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TOWARDS SUSTAINABLE BUILDING IN LIBYA

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Abstract

In Libya there are some steps which are needed to deliver sustainable building. This paper illustrates several stages to achieving sustainable building in Libya and some barriers facing it. Although, there are massive amounts of renewable energy in Libya, for example, solar energy not many people care about using this energy to preserve the environment and this endangers the coming generations. In order, to achieve the aim of this study literature was used to explore the possibility of implementing sustainable building in Libya. The barriers that were identified by this study are financial problems, and substantive and technical obstacles. The paper concludes by suggesting some ways in which these barriers might be overcome such as, motivating society to use renewable energy, controlling emissions and reducing resource consumption from the design stage through the various stages of the project until the end of the building's life.

المخلص

تتوفر في ليبيا بعض الخطوات اللازمة لتوفير البناء المستدام. في هذه الورقة تم توضيح عدة مراحل لتحقيق البناء المستدام في ليبيا وبعض العوائق التي تواجهه. وعلى الرغم من وجود كميات هائلة من الطاقة المتجددة في ليبيا، على سبيل المثال، الطاقة الشمسية لا يهتم كثيرًا باستخدام هذه الطاقة للحفاظ على البيئة وهذا يعرض الأجيال القادمة للخطر. من أجل تحقيق هدف هذه الدراسة، تم استخدام الأدب لاستكشاف إمكانية تنفيذ بناء مستدام في ليبيا. الحواجز التي حددتها هذه الدراسة هي المشاكل المالية، والعقبات الفنية والتقنية. وتختتم الورقة باقتراح بعض الطرق التي يمكن بها التغلب على هذه الحواجز مثل، تحفيز المجتمع على استخدام الطاقة المتجددة، والتحكم في الانبعاثات وخفض استهلاك الموارد من مرحلة التصميم عبر المراحل المختلفة للمشروع حتى نهاية حياة المنشأ.

Keywords: Libya, sustainable, building, barriers, environment

1. INTRODUCTION

The study of sustainable building has become important to reduce the negative impact of construction on the environment and the relationship between buildings and the environment has been investigated by many researchers. However, not enough research has focussed on the way to implement sustainable building in developing countries. This study will consider how sustainable building can be implemented in Libya and the barriers facing it. To investigate this issue previous studies were used, particularly a study that was conducted in Sudan [2] and also a study

at Tufts University in the United States of America [4], because there is no recent study about how sustainable building can be implemented in Libya. There are similarities between Sudan and Libya, for example the weather and materials used in construction. In addition, both countries are Muslim and Arabic countries where the culture is similar and culture significantly affects building design. The reason for choosing the study in the United States of America was to look for any similarities in the situation relating to the barriers facing sustainable buildings in developed and developing countries.

2. LITERATURE REVIEW

There are a number of different definitions of the "built environment" in the literature. According to [8] "the built environment is a material, spatial and cultural product of human labour and combines physical elements and energy forms of living, working and playing". It has also been defined as "the human-made space in which people live, work, and recreate on a day-to-day basis" [6]. According to [5] Lee et al (2008) "the built environment encompasses places and spaces created or modified by people including buildings, parks, and transportation systems". In recent years, public health research has expanded the definition of "built environment" to include healthy food access, community gardens, "walkability", and "bikability".

Recently, sustainable building within the built environment has been widely discussed and has developed to become one of the most important topics in the construction sector. Sustainable building relates to building and development practices that use an integrated approach to design, construction, and operation for residential, commercial, industrial or institutional buildings. It attempts to optimize energy and water efficiency, to minimize the waste produced during construction, to improve indoor air quality, to use environmentally preferred products, and to encourage the application of alternative energy supplies [1] (CUI, 2006, p.8).

Much current research emphasizes that the negative effect on the environment caused by buildings

during construction or demolition can be reduced by sustainable building. Beside that the comfort and health of residents will be increased[9] (Vargas 2013, p.23).

Sustainable building considers efficiency of the use of resources as one of the most important points affecting the building action during construction or building life[7]. The integration of technology systems into the building is very important because there are many common denominators between a building and the technology for achieving sustainable or green building. In other words, sustainable buildings have both active and passive components because including these three basic groups:

1. materials and equipment
2. active system design, for example, mechanical, electrical, plumbing systems
3. passive general design, such as placement/orientation to help achieve low energy consumption and using the ventilation for heating without the need for an additional heating system.

Sustainable building involves maximizing the efficiency, health and comfort of indoor environments, whilst simultaneously minimizing the environmental and public health impacts and resource use associated with the buildings.

According to [3] John et al (2004, p 320-321), sustainable building is concerned with the entire life of buildings including, bringing

ecological quality and functional quality. It combines building design with electrical, mechanical and structural engineering. John et al continue that the design team in sustainable building will “express concern for the traditional aesthetics of massing, orientation, proportion scale, texture, shadow and light, the facility design team needs to be concerned with long-term costs: environmental, economic and human”. Recently, people have understood that quality of life is affected much more by buildings than had previously been thought.

Building design is changing and this alternative and integrated approach has encouraged sustainability which has had an impact on upon the lives of people and corporations and wider society. “Responsible and holistic thinking” [3] has increased.

The current literature review has revealed a significant need to adopt sustainable building practices in world. This study will investigate how sustainable buildings can be implemented in Libya while also preserving traditional building styles and materials. It will also consider the major barriers facing it.

3. DISCUSSION

This research paper is based on two different studies, one in Sudan and another undertaken at Tufts University in the United States of America .The reasons for choosing these studies are because one of them is from a developing country and it has many similarities with Libya, while the other case is from a

developed country. The present study will help to find out what is different between them concerning barriers facing sustainable buildings and if there are types of barriers which are the same in both. This will help to understand how sustainable building can be implemented Libya.

3.1. Sustainable building in developing countries

Research by [2] Dahi (2012), suggests that sustainable building in Sudan is only at an early stage of implementation. The construction sector is one of the most important sectors that plays a direct role in the climatic changes associated with global warming, and engineers, and especially architects, should pay great attention and work as one team to adopt green design. Research in the development of modern strategies in the construction sector put climate change as the first concern. Architects must focus on controlling emissions and reducing resource consumption from the design stage through the various stages of the project until the end of the building's life. [2] continues that the Ministry of Education should work to develop a strategy to support and educate students about the benefits of sustainable buildings. The government should motivate society to use renewable energy and develop the areas of industrial silicon for solar energy conversion and storage of solar energy.

There is not a big difference in the construction situations in Libya and Sudan because they use the same building materials for example concrete, limestone, concrete block, bricks etc. In addition, design is affected by the common culture in

both countries. Some of the barriers to sustainable building being implemented in both Sudan and Libya are the high capital cost of renewable energy projects such as solar energy, wind energy, hydropower, offshore wind, wave, and tidal energy etc. Additionally, implementation is affected by an absence of funding mechanisms, as well as the belief that investment in projects like these represents a financial risk despite green building reducing the impact on the environment [2] (Dahi, 2012). This belief exists in developed and developing countries. Therefore, this is likely to be a barrier to implementing sustainable building in Libya. Also there are some substantive and technical obstacles, such as incomplete equipment, lack of technology and techniques for the manufacturing of solar panels and a lack of people with sufficient experience in the area of green building.

The next section will consider how developed countries have faced the challenges of implementing sustainable development and if there are any lessons for developing countries to help them overcome the barriers.

3.2. Sustainable building in developed countries

[4] argues that, even in developed countries, no modern-day building project can be said to be completely sustainable, but in recent years, more projects have been drawing closer to that goal. There are certainly more government agencies today that require or encourage sustainable building practices and sustainable building has become an urgent target

for protecting life, so, the whole of society should be educated. She states that sustainable building uses methods and materials that are resource efficient and that will not negatively affect the environment or the associated health of the occupants of buildings and the construction workers who build them. [4], There are several issues which need to be considered. These include: land use, site impact, the indoor environment, energy and water use, lifecycle impacts of building materials and soil waste. [4], point out that in developed countries, unsustainable building practices can put stress on local and regional communities and government services by filling up landfills, exacerbating flooding, increasing the demand for roads and utility infrastructures, etc. Building practices affect the climate, primarily because of the use of greenhouse gas-producing energy sources for heating, cooling, ventilation and lighting and the use of building materials and equipment that contain ozone layer depleting chemicals. [3],[4] emphasized that sustainable building includes a wide range of methods, materials and systems. These can be traditional and low-tech or modern and high-tech. However, sustainable building is not about technology or materials it is about attitudes and approaches[3], [4]. Technology is one step towards sustainability, but it can often do more harm than good. For example, “noxious gases” come from the equipment and materials used from new finishing material in carpeting, upholstery and paint. The harm caused by technology can be physical or mental on building occupants and therefore must be used cautiously.

The decision not to use certain high-tech gadgets can be as important as the decision to use other equally high-tech methods [4] (Landman 1999, p.8).

According to [4] Landman (1999, p. 25), there has been an increased awareness of environmental considerations in building design in the USA: "Sustainability or sustainable development" is the main target of sustainable building and is being implemented in the field of construction. Sustainability has many significant aspects and buildings are the most important portion in the sustainability equation. "Whether the issue is national economic development or real estate development (often seen as an indicator of economic development), the same general principles of sustainability apply." Recently sustainable building has spread and many people understand the relation between environment and buildings and between "the economic, environmental and social effects of standard building practices" [4] (Landman, 1999). However, she argues that it is necessary to boost even further the adoption of sustainable building by training building professionals in sustainable building concepts and methods. A larger demand for sustainable building products and services can be achieved by the approaches mentioned above and this may encourage the market. This may motivate extra innovation and reduce prices.

Clearly, education and the economy form an inseparable unit in the area of sustainable building. All the constituents for sustainable building practice should be promoted

by the government and building professionals. Supporting and encouraging that practice has been undertaken by governmental and non-governmental groups. However, the respondents in [4] Landman's (1999) study evaluated that just 5-10% of sustainable elements for example, educational programs, economic incentives and regulatory requirements are routinely integrated into their building projects by building professionals.

From the study conducted by [4] Landman in developed countries in the field of sustainable building the issues faced them to implement sustainable building are always about education and economy. So, this problem can be also existed in developing countries include Libya.

4. CONCLUSION

This paper has used two studies, one in Sudan and the other in the United States of America. These studies were chosen because there is no recent study in Libya about implementing sustainable building and there was limited time to do field studies there. There are many similarities between Libya and Sudan in the materials used, the climate and the culture. This paper also looked at a study conducted in the United States of America to attempt to find the similarities between developed and developing countries in the barriers facing sustainable building.

This study has clearly demonstrated that, in spite great progress in the field of sustainability especially in the sector of sustainable building there are still some barriers to overcome. These barriers are the

same in both developed and developing countries but perhaps in different degrees. Professional training and educational opportunities should be increased and costs and cost misperceptions should be decreased. Governments should focus on these obstacles, despite the presence of several other barriers. This would help speed up the practice and implementation of sustainable buildings in Libya since it is repeated in developed and developing countries.

This paper identifies many elements that are needed to achieve sustainable building in Libya such as better equipment and technology and people with sufficient experience in the area of green building[2] (Dahi 2012). Furthermore studies in developed countries suggest that many other strategies are needed for sustainable building to be implemented, for instance, enhancing customer demand, professional training and educational opportunities should be increased and the costs and cost misperceptions should be decreased.

The primary recommendation of this paper is that further research be undertaken in Libya, especially into financial support and the existing legal and regulatory framework.

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