Economic Benefits of Sustainable Construction
Avantages économiques de la construction durable

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Received:06/02/2019 *Accepted:09/03/2019* *Published:31/03/2019*

Abstract:
This article discusses the economic benefits of sustained construction; it demonstrates the economic value of green construction projects. As a step to depict the contribution of ecological construction to the development and to the growth of economies, this study has shown the principles of sustained construction and their direct and indirect economic impacts. It concludes that sustained construction projects affect economic growth through two main advantages; these are: less energy consumption and expenditures, and economic efficiency.
Keywords: Sustained construction; Economic growth; the added value; Ecosystem.
(JEL) Classification: Q51 ،Q58.

ملخص:

يناقش هذا المقال الآثار الاقتصادية للبناء المستدام حيث يوضح القيمة الاقتصادية لمشاريع البناء الأخضر بالإضافة إلى آثارها البيئية . وكخطوة لإيضاح مساهمة البناء الإيكولوجي في تنمية الاقتصاد وتطويره، أظهرت هذه الدراسة مبادئ البناء المستدام وآثارها الاقتصادية المباشرة وغير المباشرة. ويخلص إلى أن مشاريع البناء المستدامة تؤثر على النمو الاقتصادي من خلال ميزتين رئيسيتين: انخفاض استهلاك الطاقة والنفقات، وتعزيز القدرة الاقتصادية.

الكلمات المفتاحية: البناء المستدام؛ النمو الاقتصادي؛ القيمة المضافة؛ النظام البيئي.

رموز jel: Q51، Q58.

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1. INTRODUCTION

The construction industry is a strategic sector that plays a fundamental role in the economic growth of countries. In fact, the increasing number of population growth rate constitutes a challenge for States to meet the growing demands on houses. In this respect, construction companies pay heavy charges for the execution of their projects because of several factors including transportation and energy fees; consequently, this affects the prices of the houses. For this, experts in economics and ecology emphasized sustainability and durable solutions for the difficulties that construction companies struggle with nowadays. This study answers the following problematic: what is the added value of the sustained construction projects to the economy? For this, this article sheds light on the importance of sustained construction on the development of economies. It aims to demonstrate that in addition to the positive ecological impacts of durable projects on the ecosystem, sustainable construction has two major economic impacts: a reduction in energy consumption and expenditures, and economic efficiency. To depict the significance of sustained construction in boosting economic growth, this study relies on a variety of books and contemporary academic studies on sustained construction and economies; for example: Liv Haselbach's *The Engineering Guide to LEED-New Construction*, Wiley Blackwell's *Sustainable Futures in the Built Environment to 2050: A Foreign Approach to Construction and Development*, Michael Bauer's *Green Building: Guidebook for Sustainable Architecture*, Molly Scott Caro's *Green Economics: An Introduction to Theory, Policy, and Practice,* and Erik Assadourian's *State of the World: Ideas and Opportunities for Sustainable Economies.* Besides, this study relies on the comparative method to delineate the differences between the sustained and conventional construction projects. It also uses the quantitative method to demonstrate the economic benefits of Green Construction.

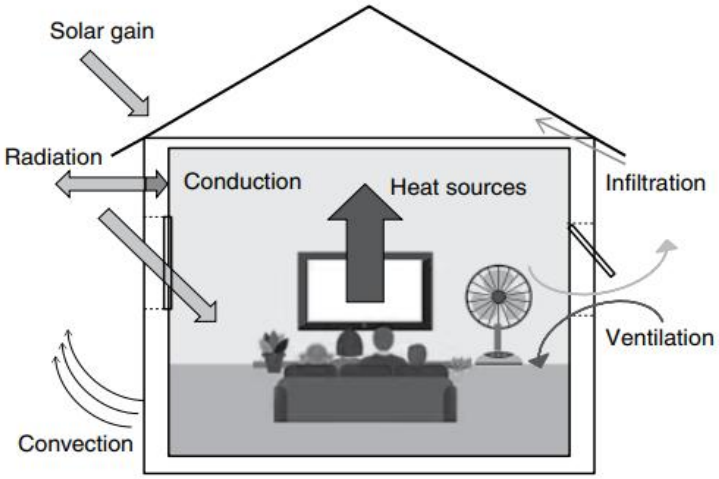
2. 1. DEFINING SUSTAINABLE CONSTRUCTION

Sustainable construction, or green construction, refers to a set of processes that involve the use of materials that do not emit toxic substances. Its process starts from the architectural design of the building to the post construction phases. In other words, it is a long cycle which implies the use of materials that are recyclable and with less damages on the environment. It is based on sustained exterior and interior design as well. It also involves renovation and restoration procedures on the sold buildings or on old houses (***Bauer, Michael, 2010, P10***).

For instance, green design focuses much on passive systems in the building; its primary aim is to establish a green infrastructure in which the building does not require much energy installations. Explicitly, sustained architecture considers thermal comfort; the latter refers to the elaborated conditions of old buildings to create satisfactory conditions.

In order to prevent temperature shifts in the interior space of the building, architects propose solutions to make use of the temperature that is transmitted by the exterior walls to the inside area of the building (***Barlow, Janet. et. al. 2018***, ***P32***). The following illustration summarizes the thermal aspects of a building:

Fig.(01): THERMAL ASPECTS OF A BUILDING (HEAT SOURCES)



Source: Barlow, Janet. et. al. ***Sustainable Futures in the Built Environment to 2050***: A Foresight Approach to Construction and Development

In fact, architects and interior designers in sustainable building consider the use of eco-friendly materials and eco-dynamic systems. They basically intend to control energy movement in the building through the EWIS. In other words, they install an external wall insulation system which permits the exterior walls to absorb and store the sun heat during the daytime and release it in the evening (***Barlow, Janet. et. al. 2018***, ***P35***). This indeed can be maintained through thermal installation walls. The latter are made from materials like cork panels, fiberboard and mineral wool

Thermal insulation also involves the use of anti-fungal materials to the interior walls to absorb the humidity inside the building that is emitted from the dwellers and which enters from the outside. In essence, the thermal comfort system helps people to use less energy because of the insulation thermal walls. By storing the heat during the daytime, people will reduce their use of climate regulators at home. Therefore, thermal insulation reduces carbon emissions; it helps people to pay less energy bills as well (***Haselbach, Liv 2010, P. 194***).

2. 2. THE LIFE-CYCLE OF A SUSTAINABLE CONSTRUCTION PROJECT

The life-cycle of a sustainable construction project is the alternative steps through which the building process goes through. It defines the phases of the project from the early to the final stages; it underlines the technical and mechanical aspects from the pre to the post construction phases. It involves the following steps:

a. Conceptual phase.
b. Design phase.
c. Construction.
d. A.S.S. (After Sale Service).
e. Renovation and Makeovers.

To Start with, the construction company follows a strategic plan which is involved in the durable development programs; the latter are compacted by the United Nations accords and international agreements to save the planet through reformulating construction, production and commercial activities with sustainable characteristics. For example, in April 22th, 2016, the Paris Climate Agreement took place in New York as a step to solve the global warming problem. Its members emphasized the necessity of the states to take measures in the construction sector to reduce greenhouse gas emissions. In this respect, several construction companies in the United States, Canada and in the European Union developed a sustainability plan to promote a durable cycle of construction projects (***Mouton, Yves, 2011, P. 18***).

Explicitly, they start with the conceptualization phase in which they hold meetings with their clients and negotiate with them the technical and the financial aspects as well as the sustainability of their project. The second phase is designing; architects and interior designers rely on the conception data that are presented

during the early stage with the clients; they present architectural plans that combine between sustainability and the clients' needs. In this significant pre-construction phase, architects rely on the following criteria in designing the needed building:

a. Energy Consumption.
b. Ventilation & Insulation.
c. Light.
d. The Green plans.
e. Construction materials.

In fact, Green design is a description of sustainable architectural conceptions that refer to a set of technical aspects that architects use when designing a building. For instance, they consider the position as well as the position of the windows and the doors to allow more sunlight volume to enter to the building. They also emphasize the importance of interior space management to create a comfortable in-house circulation for the inhabitants. In addition, designers consider insulation aspects of the building as a step to create thermal comfort. They determine a set of functional aspects to allow the absorption of heat by the walls that in turn keep the internal atmosphere of the building cooler during the summer daytimes. Then, they gradually generate warmth during the night. Moreover, architects also propose solutions to prevent the entrance of the heat from the exterior through the roof to the inside of the building. In this respect, they design heat-reducing roofs such as tiles and roofs covers with plants (***Haselbach, Liv, 2010, P. 239***). Accordingly, the insulation solutions of the building reduce the energy consumption for the dwellers will make use of natural ventilation and lightening techniques as well. Besides, architects make much emphasis on the selection of construction materials. They also consider whether the construction field is located at an area with a high water tables or wet lands as a procedure to secure less humidity access to the building. They also select construction materials which are less toxic and do not have a high level of emissions. Likewise, they chose materials with less toxic emissions like formaldehyde, nitrogen and carbon monoxide in order to prevent the formation of biological pollutant substances like mold, dust mites, and volatile organic compounds (VOCs) (***Assadourian, Erik, 2008, P. 78***).

In fact, during the construction process, sustainable building requires the use of recycled building materials like the wood, the glass, and the plastic; the latter should be taken from other construction or makeover projects. Thus, instead of throwing the wastes, the construction companies collect them and set them into categories. In addition, they use ecological materials like bamboo, wood, and cork (***Bauer, Michael, 2010, P54***).Besides, the construction companies extend their contact with their contractors and clients for post sales phases. Explicitly, they keep in touch with the users of the building in order to explain to them how to use the smart options of the house and the right manner to clean or to deal with the ecological materials. Accordingly, the ASS (After Sale Service) is a significant phase in sustainable construction (***Caro , Molly Scott, 2009, P. 109***).

3. ECONOMIC BENEFITS OF SUSTAINABLE CONSTRUCTION

3. 1. LESS ENERGY CONSUMPTION AND EXPENDITURES

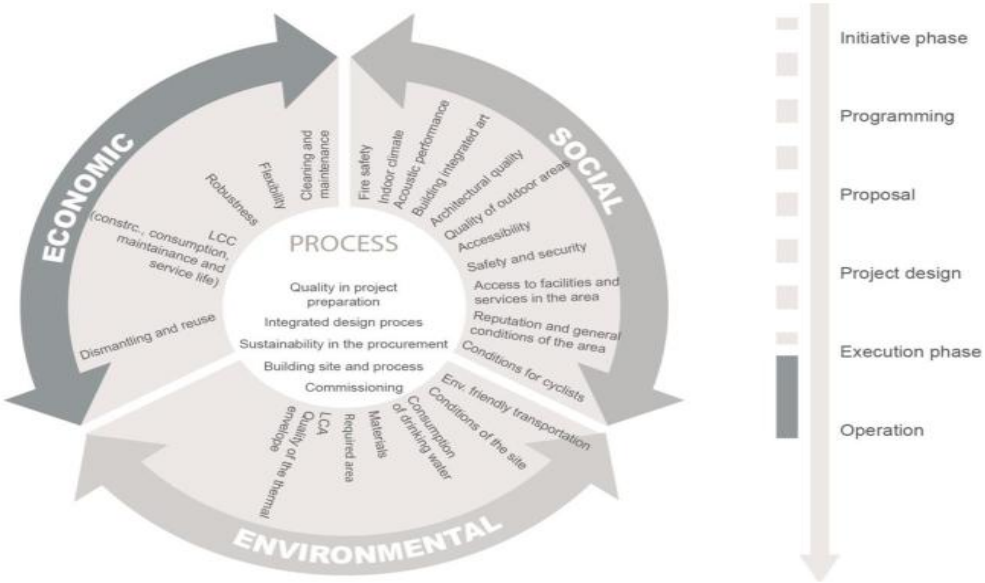
Indeed, the energy consumption is one of the most important aspects in the sustainable construction processes. The fundamental fact which led construction engineers and architecture experts to set the foundations of green building system is to reduce energy consumption. The latter refers to the volume of the energy that was consumed from the pre to the post construction processes. In other words, construction engineers consider the used energy during the transportation phase like the trucks that transported the raw materials to the factories that transformed them to construction materials. In addition, they count the costs of transportation of the materials and machines from the stores to the construction fields. Moreover, they intend to make use of recycled materials that are taken from other demolished or renovated buildings as a step to reduce energy (oil and electricity) consumption in all the construction phases. Indeed, recent studies show that the use of recycled materials contribute to the reduction of carbon emissions; it also lowers energy consumption and the costs of gas used by the transportation engines during the building process. This plays a significant role in decreasing national and international financial expenditures on setting programs for the protection of the environment from the Global Warming (***Bauer, Michael, 2010, P. 21***).

3. 2. ECONOMIC EFFICIENCY

Sustainability is a global field that has several goals and mechanisms. It is a general plan that involves complementary projects. In other words, sustainable development requires the coordination between social, economic and

environmental sectors. In order to maintain valuable results in sustainability, there must be a green transformation in all the sectors such as education, industry, culture and construction. According to experts in sustainable development, adopting sustained measures in economy requires a sustainably oriented society, education and culture. All of the so mentioned sectors constitute a unity in sustainable development (***Barlow, Janet. et. al. 2018, P.175***). Likewise, green construction interacts and influences the social and economic sectors. For instance, green construction companies create new job opportunities for the unemployed persons; they also offer certificates and professional courses on sustainable buildings and renewable energies. This contributes to the propagation of the sustained lifestyle in societies and to the decrease in unemployment rates (***Kamara, Aliakbar, et.al. 2017, P. 332***). The following graph demonstrates the economic efficiency of sustained construction in relation to social and environmental sectors.

Fig,(02) : DIAGRAM ON THE INTERRACTION BETWEEN ECONOMIC, SOCIAL AND ENVIRONMENTAL SECTORS IN SUSTAINABLE DEVELOPMENT.



Source: Kamara, Aliakbar, et.al. ***Sustainability Focused Decision-Making in Building Renovation***

4. CONCLUSION

The present article has discussed the economic advantages of sustainable construction; it has demonstrated that sustained building requires the use of construction materials with less toxic emissions like bamboo and cork as well as recycling materials of demolished buildings. It has also shown the significant role of thermal plans in maintaining sustainability. In essence, this article has clearly demonstrated that durable construction contributes to the economic growth due to two significant impacts: less energy consumption and lower bills, and job creation to the unemployed.

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