful LEED Certificated Projects

"U.S Green Building Council's "Leadership in Energy and Environmental Design Green Building Rating System" (LEED) is one of the nationally accepted certification programs while designing constructing and operating the green buildings. This program provides property owners with tools to achieve high levels of environmental performance. As mentioned before the five areas LEED focuses on are: sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality (U.S Green Building Council, 2009).Within each category, a building can earn a certain amount of points, the number of which determines a project's level of LEED certification" (Bovich, 2007).

The Proximity Hotel in Greensboro, NC, earned Platinum LEED certification. The hotel has as much as 100 solar panels installed on the hotel's rooftop. Dennis Quaintance, the CEO of Quaintance-Weaver, which built and operates the hotel, says that "When we started the design process four years ago, I would have never believed that we could use 39% less energy and 33% less water without one iota of compromise in comfort or luxury and with minimal additional construction costs" (Proximity Hotel , 2010 p.2). Going Platinum, by U.S. Green Building standards, means achieving at least 52 sustainable design credits in a variety of green building categories; the Proximity got 55.

Figure 4: Proximity Hotel Exterior
(http://www.proximityhotel.com)

Figure 5: Proximity Hotel Social Lobby Area
(http://www.proximityhotel.com)

Figure 6: Proximity Hotel Interior of the Guest Room
(http://www.proximityhotel.com)

Figure 7: Proximity Hotel LEED Certification Plaque
(http://www.proximityhotel.com)

More than 70 sustainable features are incorporated into the 157-room Proximity, including energy-efficient materials that use 41 percent less energy and 4,000 square feet of solar panels on the building's rooftop which produces 60 percent of the building's heat. The Proximity was built with materials including salvaged wood, 90 percent post-consumer reinforced steel, and recycled asphalt and concrete. Each guestroom features extra-large windows to utilize natural light, efficient air quality circulation (Proximity Hotel, 2010).

Table 3: The LEED Point Distribution of Proximity Hotel (LEED, 2009)

Sustainable Sites ……... 12/14
Water Efficiency …… .4/5
Energy & Atmosphere ……...16/17
Materials & Resources ……6/13
Indoor Environmental Quality..…… 12/15
Innovation & Design ……...5/5
Certified ……..55

Seattle's first LEED-certified hotel (and Hyatt's first LEED-certified location in North America), the Hyatt at Olive 8 is a brand-new eco-chic addition to the city's downtown accommodation offerings.

The glass building design combined with energy-efficient lighting infrastructure (LED, fluorescent and cold cathode) and a living green roof help cut water and energy usage significantly, the Hyatt uses 32 percent less water and 20 percent less energy than other buildings of its size. Another construction note is that 95 percent of recyclable construction debris was diverted from landfills by being incorporated into the building design (Hyatt, 2010).

Room features include Watt Stopper light controls, Toto dual-flush toilets and Bricor water-reducing showerheads. Green housekeeping utilizes chemical-free cleaners.

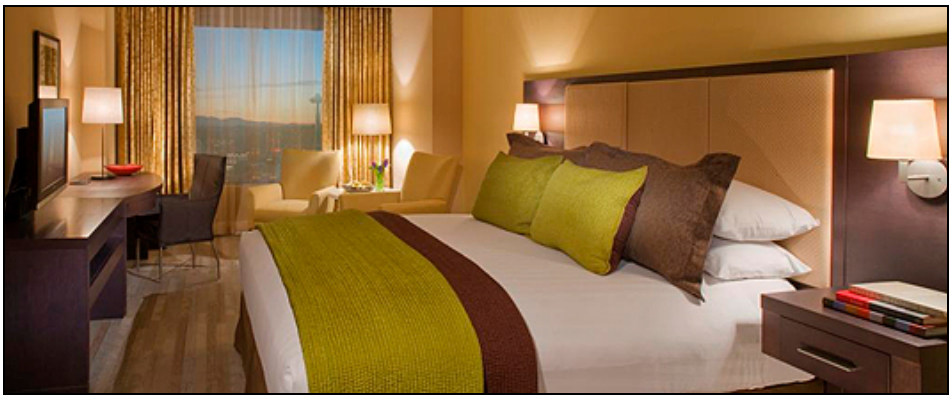


Figure 8: Hyatt at Olive 8 Interior of the Guest Room
(http://www.olive8.hyatt.com/hyatt/hotels/index.jsp)

Orchard Garden Hotel is Green Seal certified and LEED certified and the first California hotel to receive this distinction. Partially used bath products are donated to homeless shelters, recycled carpets are chemical-free and cleaning products are organic and citrus-based. Orchard also employs an innovative combined key card and lighting system that will save 20 percent of energy costs: As guests enter a room, they place the guestroom key card in a box that triggers the lights to turn on; when they leave with their key, the lights turn off.

San Francisco's first hotel to earn this certification, the Orchard Garden is only the third hotel in the U.S. and fourth hotel in the world with this certification. The Orchard Hotel is currently registered for Leadership in Energy and Environmental Design Certification for New Construction (LEED-NC) from the USGBC (USGBC, 2008).

The Orchard Garden Hotel fills the requirements of LEED certificate in energy use, lighting, water and material use criteria as well as incorporating a variety of other sustainable strategies. It provides environmental performance, occupant health and also financial health. It supplies environmentally sustainable practices that have never used in the sector. These practices can be seen through the building's framework and construction practices, guest room and public space decoration and lightning also the housekeeping.

Figure 9: The Frontal Facade of Orchard Garden Hotel
(Orchard Garden Hotel Website, http://www.theorchardgardenhotel.com, 2009)

Figure 10: The Frontal Facade of Orchard Garden Hotel
(Orchard Garden Hotel Website, http://www.theorchardgardenhotel.com, 2009)

The design of the hotel is made by Architecture International firm. All materials that are used in the construction are eco-friendly materials. Concrete is made by fly-ash which is a by-product of recycling coal, wood certified by the Forest Stewardship Council that harvested in a sustainable manner. Added to these, the drapery, sheers, upholstery, coverlets and shower curtains are made of recycled polyester and the textiles are machine-washed instead of dry-cleaning which use harmful chemicals. The hotel's green practices include, a 100% tobacco-free environment, the products for chemical-free cleaning, soy-based inks and recycled paper, in-room recycling bins and the "San Francisco debut of a guestroom key card energy control system" (Orchard Garden Hotel Website, 2010).

Figure 11: The Lobby of Orchard Garden Hotel
(Orchard Garden Hotel Website, http://www.theorchardgardenhotel.com, 2009)

Figure 12: The Interior of Guest Room of Orchard Garden Hotel
(Orchard Garden Hotel Website, http://www.theorchardgardenhotel.com, 2009)

With an extensive product offering and a commitment to sustainable business practices, Bentley Prince Street worked closely with the design team to collaborate on the style and coloration of carpets for the hotel guest rooms, hotel corridors and the main lobby areas. Orchard Garden Hotel received one LEED point in the Materials and Resource category for manufacturing the products within the 500 mile radius of the project site.

The City of San Francisco has acknowledged the Orchard Garden's efforts by granting its official Green Seal and named the hotel a certified San Francisco Green Business.

Table 4: The LEED Point Distribution of Orchard Garden Hotel (LEED, 2009)

Sustainable Sites	5/14
Water Efficiency	2/5
Energy & Atmosphere	1/17
Materials & Resources	7/13
Indoor Environmental Quality	7/15
Innovation & Design	4/5
Certified	26

Figure 13: The Textiles used in decoration
(Orchard Garden Hotel Website, http://www.theorchardgardenhotel.com, 2009)

Figure 14: The Exterior Location of Orchard Garden Hotel
(Orchard Garden Hotel Website, http://www.theorchardgardenhotel.com, 2009)

LEED certification based on a pointing system on different topics. The Orchard Garden Hotel has won the LEED certificate on the New Construction topic at May 31, 2007. Table 4 shows the distribution of the points of the Orchard Garden Hotel.

Armstrong World Industries' Corporate Headquarters, also known as Building 701, is located on a 700-acre campus in Lancaster, Pennsylvania. Originally constructed in 1998, the glass and steel building contains two wings toes are connected with a daylight atrium. "In 2006 the project earned an Energy Star label from the U.S. Environmental Protection Agency, and in 2007 it earned a Platinum rating in the U.S. Green Building Council's LEED for Existing Buildings Rating System".

Figure 15: Armstrong Headquarters Building
(USGBC Website, http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1721, 2010)

The important aspect of the building through the LEED certification process was to reduce the building's use of water. The project team has used various elements such as waterless urinals, dual-flush toilets, and water sensors for the faucets. These elements caused the building to use half amount of water from its previous design. The amount was decreased from 800,000 to 420,000 gallons. The building has also achieved an innovation credit by selecting ceiling panels and furniture systems for sound absorption. These panels have a high percentage of recycled content and are manufactured locally. The building's floor plate has both interior and exterior light shelves. They allow the daylight to reach more than 50% the building's regularly occupied spaces. The double-paned, argon-filled, low-emissive glazing which covers the 80% of the building's exterior aided the LEED certification. This establishes two million kilowatt-hours of wind power each year enough to provide 75% of the project's electricity use.

Figure 16: Armstrong Headquarters Building Interior
(USGBCWebsite, http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1721, 2010)

Figure 17: Armstrong Headquarters Building Interior
(USGBCWebsite, http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1721, 2010)

Table 5: The LEED Point Distribution of Armstrong Headquarters Building
(LEED, 2009)

Sustainable Sites …….... 13/14

Water Efficiency ……..5/5

Energy & Atmosphere …….. 16/17

Materials & Resources …….. 13/13

Indoor Environmental Quality……. 13/15

Innovation & Design ……... 5/5

Certified ……...65

If we search for buildings with LEED certification in Turkey, we do not see many examples. However, there are only a few buildings which have been acquired certification. One of these buildings is Unilever Building that has awarded with LEED Silver score in September 2009 (Figure 18-19) in the LEED – Commercial Interiors type. Unilever Office Building has earned the first LEED Certification in Turkey (Unilever, 2010).

Figure 18: Unilever Office Building, Istanbul LEED, Commercial Interiors, Silver
(UnileverWebSite, http://www.unilever.com.tr/ourcompany/2009/unilever.asp, 2010)

Figure 19: Unilever Office Building, Istanbul LEED, Commercial Interiors, Silver
(UnileverWebSite, http://www.unilever.com.tr/ourcompany/2009/unilever.asp, 2010)

Unilever did not focus to take LEED Certificate at the start of the project, but as the project progressed deeper the need for sustainable movements affected the project team and they decided to focus on LEED Certification System. The natural lighting, energy management and indoor materials were selected in light of sustainable movement. The comfortable and relaxing work space also was a good aspect in indoor environmental quality category (Unilever, 2010).

Another example to certificated buildings in Turkey is the Siemens Building (Figure 20) in Gebze. Siemens Building has achieved Gold LEED Certificate. Siemens building again used the natural lighting to reduce energy usage with large windows that surrounds the building for natural light (ÇEDBİK, 2010).

Figure 20: Siemens Building, Gebze LEED Certificate, Gold
(ÇEDBİK Web Site, http://www.cedbik.org/SertifikaliYesilBinaOrnekleri.asp, 2010)

3.3 BREEAM Certification System

The construction industry has increasingly sought to apply green building labeling methods internationally in an effort to create performance benchmarks. Developers, owners, and occupants alike have begun to recognize the benefits of sustainable design and the value of achieving a measurable level of sustainability by obtaining a 'green label'. The US-based LEED (Leadership in Energy and Environmental Design), developed by the USGBC (United Stated Green Building Council), and the UKbased BREEAM (Building Research Establishment Environmental Assessment Method), developed by the BRE (Building Research Establishment), methodologies have become the most preferred internationally recognized sustainable building certification scheme.

In the previous chapters LEED certificate is briefly introduced. In order to compare these two most popular certifications an information about BREEAM (Building Research Establishment Environmental Assessment Method) should be given.

3.3.1 History of BREEAM Rating System

Building Research Establishment Environmental Assessment Method is an UKbased certification method generally known as BREEAM. It is formed from construction and environmental researches that are carried out at the Building Research Establishment Ltd. shortly known as BRE. These researches are based on many years of experiences. BREEAM is the earliest building rating system for environmental performance assessment. BREEAM provides wide range of benefits that allows building owners, users and designers to review and improve environmental performance throughout the life of a building. BREEAM evolved from a design checklist to a comprehensive assessment tool which can be used in various stages of a building. It has been accepted in many regions such as Canada, Australia and several European countries and these countries have developed different variations of the rating scheme. BEPAC (Building Environmental Performance Assessment Criteria), BREEAM Canada and BREEAM GreenLeaf are examples of such efforts. In the world, totally 714.000 buildings applied for BREEAM certification and there are 116.000 buildings that has achieved the certification (What is BREEAM, 2009).

The general aims of BREEAM certification system are:

· To mitigate the impacts of buildings on the environment.

· To enable buildings to be recognized according to their environmental benefits.

· To provide a credible, environmental label for buildings.

· To stimulate demand for sustainable buildings.

The objectives of BREEAM certification system are:

· To provide market recognition to low environmental impact buildings.

· To ensure best environmental practice is incorporated in buildings.

.To set criteria and standards surpassing those required by regulations and challenge the market to provide innovative solutions that minimize the environmental impact of buildings.

· To raise the awareness of owners, occupants, designers and operators of the benefits of buildings with a reduced impact on the environment.

· To allow organizations to demonstrate progress towards corporate environmental objectives (What is BREEAM, 2009 p.66).

3.3.2 BREEAM Rating Categories

BREEAM is tried and tested, both in terms of its robust technical standards and its commercial delivery and expert advice continues to inform almost every issue in BREEAM. BREEAM also helps the developers and designers to increase the chances of getting a higher rating from the beginning of the process by encouraging the issues above. The credits are awarded from the each criterion. After that these credits are added together to form an overall score. These scores then are rated on chart of Pass, Good, Very Good or Excellent (What is BREEAM, 2009). Every rating has a percentage of overall score like in Table 6. BREEAM covers a wide range of building types such as offices, homes, industrial units, retail units, schools, leisure centers, laboratories, and even prisons.

Table 6: BREEAM Rating Benchmarks (By Author)

BREEAM Rating	% Score
UNCLASSIFIED	**< 30**
PASS	**≥30**
GOOD	**≥45**
VERY GOOD	**≥55**
EXCELLENT	**≥70**
OUTSTANDING	**≥85**

BREEAM evaluates the performance of buildings in the following areas:

- Management: Overall policy and site management, commissioning and procedural issues.
- Health and well-being: Indoor and external issues affecting health and well-being.
- Energy: Operational energy and carbon dioxide (CO2) issues.
- Transport: Transport-related CO2 and Location related factors.
- Water: Consumption and water efficiency.
- Materials: Environmental implication of building materials including life-cycle impacts.
- Waste: Waste products.
- Land use and Ecology: Greenfield and Brownfield sites and ecological value conservation and enhancement of the site.
- Pollution: Air and water pollution issues (What is BREEAM, 2009 p.66).

Table 7: BREEAM Environmental Weightings (What is BREEAM, 2009)

BREEAM Section	Weighting %	
	New builds, extensions and major refurbishments	Building fit-out only
Management	12	13
Health and Wellbeing	15	17
Energy	19	21
Transport	8	9
Water	6	7
Materials	12.5	14
Waste	7.5	8
Land use and Ecology	10	NA
Pollution	10	11

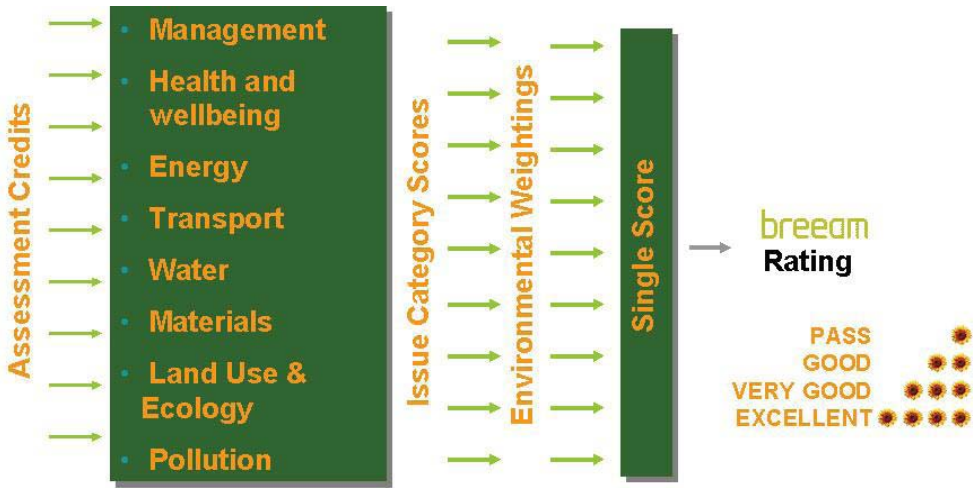


Figure 21: BREEAM scoring and weighting (Flanagan et.al, 2008 p.3)

The following conditions must be met in order to certify a building at the Outstanding BREEAM rating level:

1. The building must achieve a final BREEAM Score ≥85%

2. The minimum performance standards (table 3) for the Outstanding rating level must have been met

3. Provision of material for the production and publication of a case study on the Outstanding rated building.

Additionally, the 'BREEAM Outstanding' building is required to achieve a 'BREEAM In Use Certification of Performance' within the first three years of the building's operation (What is BREEAM, 2009). If the building is not certified against 'BREEAM In Use' during this three years period, the 'outstanding' rating will be downgraded to an 'Excellent BREEAM' rating after the expiry of the three years from issue of the 'Final BREEAM' certificate (What is BREEAM, 2009 p.103).

"Innovation credits provide additional recognition for a building that innovates in the field of sustainable performance, above and beyond the level that is currently recognized and rewarded within standard BREEAM issues" (What is BREEAM, 2009 p.103). Innovation credits are very important for clients and design teams to increase their building's BREEAM performance (What is BREEAM, 2009). The Innovation credits are not to be awarded till approval is received from the BREEAM Office. The maximum number of Innovation credits is 10; and the maximum available score achieved for 'innovation' is 10%. It is possible to add an additional 1% score to a building's final BREEAM score for each Innovation credit achieved. Innovation credits are regardless of the final BREEAM rating.

The BREEAM Bespoke scheme can be used to assess sustainability impacts at the following stages:

1. Design Stage (DS) - leading to an Interim BREEAM Certificate
2. Post-Construction Stage (PCS) – leading to a Final BREEAM Certificate. (What is BREEAM, 2009 p.96)

The Design Stage assessment and subsequent interim BREEAM Certification represents the performance of the building at the design stage of assessment, prior to the beginning of operations on site. The Post Construction Stage assessment and subsequent BREEAM Certification represents the final 'as built' performance and BREEAM Rating. A PCS assessment is carried out after practical completion of the building works, before handover and occupation of the building (What is BREEAM, 2009).

The types of buildings that BREEAM Certification covers are:

·Retail

·Industrial

·Schools

·Housing

·Courts

·Prisons

·Hospitals

·Ecohomes

·Bespoke (tailored to any building not covered by a standard scheme)

·International (this version is based on any of the existing schemes which are adapted to assess any type of building and any region in the world) (What is BREEAM, 2009).

BREEAM assessments are carried out by licensed assessors. BRE trains, examines and licenses organizations and individuals to help design teams gather the appropriate data and to carry out the assessments. For each assessment, the assessor produces a report outlining the development's performance against each of the criteria, its overall score and the BREEAM rating achieved. Once a report has successfully passed the Quality assurance process, BRE issues the client with a certificate that confirms the development's BREEAM rating. All aspects of the BRE's operation of BREEAM are accredited under ISO9001. Assessors qualified to deliver the BREEAM assessments are also covered under a UKAS accredited competent persons scheme (What is BREEAM, 2009 p.40).

BREEAM Offices 2005 - Design & Procurement Assessment tool

Design Stage Assessment Results

BREEAM Rating: Example 1	Good

Core & Design & Procurement Credit Allocation Table

Overall Credit Allocation	Env Weighting	Available	Achieved	Percentage section credits achieved	Overall Weighted Percentage
Management	15%	10	5	50.00%	7.50%
Health & Wellbeing	15%	15	8	53.33%	8.00%
Energy		17	9	52.94%	
Transport		14	7	50.00%	
Energy & Transport	25%	31	16	51.61%	12.90%
Water	5%	6	4	66.67%	3.33%
Materials	10%	12	4	33.33%	3.33%
Land Use & Ecology	15%	11	6	54.55%	8.18%
Pollution	15%	12	6	50.00%	7.50%
				Totals	50.75%

Figure 22: BREEAM Sample Sheet (What is BREEAM, 2009)

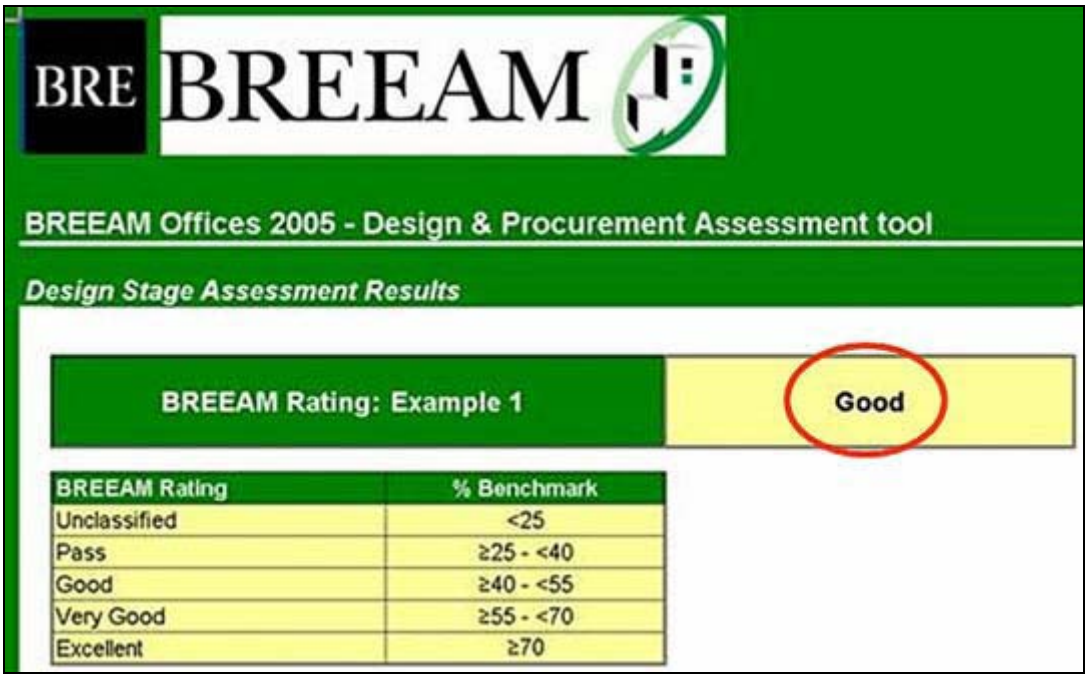


Figure 23: BREEAM Sample Sheet (What is BREEAM, 2009)

BREEAM offers a variety of benefits ranging from environmental to financial gains. For a long time BREEAM has been used to evaluate the environmental performance of both new and already existing buildings.

Financial benefits – Reduces energy and other running costs, improve staff productivity, make office buildings more aesthetic and thus are able to attract higher rental incomes.
Publicity benefits – Makes offices more attractive to potential customers or tenants by demonstrating environmental commitment.
Benefits to management – Provides a thorough checklist for benchmarking building performance, setting realistic targets for improvement, apart from complementing wider corporate management strategies.
Benefits to staff and building users – Creates a better place for people to work more productively, by providing a healthier and comfortable indoor environment. (What is BREEAM, 2009 p.96)

The typical components of BREEAM's assessments are:
Carbon dioxide emissions with quantified benchmarks
Healthy building features
Air quality and ventilation
Minimizing ozone depletion and acid rain
Recycling and reuse of materials
Ecology of the site
Water consumption and conservation
Noise
Risk of Legionnaire's disease
Hazardous materials assessment
Lighting
Environmental impact of construction materials
Transport implications of buildings (What is BREEAM, 2009 p.191)

There are many changes expected for the next version of BREEAM. The following changes will affect the current schemes:
·The environmental weightings have been revised to reflect the change in importance of the environmental issue categories since the last weightings exercise.
·Minimum standards are to be introduced through the introduction of mandatory BREEAM credits.
· A two stage certification process is being introduced an interim certificate will still be available at the design stage but a final certificate will not be awarded until post construction stage (What is BREEAM, 2009 p.104).

3.3.3 Examples of Successful BREEAM Certificated Projects

BREEAM (Building Research Establishment's Environmental Assessment Method) was developed in the United Kingdom in 1990 and it is the first building environmental assessment method. BREEAM covers a range of building types including: offices, homes, industrial units, retail units, and schools. There are many projects that achieved BREEAM certification from all around world (What is BREEAM, 2009).

Centrum Galerie is the first building in Germany, and the first shopping mall in continental Europe, to receive BREEAM Excellent. The overall score of the building due to BREEAM evaluation is 76.46% and received the certification in BREEAM International category (BREEAM Certificated Projects, 2010).

Figure 24: Centrum Galerie, Dresden, BREEAM Certificate, Excellent
(BREEAM Certificated Projects, http://www.breeam.org/page.jsp?id=205, 2010)

The Centrum Galerie development scored extremely well under the Management and Transport sections of BREEAM, with a 100% score in each. It also scored well under Health and Wellbeing and Energy. Careful use of resources and optimization of

the energy and space consumption has been a critical issue of the Centrum Galerie project since planning began in 2006 (BREEAM Certificated Projects, 2010).

It is an inner-city regeneration project that makes the best possible use of land and is close to all major public transport facilities. The design of the building and the use of the most advanced technologies all contribute to protecting resources. For example, the lifts and escalators have an energy saving mode, in fact all lifts are designed with an energy recovery system, with an active return of excess energy to the grid. Maximum use is made of natural lighting (BREEAM Certificated Projects, 2010).

Figure 25: Centrum Galerie, Dresden, BREEAM Certificate, Excellent
(BREEAM Certificated Projects, http://www.breeam.org/page.jsp?id=205, 2010)

Horizon House is the Environment Agency's new corporate office that is part of a larger, mixed-use development in the centre of Bristol, which includes another office building and a residential block. The building performed well across all of the BREEAM categories. Management, Transport and Water sections had achieved full points. The majority of points have been achieved under Health and Wellbeing. The overall score of

the building is due 85.06% and received the certification in BREEAM Offices category with “Excellent rating (BREEAM Certificated Projects, 2010).

Figure 26: Horizon House, Bristol, BREEAM Certificate, Excellent
(BREEAM Certificated Projects, http://www.breeam.org/page.jsp?id=205, 2010)

The Stores Building has been designed for compact and economical space use and circulation flow in a minimum rectangular envelope. This achieves both a reduced volume of heated space in the building and a reduced external surface area from which heat energy can be lost. The design team had reviewed more than 30 possible options for environmentally sustainable improvements that could be used on the campus redevelopment. This allowed them to quickly assess and incorporate the most appropriate elements into the new Stores Building during the briefing and design stages, so these were fully integrated into the design. The nature of the building required a largely windowless external envelope, which also gave opportunities for achieving a good thermal and air tight envelope. Also the noise reduction through the building was achieved through the fabric that has applied on insulated external walls and roof.

The project performed very well across all categories with the top scoring categories being:

- Water and Management, which both achieved 100% of available credits
- Pollution: 92.31%
- Health & Wellbeing: 85.71%
- Energy: 83.33%

The overall score of the building due to BREEAM evaluation is 83.76% and received the certification in BREEAM Industrial category with Excellent rating.

Figure 27: The Stores Building, Surrey, BREEAM Certificate, Excellent
(BREEAM Certificated Projects, http://www.breeam.org/page.jsp?id=205, 2010)

Figure 28: The Stores Building, Surrey, BREEAM Certificate, Excellent
(BREEAM Certificated Projects, http://www.breeam.org/page.jsp?id=205, 2010)

The example of BREEAM Certificated projects in Turkey is more seen in shopping centers. The first building that achieved BREEAM certification is Erzurum Shopping Center (Figure 31-32) with the Very Good standard. Gordion Shopping Center in Ankara (Figure 29) has also achieved BREEAM Very Good certification score. These buildings are one of the first BREEAM Certificated buildings in Turkey (ÇEDBİK, 2010) (APPENDIX IV).

Both of these buildings are constructed by REDEVCO Company which focuses on the sustainable approaches through the whole buildings. The European standards were used through the buildings, aiming to achieve energy sufficient solutions also added to other sustainable materials and indoor quality usage (ÇEDBİK, 2010).

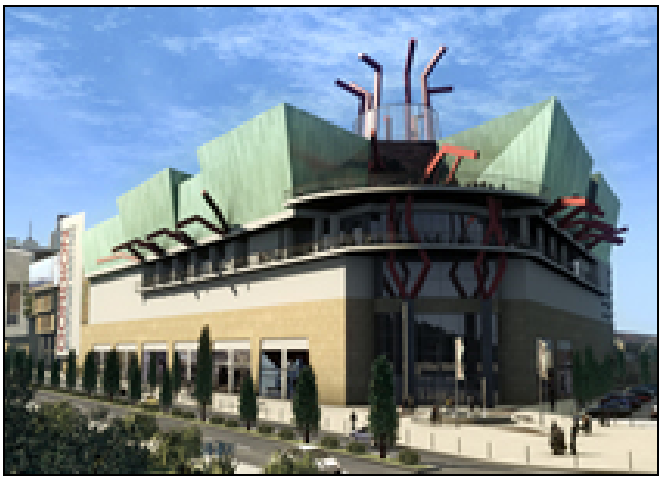


Figure 29: Gordion Shopping Center, Ankara BREEAM Certificate, Very Good
(ÇEDBİK Web Site, http://www.cedbik.org/SertifikaliYesilBinaOrnekleri.asp, 2010)

Figure 30: Gordion Shopping Center, Ankara BREEAM Certificate, Very Good
(ÇEDBİK Web Site, http://www.cedbik.org/SertifikaliYesilBinaOrnekleri.asp, 2010)

Figure 31: Erzurum Shopping Center, Erzurum BREEAM Certificate, Very Good
(Yapı Dergisi, Ecology in Buildings, April 2010)

Figure 32: Erzurum Shopping Center, Erzurum BREEAM Certificate, Very Good
(Yapı Dergisi, Ecology in Buildings, April 2010)

LEED and BREEAM certification processes have become the national standard in their present countries, but already many different governments have already accepted these schemes into their planning processes. The importance of these two schemes can be investigated differently but their methods still can be comprised.

3.4 Comparison of LEED and BREEAM Rating Systems

In order to successfully make a comparison between LEED and BREEAM the verification of these two methods should be clarified. The diagrams beneath show the verification process of these two certification systems.

Table 8: Verification Process of LEED (By Author)

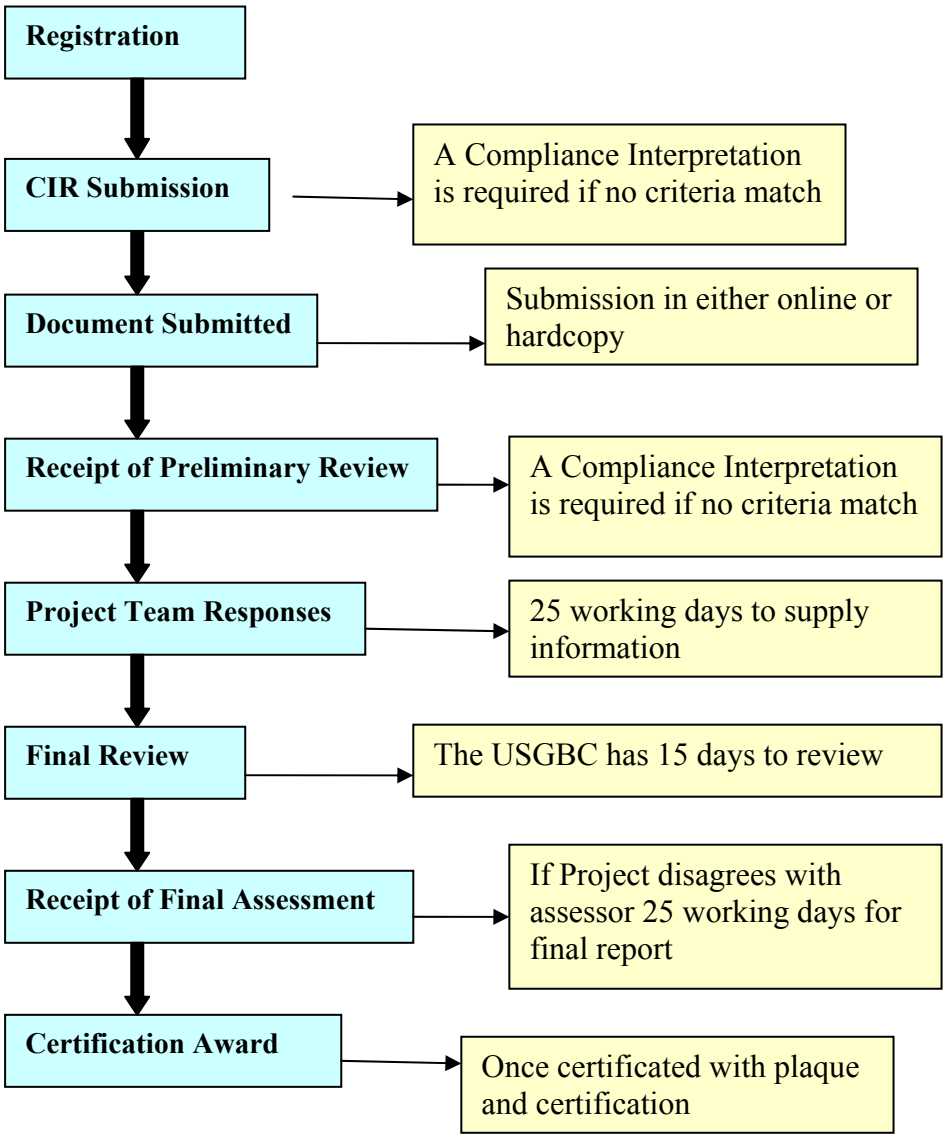
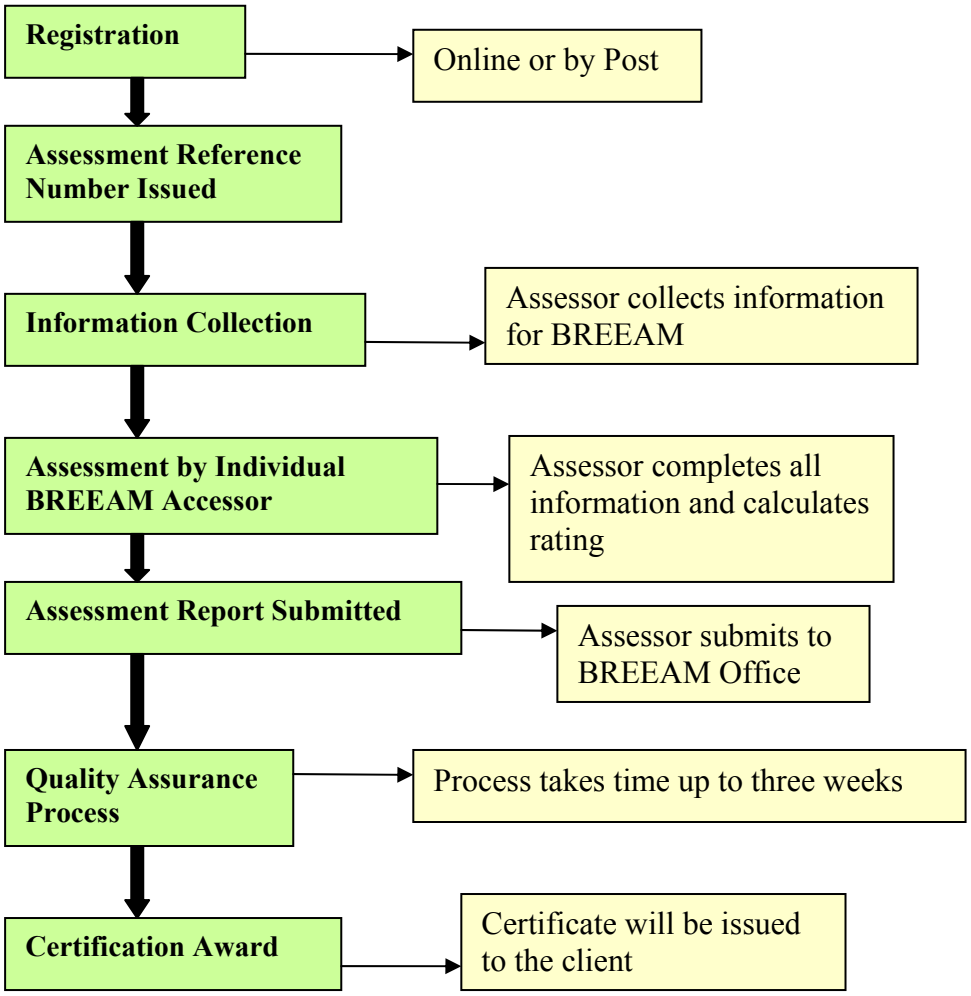


Table 9: Verification Process of BREEAM (By Author)



LEED and BREEAM have many similarities. The most important one is the general process and intent. Both schemes have their own recognized and accepted certification systems based on their independent criteria's.

Each certification systems have been developed through years of research and have a similar organization. Both systems have a credit system that are divided into different topics. These credits that are achieved through the organizations that the systems formed which are USBGC and BRE then rewiev these credits into levels. These levels differ in name within each system like, in BREEAM Pass, Good, Very Good, Excellent and Outstanding and in LEED Certified, Silver, Gold and Platinum for any building form and type.

Another similarity is in innovation credits. LEED has innovation credits since the first versions. Innovation plays an important role in LEED system as it consists of four points that can be added to the rating. The opportunity of getting higher ratings is possible with these innovation points. BREEAM also have innovation pointing system in itself which again helps the project owners can earn %10 more points on overall score (What is BREEAM, 2009).

Table 10: Assessment Methodology Similarities between LEED and BREEAM (By Author)

ASSESSMENT METHODOLOGY SIMILARITIES
• Independent third-party certification verification. • Aim to assess the overall sustainability of a development using a 3-prong approach Social, Environmental & Economical • Credit thresholds determined by improvement upon industry standards. • Recognized "label" for certification. • Innovation points are available and play an important role at final score.

If we compare the two systems, although both systems cover many of the same topics and have many similar requirements, both methodologies are executed through different concepts which make them more appropriate for different occasions.

There are less LEED certificated building in compared to BREEAM. The LEED certification consists of two phases which are Design Phase and Construction Phase. LEED requires both phases to be completed in order to achieve the certification. This makes the timeline of the certification takes longer. On the other hand, BREEAM requires completion of single stage which are either the Design Stage or the Post-Construction Stage. This makes the timeline of the certification takes shorter. Any of the two systems approach can be argued, but in future BREEAM is thinking to expand its certification into both stage method like LEED which indicates the correct approach for designer and construction team.

One of the most important difference is the standards that the systems are using. LEED system still uses United States based standards. This also frequently presents a difficulty in assessing compliance, as project teams abroad are unlikely to be familiar with U.S. Standards. Often, a U.S. based consultant must be contracted to undertake compliance analyses, adding to professional costs and potentially construction

costs as well. Compared to LEED, BREEAM has formed BREEAM International mechanism which provides region specific criteria (What is BREEAM, 2009). This makes BRE successfully respond to Project demands in foreign countries.

Other difference is prerequisites. LEED system has prerequisites at any level of the projects including seven in new construction. Failure in any prerequisite mean declination of the project certification even though the project can get Platinum level in LEED. On the other hand BREEAM has no prerequisite (What is BREEAM, 2009).

The assessor involvement is also another difference in both of these systems. BREEAM requires BRE-trained individual in projects in order to undertake the assessment and submit the report. For becoming a BREEAM Assessor an exam and a test is required for a person. This can be quite costly for the firm that applied for the certification because the trained person must be the member of the firm with a salary. However becoming a LEED Assessor is much more easy as the test for this process is computer-based and can be taken online worldwide. Furthermore, for LEED certification involvement of an assessor is not required but LEED encourages the companies to have a LEED assessor by putting an additional point in the process.

One of the key differences between LEED and BREEAM is the use of life cycle analysis. Currently LEED uses a checklist approach to assess the embodied impact of the materials. This is an over simplification which leads to potential inaccuracies. The USGBC are currently developing an approach which will bring the assessment of materials more into line with the Ecopoints / Green Guide method, developed by BRE.

Finally, the accessibility is another example of the differences between these two methods. The response time to the projects in BREEAM is much more slower than LEED. Also at LEED system more online support is available (LEED Rating Systems, 2009).

Table 11: Assessment Methodology Differences between LEED and BREEAM (By Author)

ASSESSMENT METHODOLOGY DIFFERENCES	
LEED	BREEAM
• 2 phase review process required (Design & Construction) to earn a single rating for 1 certificate.	• 2 phase review process optional (Design Stage & Post- Construction Stage). Each phase is separated certified, for a possible 2 certificates with different ratings.
• U.S. regulations and best practice apply. Eg. ASHRAE	• Local and/or Regional regulations and best practice apply.
• LEED AP participation in process is optional.	• BREEAM International Assessor contracted to complete formal assessment is required.
• Pre-requisite credits apply for every project to achieve any level of certification.	• Pre-requisite credits apply only for non-International assessments attempting higher levels of certification.
• Accessibility is faster.	• Slower in response to projects.

Clearly, all assessment methodologies available worldwide have not been discussed herein. The two most recognized third-party verified certification schemes, BREEAM and LEED, have been chosen. They have varying benefits and disadvantages, and it is the responsibility of the project team to consider these and advise the owner which scheme will be more beneficial and feasible, locally and globally. Whatever certification methodology is determined to be the most logistically suitable to the project, other considerations, such as marketability, recognition and uniformity, will often ultimately have as significant or greater an influence on the final methodology selected.

3.5 Responsibilities and Capacities of Interior Architect in the evaluation process of BREEAM and LEED

According to IFI, interior architects are the professionals who form programming, design analysis, space planning, and aesthetics, using specialized knowledge of interior construction, building codes, equipment, materials, and furnishings services that are related to interior spaces. They also prepare drawings and documents in relation to the design of interior spaces in order to enhance and protect the health, safety, and welfare of the public. They identify research and solve problems in repect to function and quality of interior environments (International Federation of Interior Architects/Designers, 2010).

The current opportunities in sustainable development, which is a very fast growing area offers interior designers a wide range of possibilities for the future. Guerin (2003) tells that "Interior architects who focus on environmentally responsible design plan, specify, and execute solutions for interior environments that reflect concern for both the world's ecology and the inhabitant's quality of life". As interior designers, we are positioned to have a major impact on sustainability and can participate to this sustainable design effort with huge range of material specifications.

According to the World Watch Institute (US Department of Energy, 2002) about 10 percent of the global economy involves building construction, operation and equipment. Consequently between 17 to 50 percent of the world's natural resources are used in this sector. This potentially causes extensive damage to the environment. Buildings also impact the health and welfare of its occupants through indoor air quality (Fisk and Rosenfeld, 1997). Indoor environments significantly influence rates of respiratory disease, allergy and asthma symptoms, sick building symptoms and worker performance. Fisk and Rosenfeld (1997) states that in the United States alone, estimates of potential annual savings from these ailments range in the billions of dollars.

Designers can prepare themselves to make more informed decisions by sharing information on life cycle cost analysis and other pertinent information regarding surface requirements of materials and their performance in many specific and relevant sustainable areas (Malin and Wilson, 1997). Interior architects must educate their customers on the importance of choosing materials that will support the intended function of the space in addition to performing well over time.

It is a common misconception that interior architects do not have a significant impact on the sustainability of a building. To refute that idea one only has to refer to the very document that most people rely on so heavily when considering sustainable choices (Guerin, 2003). According to LEED-NC, in the category called Materials and Resources, designers may have direct control of 7 of the possible 14 points. For the category Indoor Environmental Quality, interior architects may have control of 6 points out of 17. That equates to a total of 13 out of 57 points, or 23%, in the entire LEED scorecard. This does not take into account the four points available for innovation in design or the one point awarded for having a LEED accredited professional on the design team LEED-NC (Leadership in Energy & Environmental Design for New Construction).

LEED Rating Sytems (2009) verify that it requires 21 points to receive certification. So it is evident that interior architects can indeed play a significant role in the sustainability of a building. Designers often use the LEED scorecard as the only way to identify if a material is sustainable. While LEED does provide a guide in some instances between material choices, designers need a more detailed profiling system to enable us to be the experts in the area of choosing appropriate sustainable choices (Bierman-Lytle, 1995). Design professionals have a unique opportunity to reduce environmental impact through the specification of appropriate materials. Montgomery (2003) explains that "The body of knowledge that is part of whole-building life cycle assessment can help to inform better design decisions in service to a healthier planet" (Montgomery, 2003 p.2).

Also in BREEAM Rating System the interior architects' role can be seen in many of the objectives that the project must complete. BREEAM focuses mainly on evaluating the environmental factors, such as use of global environment and resources, friendliness with surrounding, and the quality of internal environment. In addition, from Management criteria through Pollution criteria interior architects' duty can easily be seen. Apart from some mathematical calculations concerning the engineers on the efficient energy, water and waste use, the other percentage of overall points all are related with interior architects' area. Added to this, BREEAM consists of two stages and both of these stages can be rated. In Design Stage of the certification interior architect plays an important role. As stated in Table 7, in materials section it is again proved that the knowledge of the interior architect on sustainable materials becomes handy.

BREEAM has identified different building types for certification and in every stage of the process BRE forces the project owners to involve a certificated assessor through all process. By applying this rule BREEAM encourages more interior architects to focus on sustainable systems and be a part of it by being an assessor; as an assessor has deep knowledge about the sustainable materials and indoor quality measurements.

Interior architect professionals need to have access to all materials in order to make perfect choices. That access will best serve our customers' sustainable objectives. The interior material specification is the most significant way in which we can be involved in the sustainable movement. Eventually, we must learn all this data with the most dynamic tools to aid us in evaluating these products. Only then can we truly consider ourselves leaders in this sustainable revolution.

The tables (Table 12-13) below show how an interior architect involves in the categories of both LEED and BREEAM.

Table 12: Interior Architects' Role in LEED Categories (By Author)

LEED Rating System Categories and Interior Architects' Role	
Sustainable Sites	As this category is more related with Landscape Design, the selection of the building and restoration of an existing structure involves interior architecture profession criteria's also.
Water Efficiency	This category, however deals with the water use and waste water products, the designing of the water system, waste reduction and plumbing areas also contains the interior architecture branches.
Energy & Atmosphere	This category contains renewable energy, ozone protection, and energy efficiency criteria, but again the usage of energy systems, placement of the energy materials in efficient areas include interior architecture profession.
Materials & Resources	This category is again an example of how interior architecture profession is valuable as the material and resources and the effective usage of them is one of the most important aspects that interior architect deals with. The process starts from beginning of the whole design from planning through the materials that are going to be used efficiently. An interior architect is also capable of deciding the correct usage of recycled materials.
Indoor Environmental Quality	This category deals with reducing indoor pollutants, improving the thermal comfort, indoor lighting and air quality. Interior architect can play an important and effective role in this category by using correct materials and correct placements through the design process. The knowledge and participation of an interior architect in this category is essential.
Innovation & Design Process	In this category, a LEED Accredited Professional is preferred in the design process and an interior architect can also participate in this category.

Table 13: Interior Architects' Role in BREEAM Categories (By Author)

BREEAM Rating System Categories and Interior Architects' Role	
Management	It is the selection of the land, site management and other issues considering the whole setup of the project that is going to be submitted to BREEAM. Interior architect again has a role and can be involved in this process.
Health and Wellbeing	This category deals with adequate ventilation, humidification, lighting and thermal comfort, aiming to give the users of the building sufficient daylight. Again here an interior architect has the capacity to select the materials, the process and right usage of instruments.
Energy	This category deals with the idea to recognize and encourage buildings that are designed to minimize the CO2 emissions associated with their operational energy consumption. However this category seems to be more related with calculations, an interior architect, as specialized in creating atmosphere, can participate in this category and can decide the designing stage.
Transport	This category aims to form good public transport networks and to help reducing the transport-related emissions and traffic congestion. Although interior architect profession deals with more interior issues rather than landscape, again in this category interior architects can participate in the designing process of exterior elements such as car parks and interior-exterior connections.
Water	This category deals with minimizing the consumption of potable water by encouraging the use of low water. The instruments in low water usage and its placement is again solved in design process that can be solved by interior architects, however this criteria again needs calculations of a specific profession.
Waste	This category aims to encourage the less amount of hazardous construction waste. This category generally related with the construction phase of the building.

Continue

Land use and Ecology	In this category the aim is to use contaminated land that otherwise would not have been remediated and developed. In this category the interior architect again can involve in selection of a correct land.
Pollution	This category aims to lower the effects that cause global warming and to check if correct uses of refrigerants are used within construction. Although this category is more general that involves many professionals in it, interior architecture profession is also one of them and can participate in selecting the correct materials and applying successful ventilation systems.
Materials	This category again same as in LEED certification aims to utilize construction materials that have low environmental impact over the full life cycle of the building. From windows to ceiling, from external walls to internal walls and from wall coverings to finishing interior architect has huge capability to select and install the elements correctly.

These tables show again the importance of interior architecture proffesion through the world's most significant rating systems. From these tables it can be understood as LEED certification process contains more critieria that an interior architect can involve with. As mentioned in above paragraphs BREEAM certification deals with more environmental issues. Added to this BREEAM has 2 stages and in Design Stage the participation of interior architect to the project is much more. In both rating systems, as they focus on sustainable approaches, interior architecture profession has the highest percentage in their Material criteria.

The comparison of interior architecture proffession participation in these methods can be another subject to deal with. From the informations that stated above, according to the changes in global technology, increasing demand on more sustainable, healthier environments, these systems have to consider this proffession in high priority.

In order to ensure sustainability, understanding the environmental issues surrounding the extraction of raw materials, the manufacture of construction materials and their effects in use is very important (Thareja et. al, 2003). The selection of materials should

be done very carefully through analyses of all possible environmental aspets. These analyses may differ from project to project. Because of this various techniques have been developed. These techniques include: gross energy requirement (GER), process energy requirement (PER), building material ecological sustainability (BES) index, and life-cycle analysis (LCA), sometimes called the cradle to grave approach (Thareja et. al, 2003).

Interior architects, although not seen clearly, play a very important role in designing the environment sustainable. As technology and life quality is improving and the world is turning into a more sustainable place, with the changing materials, newly found techniques and with the change in perspective through design criteria, the interior designers have to progress like computers and update themselves everytime in order to catch the state of architectural approach in the world. With this idea the designer can find solutions and results more quickly and appropriate way.

CHAPTER 4

STATUS OF INTERIOR ARCHITECTURE IN SUSTAINABLE APPROACHES IN TURKEY

4.1 History of the Consciousness of Sustainable Design in Turkey

In Sustainable Architecture in Turkey, Arsan points out the confusion in the usages of the terms concerning ecological design. She mentions that the terms environmental design, green architecture, ecological architecture, environment sensitive architecture, environment friendly architecture, smart architecture, energy effective architecture, energy conscious architecture, climatic architecture can be discussed as controversial subjects. They usually compete with each other.

The term sustainable design is reached through time like "environmental design" in 70's, "green design" in 80's and "ecological design" in 90's which resulted in "sustainable design" in mid 90's till present time. 70's technological approach filled with rich design changed into more green movement with the liberal economy in 80's by the concept of recycling turned into sustainable movement and spread with the United Nations Environment and Development Conference in 1992 (Arsan, 2008). This change in the terminology shows the extending architectural theory and application fields on this subject. In this context, until the mid 1990s applications having the "building" as the subject and "correlating with the balance of nature" as the worry and in generally speaking "environment friendly" could be mentioned. As the second criterion, the character of the architectural manner which makes the building environment-friendly, meaning building's morphology, material choice and construction technique and construction units intended for compatibility with the climate and topography should be examined (Yavuz and Zığındere, 2000).

Arsan argues that in Turkey, it is quite difficult to find a clear comment about in which general terms environment sensitive buildings are examined depending in part on the scarcity of the samples and as a result to draw a correspondence with these periodical differences mentioned above. But it is possible to make comment on the diversity of our sustainable architecture practice when environment centered activities are taken into account which became widespread from the beginning of 1990s to present in our country (Arsan, 2008).

Arsan (2008) points out that, after the Habitat II-United Nations (UN) Human Habitats Conference held in 1996 in Istanbul, concern for the sustainable architecture and concrete enterprises both in variety and in number have increased (although not as much as expected) in our country. In this increase the impact of the conference themes such as concepts of "habitable environment" and "sustainable habitat" and expressions of "localness" and "participation" is great. Arsan (2008) also states that the "Think global, act local" principle, accepted in Turkey with Local Agenda 21 activities, constituted the agenda of the conference and started the questioning process of these two environment related issues in our architectural practice and provided awareness: The fact that habitat problems can only be solved by local actors and positive role of non-governmental organizations (NGOs) and individual enterprises in creating "alternative/ environment sensitive" living styles and residence sites.

As a result, by looking at this panorama appeared in more than a 30-year period it can be said that "sustainable development" is the popular discourse of the last 20 years; it is still a new and developing subject for Turkey. "Sustainable habitat" approach, which became agenda of our society in theory with the Habitat II-United Nations (UN) Human Habitats Conference held in 1996 in Istanbul, didn't get the expected interest in the application field after the conference. Consequently, the discourse got limited applications in extent and in number as response in our country. A transition process program in order to make this concept an inseparable part of our daily life and encourage the sustainable building practice should be prepared. When the sustainable architecture in Turkey is examined by examples, the first thing attracting the attention is that the principles of the concept are not investigated enough and consequently not understood. In some samples, the sustainability of the building is thought to be the same as constructing hi-tech, "energy-efficient", "ecological" or "smart" buildings which produce energy by itself, consume less energy and use passive systems. In other terms,

the term is handled with its morphological aspect without establishing a bond with social, cultural, environmental and economic realities of its region.

Sustainable building enterprises are quite insufficient when compared with our current building stock. The samples are heavily house functioning projects realized by individual efforts or NGOs. The efforts of the official institutions, including the many experimental buildings in the universities, are far more less in number. One of the leading reasons of this is the negligence of the central or local administrations for creating an environment built in a sustainable way and the lack of architectural and planning policies encouraging and protecting sustainable development approach. At this point it is certainly important to mold public opinion demanding sustainable building. But the current panorama shows that the pioneering role of the official institutions supporting, encouraging and forcing to comply with the architectural practice gains importance. More public buildings (education and office buildings, shopping centers, hospitals etc.) should be projected as qualified samples in order to increase the demand of the users and to make the sustainable architecture practice more easily adopted. Most of the projects are not the applications based on the "sustainability" concept; but are the buildings holding sustainability design principles unconsciously.

Although there is little interest to sustainability in Turkey, Turkish Green Building Council was formed under name ÇEDBİK. ÇEDBİK is also recognized by the World Green Building Council and became the member of it. Without any government support, ÇEDBİK was formed with twenty-three people as an institute in 2007. Nowadays it contains fifty people and has made a pact with BRE-International. The institution supports buildings and constructions to be formed in green movement and also it helps projects to achieve LEED, BREEAM or other certification schemes. ÇEDBİK has formed no rating systems like LEED or BREEAM that can be applied in Turkey's aspects (ÇEDBİK, 2010).

4.2 Laws and Regulations Concerning Sustainable Design

The statements and examples which are defined in the previous chapters bring out a need to remodel the existing scheme of architectural design and application profession in our country. Concerning the sustainability and environmental awareness values, the built environment requires professionals with relevant certifications and background. The construction phase and the design phase in Turkey are of great importance considering these applications and the certification principles. The following are the laws,

regulations and procedures which prove that the process in Turkey is incompetent in evaluating and applying sustainability in construction of any kind of buildings. The Chambers of the professions define the extend and the ethics of the professions to be applied but do not mention evaluation of certified professionals to act in.

The Law of Building Governance (4708) defines and certifies the buildings with prior concern to seismic evaluations and buildings sustainability due to margins of structural stability. The personnel to control the margins of the building are defined as architects and engineers involved in construction business. The interior architect is discluded from this law with misunderstanding of the profession and the sustainability is not mentioned within any part of the law in any sense. The ecological concerns and environmental control is diminished to an extend that the building is certified as long as it is structurally sound. The laboratories which are used due to this law only measure the materials' stability but not its energy consumption and natural resource usage (4708 Sayılı Yapı Denetimi Hakkında Kanun, 2010).

The Law of Reconstruction (3198) defines the legal permits established and given to the buildings and the rules to be applied. The rules concentrate on the ownership of land, land management, application of type of buildings and the registration process of the buildings to be built. The protection of the environment is in minimal concern for the protection of the environment only mentioning the areas legally limited to erect any building on it. The Law does not mention any environmental concern or sustainability let along Interior architecture as a profession (Imar Kanunu, 2010).

The Law Concerning Engineering and Architecture (3458) with Law of TMMOB only concentrates on the verification of the profession of being an architect or an engineer. The law does not define the professional margins or working habits and limitations of the professions mentioned. The sustainability, certification, registration and the profession of Interior architecture are not the concern of the law at all (Mimarlık Mühendislik Hakkında Kanun, 2010).

The Law of Municipalities (5392) focuses on applications within the limits of the municipalities. The law defines the protection of the environment as built environment and the historic environment. The built environment and the outcomes of the built environment is to be detected by the professionals within the municipality not to mention that the interior architecture was not included as well as sustainability and environmental awareness in the sense of ecology (Belediye Kanunu, 2010).

The Regulations of Environmental Impact Evaluation provided by the Ministry of Environment and Forests mainly concentrates on the principles of evaluation of any consequences as outcomes of planned activities to reveal environmental problems. This is relevant for every kind of establishments to produce wastes of a variety. The estimated waste values are considered for these establishments and the relevant permits and prohibitions are applied. The sustainability is not a concern but a means as an outcome of this Regulation. The evaluation committee does not include an interior architect or any binding points to the profession (Çevresel Etki Değerlendirmesi Yönetmeliği, 2010).

The Law of Environment (2872) is the law that really considers the environmental protection values and sustainable environment. The wastes chemical and regular, their procession and the application procedures are mentioned and partially defined by the law. The limitation of natural areas and the construction binderies are discussed with a reference to the worldwide applications and procedures. Yet, the professions related to such applications are out of laws concern and the certification and registration which is said to be followed along with international applications are lightly mentioned (Çevre Kanunu, 2010).

4.3 Laws and Regulations Concerning Role of Interior Atchitect in Sustainable Design

The design phase and the construction phase in Turkey are detected by the municipalities, Chambers of professions, and relevant laws and regulations without mentioning the musts or any claims of offerings and suggestions on creating sustainable buildings. The international laws bring out solutions and proposals to such applications even present in directives and declarations. The application in Turkey is proved to be incompetent in providing such outcomes and schemes of evaluation to achieve environmental aware and sustainable design in reality. The disclosure of interior design profession in such evaluations and applications is also a preliminary factor of the reason why the following model is to be proposed.

The construction sector consists of many professions including building architects, interior architects, landscape architects, urban and environmental planners, and specialists in areas of a variety. Professionals with such backgrounds are supposed to work on projects as teams with each other along with other professionals from complementary fields.

The following table shows the current situation and application principles in the construction scheme in Turkey. The phases and registration formats are weak concerning

the laws being incompetent to achieve a healthy evaluation of the application. All aspects of the application is ruled by the architect and supervised by his demand where the other professionals are briefly discluded from the decision phase of practicing. Unless the architect is fully equipped on the subject of sustainability and ecological design, his decisions are of crucial importance and the mistakes can not be prevented. The decision maker at the construction phase has to be certified and regulated by law which in this case is irrelevant and inappropriate to be evaluated.

Table 14: Current Situation of Professions of Construction in Turkey (By Author)

Profession	Responsibility	Certified By	Controlled By
Civil Engineer	To define and design the structural system of the building to be erected, make seismic and other structural calculations defining the appropriate structural system for the building supervising the application.	Relevant Chamber to Register the Action of the Professional	Relevant Chamber, Municipality and Building Governance Firms
Mechanical Engineer	To provide technical designs and applications within the building concerning every mechanical practices	Relevant Chamber to Register the Action of the Professional	Relevant Chamber, Municipality and Building Governance Firms
Electrical Engineer	To provide technical designs and applications within the building concerning every electrical practices	Relevant Chamber to Register the Action of the Professional	Relevant Chamber, Municipality and Building Governance Firms
Architect	To design the building to be erected, supervise the construction and define technical aspects	Relevant Chamber to Register the Action of the Professional	Relevant Chamber, Municipality and Building Governance Firms
Landscape Architect (Optional)	To design the environment of the building to be erected, give suggestions for the interior plantation, define technical aspects and supervise application	NONE/OPTIONAL TO REGISTER THE PROJECT WITHOUT ANY LAW BINDERY APPLICATION	NONE
Interior Architect (Optional)	Design the interiors of the buildings to be erected, define material, detail, finishing and furnishings, supervising applications	NONE/OPTIONAL TO REGISTER THE PROJECT WITHOUT ANY LAW BINDERY APPLICATION	NONE

The check points of the desicionmaker as the architect are also very crucial where the architect controls the architect and could be as limited in case of stock of information as he has. The other important aspect is that, there are no restrictive rules to be applied to building, concerning sustainability to register the professional that bound to associations, chambers, municipalities or law. The critical professions are not included in the design and construction phase as well as their decisions.

The scheme of any construction phase is bound by law all over the world. The efficiency and the true application is a demand by the end-user to get the best of the building that they are supposed to perform activities within. Governmental or not, any building that is to be built will be used by people with demands and the nature provides the land and other supplies for the people to sustain the building as well as their activities.

The situation must be under critical control to provide the user all means of efficiency as well as a sustainable and healthy environment. The problem in Turkey derives from the lack of this control mechanism and the faulty applications are encouraged by this procedure. The user bound profession is interior architecture by all means. The interior architect defines and designs the life establishment in the building and provides the environmental comfort. The lack of consideration of this profession causes critical problems not only for the usage but also in the environmental quality. It is mandatory to bring out a new system that contains the interior architecture profession in every aspect of the building construction and design by law.

4.4 Rating Systems of Sustainable Buildings in Turkey and the Limitations of the Interior Architects

The certification and registration phase in the current situation is also stated as follows where the necessity of such rating process is not a must or an offering in Turkey. Another concern is that the certification of equipped personnel and the professions. The choice of the decision maker and the checkpoints are irrelevant where the rules do not prohibit, limit or forbid any professional from making mistakes and do not reward anyone who does not. So the faults become a closed circuit and the interior architecture profession cannot surface and claim that the material choice which is one of the most important parts of sustainable design is also his work to be done. Interior architect ties the end-user to the building with function, comfort and technology. The consumer is living his life within the space created for him. This becomes critical for the end user to be interconnected by all means of products those are sustainable, saves time, energy and money. In greater scale this is a very important support to the countries economy.

Table 15: Current Control and Certification Mechanism in Turkey (By Author)

Application	Responsible Professional	Bound To Ministry /Association of	Mentioned By Law/Regulation	Certification Principles Required
Appliances	Technician/ Architect	Relevant Chamber, Ministry of Public Works and Building Reconstruction	Law of Environment, The Regulations of Environmental Impact Evaluation, Relevant Chamber Regulations	NONE
Storage Facilities	Technician/ Supervised By mechanical Engineer, Architect	Relevant Chamber, Ministry of Public Works and Building Reconstruction	Law of Environment, The Regulations of Environmental Impact Evaluation, Relevant Chamber Regulations	NONE
Interior Plantation	Landscape Architect & Architect	Relevant Chamber, and Ministry of Environment And Forests	NONE	NONE
Electrical Equipment and Lighting	Electrical Engineer, Lighting Engineer, Architect	Relevant Chamber, Ministry of Public Works and Building Reconstruction	Relevant Chamber Regulations and Municipality Applications, Law of Building Reconstruction	NONE
Mechanical Equipment (Plumbing, heating etc.)	Mechanical Engineer, Architect	Relevant Chamber, Ministry of Public Works and Building Reconstruction	Relevant Chamber Regulations and Municipality Applications, Law of Building Reconstruction	NONE
Furniture	Architect, Technician	Relevant Chamber, Ministry of Public Works and Building Reconstruction	NONE	NONE
Finishings	Architect, Technician	Relevant Chamber, Ministry of Public Works and Building Reconstruction	Law of Building Reconstruction	NONE

It can be seen clearly that most of the professions that are supposed to be in the application procedure for construction and design are left out and not recognized by law in Turkey. This brings out the problem of consistent and appropriate methodology and recognition of the necessities of the user and the designer. The problem of non recognition of the other professions means that the services that they would provide are also missing during the phase of construction. The application would be in the hands of

one minor profession and it would be rather subjective in establishment. Mechanism that controls and certifies the professions are not yet established in Turkey. The law lacks the obligations and relevant methodology to provide a sound application. The following is a new model proposed to light the way for a next action plan for Turkey in case of recognitions of professions in the construction in light of sustainability, that are also strengthened by the branding of certification.

4.5 Proposals for the Professions of Construction Field in Turkey

Human behavior proved that, laws and regulations are social actions that shape and obligate the actions of any community. These communities consist of all kinds of performances that they act together or separately concerning professions and social amenities. One of the biggest communities that contain many professions bound by law is construction. The previous headings in this chapter prove that, the laws and regulations that bind the professions of construction, lack the priory knowledge and primary concerns to certify the necessary professions and the buildings designed by them. This means that the laws can not communicate the professions that already exist in the construction system like interior architecture. Added to this, as interior architecture has not yet been recognized by the government, the services that they provide could not be recognized.

The following table proposes that a new approach concerning checkpoints, decision-making and application of law is necessary. A new “national law concerning construction” is necessary and very critical. The new law should contain all the necessary professions in the following table and many other which are not mentioned for the sake of achieving a healthy and sustainable built environment.

Table 16: Proposed Model of Professions of Construction in Turkey (By Author)

Profession	Responsibility	To Be Certified By	To Be Controlled By
Civil Engineer	To define and design the structural system of the building to be erected, make seismic and other structural calculations defining the appropriate structural system for the building supervising the application.	The Chamber of the relevant profession in case of professional applications credibility bound to the international associations defining accreditation and adequacy in profession bound by the NEW NATIONAL LAW CONCERNING CONSTRUCTION. The certifications should contain an ecological and sustainability rating in this case LEED or BREEAM is offered primarily.	Relevant Chamber to Register the Action of the Professional, Building Governance Firms, NEW NATIONAL LAW CONCERNING CONSTRUCTION
Mechanical Engineer	To provide technical designs and applications within the building concerning every mechanical practices	The Chamber of the relevant profession in case of professional applications credibility bound to the international associations defining accreditation and adequacy in profession bound by the NEW NATIONAL LAW CONCERNING CONSTRUCTION. The certifications should contain an ecological and sustainability rating in this case LEED or BREEAM is offered primarily.	Relevant Chamber to Register the Action of the Professional, Building Governance Firms, NEW NATIONAL LAW CONCERNING CONSTRUCTION
Electrical Engineer	To provide technical designs and applications within the building concerning every electrical practices	The Chamber of the relevant profession in case of professional applications credibility bound to the international associations defining accreditation and adequacy in profession bound by the NEW NATIONAL LAW CONCERNING CONSTRUCTION. The certifications should contain an ecological and sustainability rating in this case LEED or BREEAM is offered primarily.	Relevant Chamber to Register the Action of the Professional, Building Governance Firms, NEW NATIONAL LAW CONCERNING CONSTRUCTION

Continue			
City Planner	Defines and designs the cityscape in respect to the historical and natural environment keeping the benefits of the citizens and the environmental aspects	The Chamber of the relevant profession in case of professional applications credibility bound to the international associations defining accreditation and adequacy in profession bound by the NEW NATIONAL LAW CONCERNING CONSTRUCTION. The certifications should contain an ecological and sustainability rating in this case LEED or BREEAM is offered primarily.	Relevant Chamber to Register the Action of the Professional, Building Governance Firms, NEW NATIONAL LAW CONCERNING CONSTRUCTION
Architect	To design the building to be erected, supervise the construction and define technical aspects	The Chamber of the relevant profession in case of professional applications credibility bound to the international associations defining accreditation and adequacy in profession bound by the NEW NATIONAL LAW CONCERNING CONSTRUCTION. The certifications should contain an ecological and sustainability rating in this case LEED or BREEAM is offered primarily.	Relevant Chamber to Register the Action of the Professional, Building Governance Firms, NEW NATIONAL LAW CONCERNING CONSTRUCTION
Landscape Architect	To design the environment of the building to be erected, give suggestions for the interior plantation, define technical aspects and supervise application	The Chamber of the relevant profession in case of professional applications credibility bound to the international associations defining accreditation and adequacy in profession bound by the NEW NATIONAL LAW CONCERNING CONSTRUCTION. The certifications should contain an ecological and sustainability rating in this case LEED or BREEAM is offered primarily.	Relevant Chamber to Register the Action of the Professional, Building Governance Firms, NEW NATIONAL LAW CONCERNING CONSTRUCTION

Continue			
Interior Architect	Design the interiors of the buildings to be erected, define material, detail, finishing and furnishings, supervising applications, settling the use of interiors, providing behavioral analysis, function diagrams and detailing the choice and use of materials and necessary appliances.	The Chamber of the relevant profession in case of professional applications credibility bound to the international associations defining accreditation and adequacy in profession bound by the NEW NATIONAL LAW CONCERNING CONSTRUCTION. The certifications should contain an ecological and sustainability rating in this case LEED or BREEAM is offered primarily.	Relevant Chamber to Register the Action of the Professional, Building Governance Firms, NEW NATIONAL LAW CONCERNING CONSTRUCTION
Lighting Engineer	Provides the designer all aspects of natural and artificial applications concerning lighting and illumination.	The Chamber of the relevant profession in case of professional applications credibility bound to the international associations defining accreditation and adequacy in profession bound by the NEW NATIONAL LAW CONCERNING CONSTRUCTION. The certifications should contain an ecological and sustainability rating in this case LEED or BREEAM is offered primarily.	Relevant Chamber to Register the Action of the Professional, Building Governance Firms, NEW NATIONAL LAW CONCERNING CONSTRUCTION
Computer Engineer	Provides the designer all aspects of software and hardware applications concerning intelligent buildings security and building management applied by the mechanical engineers.	The Chamber of the relevant profession in case of professional applications credibility bound to the international associations defining accreditation and adequacy in profession bound by the NEW NATIONAL LAW CONCERNING CONSTRUCTION. The certifications should contain an ecological and sustainability rating in this case LEED or BREEAM is offered primarily.	Relevant Chamber to Register the Action of the Professional, Building Governance Firms, NEW NATIONAL LAW CONCERNING CONSTRUCTION

4.6 Proposals for the Certification Processes of Sustainability in Turkey

The reason for the professional to be registered and certified by international means that, it will help and support the environmental awareness. This will give a hand to the establishment of certified and environmental friendly buildings. The projection with the production of a new healthier, more controlled law without any gaps is vital for a sustainable environment. The economical aspects are countless when a healthy systematic of sustainability and certification is applied. The following table explains a proposal bringing out an approach idealized to certify a professional of construction and the building and also to register and control them. The interior architect is of great importance since the material and application choices in the interior space are done by him and consume most of the natural resources and energy in a building.

Interior architect makes drafts of documents for construction for the projects assigned to them. They define and provide plans for interiors of projects containing but furniture, necessary fixtures and technical applications, elevations for interiors, lighting equipment and design, with selection of texture and colors, materials, and finishes. They also provide technical specifications and guidance for objectives including concepts. If the services they provide are recognized by law and connected by a certification system based on sustainability, the success of establishing a healthier built environment is guarantied.

The following table defines a methodology, which proves how a certification scheme is needed through sustainable approach with all the professions that are to be recognized in the construction sector.

Table 17: Proposed Model of Control and Certification Mechanism in Turkey (By Author)

Application	Responsible Professional	Bound To Ministry /Association of	Bound By Law/Regulation	Certification Principles Required
Appliances	Technician/ Supervised by Electrical Engineer & Computer Engineer principles defined by Interior Architect	Relevant Chamber, Ministry of Public Works and Building Reconstruction	EU directives, International Law, and International Association advocacies in regard to Law of Environment, The Regulations of Environmental Impact Evaluation, Relevant Chamber Regulations	Accreditation due to EU directives, International Law and international associations of the relevant professions, Certifications recognized as LEED or BREEAM

Continue				
Storage Facilities	Technician/Supervised By Mechanical Engineer, Architect/Interior Architect, principles defined by Interior Architect	Relevant Chamber, Ministry of Public Works and Building Reconstruction	EU directives, International Law, and International Association advocacies in regard to Law of Environment, The Regulations of Environmental Impact Evaluation, Relevant Chamber Regulations	Accreditation due to EU directives, International Law and international associations of the relevant professions, Certifications recognized as LEED or BREEAM
Interior Plantation	Landscape Architect & Interior Architect	Relevant Chamber, and Ministry of Environment And Forests	EU directives, International Law, and International Association advocacies in regard to Law of Environment, The Regulations of Environmental Impact Evaluation, Relevant Chamber Regulations	Accreditation due to EU directives, International Law and international associations of the relevant professions, Certifications recognized as LEED or BREEAM
Electrical Equipment and Lighting	Electrical Engineer, Lighting Engineer, Interior Architect	Relevant Chamber, Ministry of Public Works and Building Reconstruction	EU directives, International Law, and International Association advocacies in regard to Relevant Chamber Regulations and Municipality Applications, Law of Building Governance and Law of Reconstruction	Accreditation due to EU directives, International Law and international associations of the relevant professions, Certifications recognized as LEED or BREEAM
Mechanical Equipment (Plumbing, heating etc.)	Mechanical Engineer, Interior Architect	Relevant Chamber, Ministry of Public Works and Building Governance	EU directives, International Law, and International Association advocacies in regard to Relevant Chamber Regulations and Municipality Applications, Law of Building Governance, Law of Reconstruction.	Accreditation due to EU directives, International Law and international associations of the relevant professions, Certifications recognized as LEED or BREEAM

Continue				
Furniture	Interior Architect, Technician	Relevant Chamber, Ministry of Public Works and Building Reconstruction	EU directives, International Law, and International Association advocacies in regard to Relevant Chamber Regulations and Law of Building Governance, Law of Reconstruction	Accreditation due to EU directives, International Law and international associations of the relevant professions, Certifications recognized as LEED or BREEAM
Finishings	Interior Architect, Architect, Technician	Relevant Chamber, Ministry of Public Works and Building Reconstruction	EU directives, International Law, and International Association advocacies in regard to Relevant Chamber Regulations and Law of Building Governance, Law of Reconstruction	Accreditation due to EU directives, International Law and international associations of the relevant professions, Certifications recognized as LEED or BREEAM

The action model explained in tables above is a mini model of idealized 'precautionary will' to enhance the adequacy of construction applications. The ideal practice has to be backed up by law, supported by national and international organizations. Interior architecture stands in a very primary position as it had been stated above. The accreditation and the certification of the interior architect and the spaces they design internationally especially on sustainability by LEED or BREEAM, will definitely change both the position of the professional and the point of view towards construction and built environment.

CHAPTER 5

CONCLUSION

Today our world suffers from many kinds of pollutions. Nature pollution is one of the most important examples for this problem. Construction sector itself plays a significant role in this pollution. The potential of implementing more sustainable practices in the construction sector requires the availability of reliable tools for assessment and benchmarking of built environmental performance. These tools have been developed by international environmental organizations, international commissions and professional associations.

The green building concept, sustainable design, and ecological architecture are the keywords trying to solve this problem. These keywords are the tools for sustainable building design. Green building practices are perceived by many construction industry professionals to be part of the solution to these problems. Within these efforts many rating systems are formed due to evaluate buildings' level of sustainability and to reward them in respect to ecological movement. LEED and BREEAM are two of the most important rating systems in the world.

In this work it is seen clearly how LEED and BREEAM are important through the green building movement. Within its rating criteria all branches of design are examined and encourage the people to get closer to ecological movement. As the world is globally turning to ecological movement, importance of definite rating is easily seen in architectural approach. The role of the interior architect in sustainable environment and in certification system process is crucial. Through all rated topics and criteria that are evaluated, the importance of interior architecture reveals to the highest extends.

It is obvious that the world is trying to employ the design principles of green building in construction sector. Unfortunately, in Turkey there is not an overall rating system along with the immediate laws and regulations to determine the role of interior architecture. Interior architecture as the profession itself should be recognized by the law and be part of the certification projects through sustainable movement.

Apart from the analyses that were made before, more brief experimentations can be made into construction sector in respect to rating systems through world. There are many other rating systems that the countries individually are using. All of these rating systems can be examined and criticized. The similarities and differences can be investigated and then can be compromised on one global and sufficient rating system that whole world can use. On the other hand, as every country, respect to their politics, social and environmental factors, locations, climates and landscapes differ in each other one global method would not be sufficient. Any private certification system which has a base pointing system that is recognized by whole world would be more appropriate.

Turkey has achieved a considerable development in built environment. Profession of interior architecture in Turkey is unrecognized and outlawed, even though the interior chemistry of the built environment is formed by it. Interior architecture as the profession itself should be recognized by the law and be part of the certification projects through sustainable movement.

Also, as Turkey is still making researches about the ecological movement, more works should be done on sustainable design. The profession gaps should be detected, new laws and regulations should be designed depending on the international laws and principles. Sustainability should be taken as a point of evaluation for the designer to act within.

Finally, all construction and design firms are recommended to implement sustainable design standards into their firms. Even the firm does not believe the signs of global warming or the research done on the LEED and BREEAM benefits, there is enough momentum behind the sustainable building concept that firms in the building industry can not afford to ignore the sustainable movement. If construction or design firms do not fully embrace and implement the sustainable design standards, they risk being left behind when everyone else does.

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APPENDIX A

LEED EVALUATION OF ORCHARD GARDEN HOTEL

LEED-NC Version 2.1 Registered Project

Sustainable Site

Sediment and Erosion Control Plan

Site Selection: development of appropriate site and reduce environmental impact

Urban Redevelopment: meets development density of 60,000 sf/acre

Alternative Transportation: located near subway and two bus lines; no parking at site, bicycle storage

Landscape and Exterior Designs to Reduce Heat Islands: Energy Star roof label

Water Efficiency

Water Efficient Landscaping: no permanent irrigation system

Energy and Atmosphere

Fundamental Building Systems Commissioning: follow best practice commissioning procedures

Minimum Energy Performance: complies with energy code ASHRAE/IESNA 90.1-1999

CFC Reduction in HVAC&R Equipment: no CFC-based refrigerants

Ozone Depletion: HVAC&R systems are free of HCFCs and halons

Materials and Resources

Storage and Collection of Recyclables: accessible area to serve recycling needs of hotel

Construction Waste Management: divert 75% of construction waste away from landfill

Recycled Content: 5% of materials used on project contain recycled content

Certified Wood: 50% of wood-based materials on project are FSC certified

Indoor Environmental Quality

Minimum IAQ Performance: compliant with ASHRAE 62-1999

Environmental Tobacco Smoke (ETS) Control: zero-exposure of non-smokers to ETS

Increase Ventilation Effectiveness: air-change effectiveness of 0.9 in each ventilated zone

Construction IAQ Management Plan During Construction: filtration media used

Low-Emitting Materials: low VOC adhesive and sealants, paint and coatings, carpets

Daylight and Views, Daylight 75% of Spaces: Daylight factor of 2% in 75% of spaces

Innovation and Design Process

Green Education Center for the Public

Green Housekeeping and Maintenance

Room Energy Control: Room key card control of lighting and mechanical systems

LEED Accredited Professional: principal participant of project team

Additional Green Practices

Minimize on-site cutting: prefab concrete forms & pipe, order studs to size

Alternative temporary power: use of ultra low sulphur fuel in generators

Just-in-Time Deliveries: no site storage of materials reduces chemical & dust absorption

Recycled jobsite furniture and office paper

Use of 100% recycled/biodegradable floor sweep

APPENDIX B

EXAMPLE LEED EVALUATION SHEET

Y	M	N	Sustainable Sites	
Y			Prerequisite 1	Erosion and Sedimentation Control
		X	Credit 1	Site Selection
		X	Credit 2	Development Density
	X		Credit 3	Brownfield Redevelopment
X			Credit 4.1	Alternative Transportation, Locate Near Public Transportation
X			Credit 4.2	Alternative Transportation, Bicycle Storage & Changing Rooms
	X		Credit 4.3	Alternative Transportation, Alternative Fuel Refueling Stations
X			Credit 4.4	Alternative Transportation, Minimum or No New Parking
		X	Credit 5.1	Reduced Site Disturbance, Protect or Restore Open Space
X			Credit 5.2	Reduced Site Disturbance, Reduce Footprint & Increase Open Space
		X	Credit 6.1	Stormwater Management, No Net Increase or 25% Decrease
		X	Credit 6.2	Stormwater Management, Treatment Systems
X			Credit 7.1	Landscape & Exterior Design to Reduce Heat Islands, Site Surfaces
X			Credit 7.2	Landscape & Exterior Design to Reduce Heat Islands, Roof Surfaces
X			Credit 8	Light Pollution Reduction
7	**2**	**5**	**14 Possible**	

Y	M	N	Water Efficiency	
X			Credit 1.1	Water Efficient Landscaping, Reduce by 50%
		X	Credit 1.2	Water Efficient Landscaping, Reduce Additional 50% or No Irrigation
		X	Credit 2	Innovative Wastewater Technologies
X			Credit 3.1	Water Use Reduction, 20% Reduction
X			Credit 3.2	Water Use Reduction, Additional 10% Reduction
3	**0**	**2**	**5 Possible**	

Y	M	N	Energy and Atmosphere	
Y			Prerequisite 1	Fundamental Building Systems Commissioning
Y			Prerequisite 2	Minimum Energy Performance
Y			Prerequisite 3	CFC Reduction in HVAC&R Equipment
X			Credit 1.1	Optimize Energy Performance, (for Title 24) 2.5%
X			Credit 1.2	Optimize Energy Performance,(for Title 24) 7.51%
X			Credit 1.3	Optimize Energy Performance, (for Title 24) 12.51%
	X		Credit 1.4	Optimize Energy Performance, (for Title 24) 17.51%
	X		Credit 1.5	Optimize Energy Performance, (for Title 24) 22.51%
	X		Credit 1.6	Optimize Energy Performance, (for Title 24) 27.51%
	X		Credit 1.7	Optimize Energy Performance, (for Title 24) 32.51%
		X	Credit 1.8	Optimize Energy Performance, (for Title 24) 37.51%
		X	Credit 1.9	Optimize Energy Performance, (for Title 24) 42.51%
		X	Credit 1.10	Optimize Energy Performance, (for Title 24) 47.51%
		X	Credit 2.1	Renewable Energy, 2.5%-7.5% Contribution
		X	Credit 2.2	Renewable Energy, 7.51%-15.5% Contribution
		X	Credit 2.3	Renewable Energy, 15.51% Contribution
X			Credit 3	Additional Commissioning
X			Credit 4	Ozone Depletion
X			Credit 5	Measurement & Verification
X			Credit 6	Green Power
7	**4**	**6**	**17 Possible**	

Y	M	N	Materials and Resources	
Y			Prerequisite 1	Storage & Collection of Recyclables
		X	Credit 1.1	Building Reuse, Maintain 75% of Existing Shell
		X	Credit 1.2	Building Reuse, Maintain Additional 25% of Shell
		X	Credit 1.3	Building Reuse, Maintain 100% Shell & 50% Non-Shell
X			Credit 2.1	Construction Waste Management, Salvage or Recycle 50%
X			Credit 2.2	Construction Waste Management, Salvage Additional 25%
		X	Credit 3.1	Resource Reuse, Specify 5% Reuse
		X	Credit 3.2	Resource Reuse, Specify 10% Reuse
X			Credit 4.1	Recycled Content, Specify 5% Recycled Content (PC + 1/2 PI)
X			Credit 4.2	Recycled Content, Specify 10% Recycled Content (PC + 1/2 PI)
X			Credit 5.1	Local/Regional Materials, 20% Manufactured Locally
	X		Credit 5.2	Local/Regional Materials, of 20% Above 50% Harvested Locally
		X	Credit 6	Rapidly Renewable Materials
X			Credit 7	Certified Wood
6	**1**	**6**	**13 Possible**	

Y	M	N	Indoor Environmental Quality	
Y			Prerequisite 1	Minimum IAQ Performance
Y			Prerequisite 2	Environmental Tobacco Smoke (ETS) Control
X			Credit 1	Carbon Dioxide (CO_2) Monitoring
X			Credit 2	Increase Ventilation Effectiveness
X			Credit 3.1	Construction IAQ Management Plan, During Construction
X			Credit 3.2	Construction IAQ Management Plan, Prior to Occupancy
X			Credit 4.1	Low-Emitting Materials, Adhesives
X			Credit 4.2	Low-Emitting Materials, Paints
X			Credit 4.3	Low-Emitting Materials, Carpet
X			Credit 4.4	Low-Emitting Materials, Composite Wood
X			Credit 5	Indoor Chemical and Pollutant Source Control
		X	Credit 6.1	Controllability of Systems, Operable Window
	X		Credit 6.2	Controllability of Systems, Individual Controls
X			Credit 7.1	Thermal Comfort, Comply with ASHRAE 55-2004
		X	Credit 7.2	Thermal Comfort, Permanent Monitoring System
	X		Credit 8.1	Daylight and Views, Diffuse Sunlight to 75% of Space
X			Credit 8.2	Daylight and Views, Direct Line of Site to 90% of Space
11	**2**	**2**	**15 Possible**	

Y	M	N	Innovation & Design Process	
X			Credit 1.1	Innovation in Design, EAc6 Exceedance
X			Credit 1.2	Innovation in Design, As approved by USGBC
	X		Credit 1.3	Innovation in Design, As approved by USGBC
	X		Credit 1.4	Innovation in Design, As approved by USGBC
X			Credit 2	LEED™ Accredited Professional
3	**2**	**0**	**5 Possible**	

APPENDIX C

EXAMPLE BREEAM EVALUATION SHEET

BREEAM Bespoke 2008

BREEAM Scoring and Rating

Table 5: Example BREEAM score and rating calculation

BREEAM Section	Credits Achieved	Credits Available	% of Credits Achieved	Section Weighting	Section score
Management	7	10	70%	0.12	8.40%
Health & Wellbeing	11	14	79%	0.15	11.79%
Energy	10	21	48%	0.19	9.05%
Transport	5	10	50%	0.08	4.00%
Water	4	6	67%	0.06	4.00%
Materials	6	12	50%	0.125	6.25%
Waste	3	7	43%	0.075	3.21%
Land Use & Ecology	4	10	40%	0.10	4.00%
Pollution	5	12	42%	0.10	4.17%
			Total Score		54.87%
			Innovation credits achieved		1
			FINAL BREEAM Score		55.87%
			BREEAM Rating		VERY GOOD

Minimum Standards for BREEAM 'Very Good' rating	Achieved?
Man 1 - Commissioning	✓
Hea 4 - High frequency lighting	✓
Hea 12 - Microbial contamination	✓
Ene 2 Sub-metering of substantial energy uses	✓
Wat 1 - Water consumption	✓
Wat 2 - Water meter	✓
LE 4 - Mitigating ecological impact	✓

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APPENDIX D

BREEAM EVALUATION SHEET OF GORDION SHOPPING CENTER

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The Code for Sustainable Buildings

This is to certify that

Gordion Shopping Mall,
Eskişehir Yolu,
Çay Yolu,
Ankara,
Turkey

has achieved a score of 57.13%, and a BREEAM rating of

VERY GOOD

Pass Excellent

This Design and Procurement assessment was carried out under the 2006 version of BREEAM International Bespoke

Signed on behalf of BRE Global Ltd

27th August 2009
Date

Martin Ratcliffe
Licensed Assessor

Roger Preston and Partners
On behalf of

Redevco Emlak Hizmetleri Mulk Yonetimi ve Isletmeleri A.S.
Developer

Chapman Taylor / Redevco Concepts
Architect

Redevco Uc Emlak Gelistirme Ins. Yatirim ve Tic. A.S.
Client

Ecofys Turkey
M&E Consultants

Certificate Reference: RO-BIB-MR02-3

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www.breeam.org

APPENDIX E

CURRICULUM VITAE

PERSONAL INFORMATION

Surname, Name: Sarımanoğlu, Umut
Nationality: Turkish [TC]
Date and Place of Birth: 23 November 1976, Ankara
Martial Status: Married
Phone: +90 312 446 95 46
Fax: +90 312 436 32 70
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EDUCATION

Degree	Institution	Year of Graduation
MS	Çankaya University Interior Architecture	2010
BS	Bilkent University Interior Architecture and Environmental Design	1999
High School	T.E.D Ankara Collage, Ankara	1994

WORK EXPERIENCE

Year	Place	Enrollment
2000 - Present	P.D.P Ltd. Şti.	Vice President

FOREIGN LANGUAGES

Advanced English, Beginner German

HOBBIES

Football, Internet, Movies, Decoration Magazines, Television, Jogging