

Green Innovation as an Input the Sustainable Economic Growth for Metal Constructions Systems.

Mohammad Abdullah Taha Almandrawy

Assistant Professor Doctor of Metal Furniture and Constructions Design, Metal Furniture and
Constructions Dept., Faculty of Applied Arts, Helwan University, Egypt

1. ABSTRACT

Sustainability is rapidly becoming an issue of critical importance for designers. Design, green innovation and creativity to all the activities production to bring ideas into use either as product or process innovations, through the complexity of dynamically which interrelate between ecological, social, cultural, economic and awareness problems solving design for metal construction. However, in a constantly changing environment, sustainability is not some ultimate endpoint, but instead is a continuous process of learning and adaptation. The relationship between economics and designing for sustainability not only requires the redesign of production and practices, but also the way we think about design. Therefore, problem of this research was: design of metal constructions systems requires sustainable economic thinking and environment. Thus, the present study aims to put criteria of green innovation with economic sustainable design for metal constructions. And also the analysis will cover many metal constructions in different places.

Keywords: *Green Innovation, Sustainable, Economic, Design of Metal Constructions.*

2. INTRODUCTION

Sustainability of metal constructions tends to be generated where creativity and design are aligned with environmental strategy. Technology can support creativity by making it easier to collaborate and to acquire knowledge, and through supporting design prototyping. At the core of sustainable development is the need to consider “three pillars” together) society, the economy and the environment. (2) [Cohen 2007] Positive sustainability influence by Product calls for contribution to a progress. This, in turn, requires sustainability innovations. Therefore, Products will contribute to the sustainable development of an economy and society if they deal with solutions to environmental and social problems. (3) [D.C.Wahl (2006)] In fact, successful Institution will Sustainability can integrate in design during all phases of design process, and many technologies to support developed product. (4) [Dean 2007] Thus, it must be found a balance between

economy, technology, society and culture intends to become a symbol of creative design. (5) [Gabe 2006] An institutions production design innovation in mainly relies on fixed assets to form the productions. Economic sustainability requires institution to manage all types of assets in such a way so as to ensure production continuity. A number of studies have been conducted which provide empirical evidence and have established an argument for the positive relationship between corporate responsibility and corporate sustainability (6).[Harland 2008] Sustainability can be addressed in each of the three phases of the product (Research-Development-Commercialization). (7) [Hill 2007] Creativity and design play a role as an input to innovation, research, development and effect on productivity and economic performance.(8) [Jones 2005] Sustainable design steel construction with creativity can play a role in improving level of Institution

production through their impact on innovation. (10) [Markusen (2006)] The concept of the “creative economy” is an evolving that is gaining ground in contemporary thinking about economic development. It entails a shift from the conventional models towards a multidisciplinary model dealing with the interface between economics, culture and technology and centered on the predominance of services and creative content. (11) [Midtunn 2010] The ultimate goal and challenge of sustainable design is to find win solutions that provide quantitative, qualitative, physical, and psychological benefits to product users. Design for sustainability involves the incorporation of sustainability objectives in design activities. (12) [Nelson 2001] To achieve sustainable design related to environmental in the product must be educated about its issues during the professional training. (13) [Orlitzky 2003] As creativity is recognized as vital to economic success, it is the more science and technology based on creative input, such as research and development, that have received more attention in economic thinking. (14) [Peter 2005] Green innovation and growth economy for metal construction have been subject to various definitions but those currently being used by international organization have a lot in common. Green innovation seeks to fuse sustainable development's economic and environmental pillars into a single intellectual and policy planning process, thereby recasting the very essence of the development model so that it is capable of producing strong and sustainable growth simultaneously. (15) [Samans 2013]

Sustainability is rapidly becoming an issue of critical importance for designers. Design, green innovation and creativity are bringing ideas for design product. Sustainability is a process of co-evolution

and co-design that involves diverse communities in making flexible and adaptable design decisions on local, regional, and global scales. (16) [S.Esbjörn 2005] The innovation systems approach is particularly important for ‘green innovation’ - defined simply as innovation for sustainable development. (19) [Stolarick 2009] A development experience is the importance of creating appropriate policies and effective Institution productions at all levels to support user-centered, sustainable development. Thus, in sustainable management is crucial to achieving the broad goals of the Green Economy, given the significant overlap between the Green Economy and Development Goals. (20) [TEE B (2010)]

Sustainable development is defined by the United Nations as the development that “meets the needs of the present without compromising the ability of future generations to meet their own needs” (21) [2009]

3. SUBJECTS & METHODS

Many metal constructions in different areas were be study in some factors as “an environmental changes & sustainability”, “green innovation & sustainable metal construction”, “design performance” and “materials & economic cost”.

• Environmental changes & sustainability

Environmental sustainability in design of metal construction is nowadays an urgent and remarkable issue and the main concerns are related to more efficient use of materials. (17) [Susan 2007]

Sustainable Design and Economy play a main role in design, construction, manufacture & maintenance, recycling and “reuse of product resources”. These principles comprise a conceptual framework for sustainable product design. This framework is intended to help designers seek solutions rather than giving them a set of

solutions. Sustainable development is the view that social, economic and environmental concerns should be addressed simultaneously and holistically in the development process. Thus, to achieve the relation between environmental, social and economic, it must be familiar with sustainability as clear in figure (1).

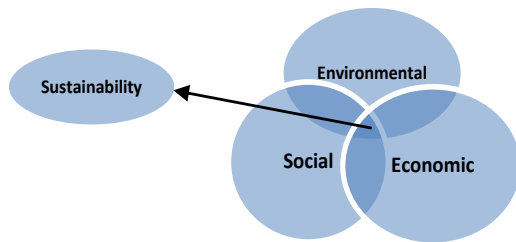


Figure (1) The relation between environmental, social, economic and sustainability

As a consequence, achieving sustainability requires an integrated approach and multi-dimensional indicators that link a community's economy, environment and society. And thus, the Compatibility between environmental and social is due to protection of environment and natural resources (locally, regionally, and globally). Therefore, it is clear that:-

- A triple bottom line approach to design for sustainability in which institution balance traditional economic objectives with social and environmental concerns.
- Eco-efficient strategies, which focus on maintaining or increasing the value of economic output while decreasing the impact on ecological product.
- The relationship between quality function, life cycle product analysis and contingent valuation, these factors are compared with user willingness to pay for environmentally benign products.
- A product development approach using design for product, such as theory of inventive problem solving design. This approach seeks to assist the designer in

employing eco-design principles without significant economic trade-offs.

Making development sustainable is in general a challenging and complex undertaking, involving such factors as technology and engineering, economics, environmental stewardship, health and welfare of people and the communities in which they live and work, social desires, and government strategies, procedures and policies.

• Green innovation & sustainable metal construction

Creativity is the first stage in innovation. It has a role in enhancing all aspects of economic performance from the design of new products to their production especially for metal construction. (1)[B.C.Brown 2006] Where, the link between manufacturing and its operations to the natural environment is gradually becoming recognized. Progress, profitability, productivity and environmental stewardship are now seen as needing consideration by manufacturing organizations (18) [Smith 2012] Product that is related to environmental innovation, including the innovation in product that are new or that offer a significant improvement on the basic characteristic, technical specification, incorporated software or any components or materials and the product, pollution-prevention or green product design, using less or non-polluting/ toxic materials, improving and designing environmentally friendly new metal constructions.

Innovation relies on the organization possessing four basic capabilities:

- The ability to identify market opportunities.
- The capacity to generate new ideas
- The means to research problems and identify potential solutions
- The skills to develop these solutions into proven product concepts

The innovation systems approach is particularly important for 'green innovation' - defined simply as innovation for sustainable development - because green innovation is typically tied to metal construction; using or changing it related its design often entails interacting or interfering with entire social systems that are connected to it. (10) [Markusen 2006]

Green Manufacturing economic as an advanced Manufacturing economic mode has been considered as an effective guarantee for sustainable development and enhancing international competitive position now. Moreover, some evidences of its effects on environmental protection and corporate social responsibility are provided constantly. (9) [Klein 1996]

- Design performance

The design can support the development of new products or innovation around existing products. Process design can also improve economic efficiency. Creativity has a role in enhancing all aspects of economic performance from the design of new products to their production, marketing and distribution. Creativity generates ideas that have the potential to be turned into successful innovation. However, creativity in itself is a necessary but clearly not sufficient condition for innovation. Creativity needs to be channeled the right way. Design and (Research and Development) R&D can be seen as ways of channeling creativity for economic advantage.

- Materials & Economic cost

The green economy provides a chance to "get the balance sheet right" by accounting for both the current and future value of the benefit ecosystems provide to people. When a product is effective, it is the value of the material and costs. (13) [Orlitzky 2003] Therefore, Materials designed and produced for a specific set of material properties. Within "Structure", green materials are

constructed into specific structural shapes using sustainable construction techniques to achieve more sustainable structural properties.

The essence of the green economy is that it recognizes the sum total of all sustainable and how they collectively provide the complete sustainable support we need. The development of it, designed to achieve society-wide equity through consensus products, requires both top-down and bottom-up strategies. While adding copper to steel is due to increasing the sustainability of metal constructions.(1) [B.C.Brown 2006]

The production for green construction materials and technologies will of course be determined more by product pull--the needs of designers, owners and contractors--than by the technological push of new nonmaterial's discovered and developed in the laboratory. But the convergence of green construction demands and green nanotechnology capabilities over the next 5-10 years appears very strong. It suggests eight categories of nanotechnology for green construction that are the focus of this report as (Insulation, Coatings, Adhesives, Solar energy, Lighting, Air and water filtration, Structural materials and Non-structural materials).

DATA ANALYSIS

From the previous study, it is clear that the link between environment, social and economic growth is sustainability of metal construction. Therefore, in order to achieve sustainable economic growth for metal constructions systems through the integration between impact sustainable innovations and design as in Figure (2).

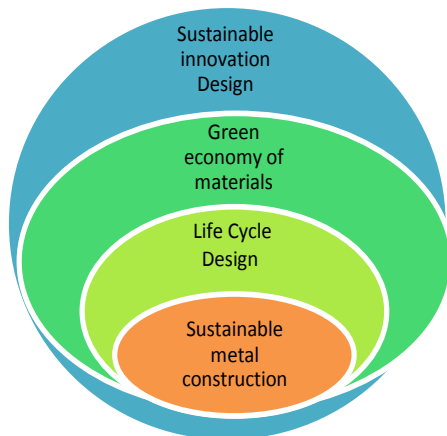


Figure (2) Integration between impact sustainable innovation and design

And also, there are economic advantages to changing designs towards being more sustainable, whether because they are easier to users. (20) [TEE.B.2010]

The following pictures and its comments refer to the stage of a metal constructions' life cycle when it is physically being constructed and operated in the sustainable-design strategy. And also, it is clear that, the construction and operation processes to reduce the environmental impact of resource consumption. The comparison between different metal constructions was study as:-



Picture (1) Taking into account the surrounding environment during the construction of the product

Use materials with high strength to-weight ratios. This will allow designers to create 'light' structures that have low overall environmental impacts with few and lighter foundations.



Picture (2) The use of aluminum interfaces in unlock metal construction

This picture includes site selection, construction design, and material processes under the sustainable-design strategy.



Picture (3) Isolation construction in compatible with the hot environment

The existing construction (insulation) remains on it. This keeps existing covering construction materials.



Picture (4 - a) Cover Metal established of abroad in accordance with the surrounding environment.



Picture (4 - b) Inside of metal construction compatible with its outside for perform function.

Some metal roof systems enable new metal roofing to be installed directly over

existing shingles and other product types. Based upon the individual product design on the construction to achieve ventilation or provide an air gap between the roof deck and the high performance metal roof.



Picture (6) The future extension of the metal construction

The metal construction system is principally manufactured from steel or aluminum to meeting some requirements of the metal construction rating standards. It is sustainable in that they provide a return on the investment.

The structural frame was designed to be adaptable, durable and quick to construction. All elements of the steel frame were designed to be manufactured into distinct modular sections with simple bolted connections to ensure rapid, easy assembly on site. This reduced the disruption on, and adjacent to, the congested and busy building site.

4. RESULTS AND DISCUSSIONS:

After the previous study about the present research, the research put some criteria for sustainable metal construction as the following:-

- The successful implementation of sustainability of metal construction systems into manufacturing economic organizations is dependent on some factors as:
 - Information: The quantitative and qualitative information required to make assessments is needed as the quantity and type of metals uses.

- Manufacturing and culture: Sustainability issues, environmental stewardship efforts, tend to be deal with in specialized departments rather than holistically by manufacture. This can lead to inconsistent application and tends to discourage the development of a sustainability-oriented culture in the organization.
- Procedures: Decision makers and designers are often not provided with the methodologies and procedures needed to ensure a construction's sustainability objectives and strategies are applied effectively, efficiently, consistently and robustly. One reason for this problem is that the number of variables to be taken into account in decision-making is usually very large.
- Designers: need to take sustainability issues into account effectively in decision making and actions if its objectives are to be achieved.
- The metal construction and process innovation need to be understood as jointly determined. To enable them to react to this, Institution production should carefully monitor the environment for changes.
- The metal construction for sustainability innovations suggests the existence of innovations with high social benefit, but very low private benefits appropriable. For such innovation user activities aimed at profit generation, which are frequently linked to product orientation, may be less appropriate.
- To better understand the value of design and its role in innovation, the holds a public consultation on the basis of their publication
- The importance of design in user-centered innovation and recommends the integration of design innovation.
- All creative metal construction, design can also have a positive impact on all production performance and of the

communications of the Institution production.

- The barriers to changing to more sustainable behaviors, there are strategies that can be implemented to promote and support change, in particular, by the construction of new social values and norms that value sustainability over a consumption-driven economy.
- There are three principles of sustainable design - economy of resources, life cycle design, and humane design - provide a broad awareness of the environment issues associated with design. The strategies within each principle focus on more specific topics. These strategies are intended to foster an understanding of how a construction interacts with the internal, local, and global environments.
- Sustainable innovation is not done alone. It involves working with partners throughout society to create value design.
- Successful designer will look not only innovation or design as specific creative inputs, but seek to promote creativity in all constructions. Practice and behavior have a strong influence on creativity and the effective integration of design.
- The sustainability innovation designer always focus on large constructions to the solutions alternative, it should have become clear, that the size of an Institution production.
- Sustainable designer strives for economy success through sustainability solutions for the production. With their innovations. They are able to exert a constructive influence on environment.
- Internal innovation relies on the organization possessing a number of key capabilities, supported by necessary resources and a creative climate.
- External innovation can enable organizations to out- source the early creative stages of construction

development, improving effectiveness and reducing costs.

- Establishing a sustainability of metal constructions supportive social culture and working conditions, enhancing awareness of sustainability among suppliers and users, responding to their requirements and engaging the community to promote sustainability.
- Innovation performance can define as measures of green innovation in develop new ideas and behavior to produce product and processes.
- To achieve sustainability of metal constructions, it must be improve design, material, green manufacture, green product innovation, environment, operation & maintenance and green innovation figure(3).

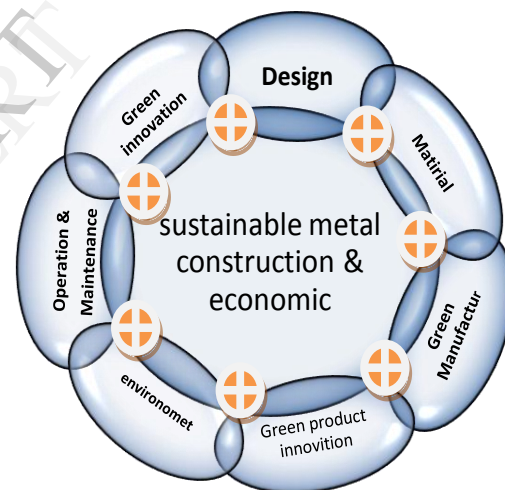


Figure (3) Flower of the sustainable metal construction.

5. CONCLUSION:

- Sustainability construction is an important subset of sustainable development because of its contribution to the metal construction economy, the significant environmental and social impacts that construction. Such processes can significantly improve the speed and efficiency of prefabrication, thereby enhancing sustainability. Thus, Designers that would be helpful include:

improved green innovation and monitoring of sustainability indicators, it must focus on the sustainability of metal constructions, improved efforts to control an environmental impact.

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