

# **The Industrial Buildings which used in Saudi Arabia and the Concept of its Impact on Sustainability**

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**ABSTRACT:** In this paper will focus on the environmental requisites as the study framework for the identification, analysis and assessment of sustainable aspects within the industrial building conception, the industrial building sustainable conception implies attending certain macrocriteria or sustainability requisites in its different stages of design, construction, use and demolition. Within a set of study scopes, like building location, materials used in constructions, construction and deconstruction processes, which used in different countries. Mention to industrial buildings which use in Saudi Arabia. So main purpose from this paper is to achieve and to find out the conditions and roles that may help to save the environment and people from pollution through the implementation of the new technique which use for the green house.

**KEYWORDS:** industrial buildings, Economy, industrial zone, risk evaluation.

## **I. INTRODUCTION**

### **Short brief about Kingdom of Saudi Arabia.**

Saudi Arabia consider one of the most advance industrial Arab country in the Arab world, because of a lot of considerations such as the economic situation as stable and prosperity country too, and as huge area comparing with other Arab countries, Riyadh City consider the capital and biggest city, the total area the kingdom around 2,150,000 km<sup>2</sup>, and it has the population of around 30,000,000 people, and the original people represent around 20,000,000, for sure Mecca and Madina City in addition to the shrines and religious shrines are holly places that Muslim people from all over the world come to visit these holly places or coming for pilgrim (Hajj and Umrah) through a year, of course Oil is also consider one of the main revenue for the state treasury in addition to another natural resources, Among the foreign policy of the state they also support many charitable projects around the world, especially some countries that suffered poverty, famine or disasters caused by weather conditions in addition to other factors that need humanitarian aid.

## **II. INDUSTRIAL ACTIVITIES**

The industrial activities are usually divided into the following categories as.

- 1- Light Industries.
- 2- Medium Industry. And
- 3- Heavy Industries.

The building sector has a significant effect on the overall environment. Buildings are No. 1 in CO<sub>2</sub> emissions; as residential buildings, so what about the industrial buildings that already produced Impurities and dusts, in addition to pollution? So such kinds of industrial activities need different kinds of buildings, with different design, and it may have horizontal or flat **shape**, or vertically depends upon the type of industry. Few years ago, they were seeking more about the industrial buildings to be friendlier to the environment, basically, sustainable construction has centred

## International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 12, December 2015

on residential and office buildings as green buildings system, recently and because of saving energy, and the aspects of sustainability in the construction field of industrial buildings.

Thus the aims of this research is to analyse the sustainable environmental requisites demandable for an industrial building, by defining a system of specific indicators to assess building behaviour against these requisites generating an assessment model as a base for measuring the building "environmental sustainability index"

The design of industrial buildings can also derive from both aesthetic and functional considerations, but we must suppose they were purely functional. During the industrial revolution proprietors began to use Georgian proportions and Georgian details on important buildings. It reflected a sense of pride in their enterprise. Water-powered mills were often located in open country and the neo-classical detailing gave the buildings some resemblance to country houses. Their facades were however designed by engineers, not architects, throughout the nineteenth century. The index to a leading architectural periodical for the years 1881-1900 lists only one building as a 'factory' designed by an architect: a mineral water plant in Malvern. Architects "were mostly concerned in building for the aristocracy, the church, and the higher levels of society and for commerce". Their involvement with commerce did however extend to town centres, warehouses and there was some competition over styles. An architectural historian wrote that a Newcastle warehouse gave "a more scholarly slant to the early Gothic inspiration". The architectural profession's first serious involvement with industry came from the railways: "most of the mainline termini were architectural showpieces not, like the viaducts, the anonymous work of engineers". Since the architects made them look like grand hotels and other urban buildings, their involvement tended to lessen the contrast between old and new. Since the 1960s old industrial buildings have become unexpectedly popular with tourists, and industrial archaeology is now a respectable academic discipline. People have begun to discover aesthetic qualities in industrial buildings which were not always apparent to their designers. At Beamish, Durham, a collection of industrial and commercial buildings has been assembled in a parkland setting and now attracts large numbers of visitors. At Bromley-by-Bow, in East London, seven 1872 gas holders have been listed by the architectural merit. In the north of England, the Killhope Wheel Lead Mine has become a tourist attraction. It is on the A689 in Westmorland, some 6 km west of the Weardale Cement Works. The latter is considered a blot on the landscape but may be appreciated as a structure when its operational life comes to an end. Industry's potential for the creation of sublime scenery has ceased to be exploited. Too many of the twentieth century's new industries, like automobile and aircraft manufacture, or the generation of electric power, has been allowed to despoil the landscape, and the public has become suspicious. Since the 1930s a wide range of people have protested against the loss of natural beauty to industry, roads, coniferous trees, power lines, factories and housing estates. Their desire for conservation has persuaded designers to find ways of diminishing the control between new industry and the landscape. The technological progress occurred in the short period of time since the industrial revolution to the present day, has been accompanied by a series of appreciable changes in the planet. Not only are today's generations the heirs to this technological progress and advance, but also the environmental alterations derived thereof, some of which are irreversible. Environment protection and social and economic development is essential to achieve sustainable development. Centring on this need for change and work pending execution in the construction sector, the sustainable development era must demand radical changes. The globalization of the construction industry has promoted the incorporation of a relative new universal vision of this sector: the sustainability already used in the 1970's referred to "sustainable economic growth". Construction action is one of the causes with great impact on the environment, according to the conclusions of the Vital Signs 2005 report drafted by the World Watch Institute of Washington, which points out the construction sector consumes up to 60% of the materials extracted from the earth. Furthermore, their use in construction generates half the CO<sub>2</sub> emissions dispersed in the atmosphere. Therefore, the architecture and engineering professions must include environmental protection in their daily tasks to fully comply with their work. Today, it is no longer possible to carry out (design and construction) building projects without assessing their impact on the environment. These disciplines must use tools, which provide them with knowledge on the affections associated with their work and assist them in taking decisions resulting in more environmental friendly projects. In recent years, numerous countries have with greater or lesser success launched initiatives to achieve more environmental friendly buildings throughout their life cycle, from extracting materials to their demolition. Thus we have terms like sustainable construction, building energetic

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efficiency, bioclimatic, passive architecture, etc. aiming to provide new trends to achieve the target of reducing the construction activity impact, and to achieve the term of sustainability. The incorporation of these design criteria in construction has acquired special relevance with the incorporation of the so-called sustainable development concepts within politically correct and desirable practices for society as a whole, thus, the advance in the research and development of new knowledge systems concerning sustainable construction has been constant. It must be mentioned the advances made in the residential construction field have not continued in the industrial building design process, whose specific characteristics make them different. It can be claimed definition of sustainable aspects is lacking in the industrial plant construction field. The industrial building sustainable conception should be tackled in the same way as residential or office buildings. The relation extant today between industry and sustainability represents a rich interesting research field given the complexity and amount of study areas, not to mention the importance of identifying factors making industrial building. Architectural requisites compatible and compliance thereof sustainable, the general concept of sustainability in construction the industrial building sector to achieve the sustainability we were looking for

- 1- The building design should be friendly with environment by using the material has no any effect.
- 2- The building should also be more economical, during the constructions, or in saving energy such as lighting, water, and ventilation, location and so on.
- 3- The designer of the industrial building should take in his considerations the social factors.
- 4- Durability, and multi usage, and movable.

Fig (1) down shown the concept of the sustain ability,

The industrial construction sector is part of the non-residential building sub-sector. It comprises [“the development of industrial building construction activities, including new designs, enlargements, modifications, maintenance and reforms”]. The construction of installations for developing production activities, whose production processes do not need a building for their execution, such as incineration plants, cement plants, blast furnaces and other similar structures; are also included in this sector. Generally speaking, the participating agents are: construction contractors, construction companies, industrial building design companies and projection direction firms. As a definition of factory or industrial building we could adopt Prof. Losada’s [8] “a space where industrial production and storage tasks are performed. The term factory as alternative for industrial buildings includes generic aspects of industrial production. Nevertheless, both terms have in common the existence of constructions, i.e., man-designed spaces materialized via the use of natural or artificial products, elements and construction systems within a controlled environment” Traditionally, the industrial building was considered an isolated container inside which certain production activity occurs. Sustainable industrial building aspects considered today refer mainly to the production process performed inside. Attention is focused on aspects like contamination caused by the Production process or activity throughout the building life cycle (air, noise, water, etc.) and process waste deposition or recycling dedicating very few resources to research on the building itself. A more sustainable vision considers the same as an architectural element permanently interacting with sustainability requisites. The building design through a systemic approach entails making an integrated study of the industrial plant that it is defined as main system. Likewise, this system consists of several subsystems or subdivisions interrelated to each other. The optimal integration of all subsystems must, therefore, be explored with the aim of obtaining the most suitable solution. The main subsystems of the industrial plant are as follows: the industrial process, the auxiliary services necessary for the correct performance of the process, the building or structural frame, the production control system and the lay-out or activity distribution. The architecture implies the spatial arrangement in such a way that a separation between the external arrangements of the industrial area, which is characteristic of the urbanism, and the inner arrangement of the building or place defined by the layout could be established. An enveloping system, borne by a structural frame, defines the latter separation. The enveloping system, together with the structural frame, forms the building. The industrial building typology should be adapted to the productive process and to the necessary auxiliary services. Each process has special features and there exists infinity of processes. In other words, groups of industries should be established in such a way that perform similar characteristics in respect

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to materials, building shapes, spans among columns, more habitual illumination types and ventilation or storage zones particularities. Among the distinguishing features of the industrial building, the following ones could be mentioned.

1- There are different possibilities in shapes and typologies of the industrial building since the final solution depends on the lay-out and the distribution of the different activities to be performed, as well as on the great variety of processes that could take place in its inner space. In residential buildings, however, the activities in the inner space are always focused on giving their inhabitants for accommodation to fixed room conditions.

2- In the industrial building, the loads associated with the productive process or with the flow of materials are usually quite more relevant (higher loads) than those in residential structures. Therefore, the structural system will be influenced by the loads to be borne.

3- Today's industries are characterized by rapid technological changes, which imply that the industrial building should allow flexibility for either future adaptation to new distributions or expansion needs of the industrial plant. The flexibility of the facilities, therefore, is also an important feature to be taken into account when designing these typologies.

4- The accessibility in industry, as well as considering people accessibility, must take on account the dimensions and the physical characteristics of the raw materials and the manufactured products in order to perform the raw materials movement.

5- Unlike in residential uses where the energy consumption depends on the type of housing, in industry it depends on the available machinery. In this case, there is a great range of possibilities to save energy consumption; for example, the energy generated in some stages of the production process can be used for other phases. On the other hand, the atmospheric conditions of the inner space are also different when dealing with residential or industrial typologies.

6- From a social point of view, the industrial plant generates wealth, creates employment, fosters commercial activities and develops the surrounding area.

7- In some cases, as consequence of the trademark image of some companies, the industrial buildings have a high aesthetic value that contributes to increase the architectonic heritage of the surrounding area



Fig (1) the concept of Sustainability - Design by the author – 2015

### III. TEXT INPAINTING

Exemplar based inpainting technique is used for inpainting of text regions, which takes structure synthesis and texture synthesis together. The inpainting is done in such a manner, that it fills the damaged region or holes in an image, with surrounding colour and texture. The algorithm is based on patch based filling procedure. First find target region using mask image and then find boundary of target region. For all the boundary points it defined patch and find the priority of these patches. It starts filling the target region from the highest priority patch by finding the best match patch. This procedure is repeated until entire target region is inpainted.

The algorithm automatically generates mask image without user interaction that contains only text regions to be inpainted.

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## IV. EXPERIMENTAL RESULTS

Figures show the results of text detection from an image and inpainting by using exemplar based Inpainting algorithm. Figs. 2, 3, 4 (a) shows the original image. (b) is the image obtained by applying first set of criteria. All objects whose area greater than 10000 and filled area greater than 8000 are eliminated and major axis lengths are in between 20 to 3000 are considered to be text. Still, some small non-text objects are detected.



Fig. 2. Text Detection and Inpainting (a) Original image (b) image after applying first set of criteria (c) image after applying second set of criteria (d) Image mask (e) Inpainted image using patch size 4 x 4 and search window size 81 x 81

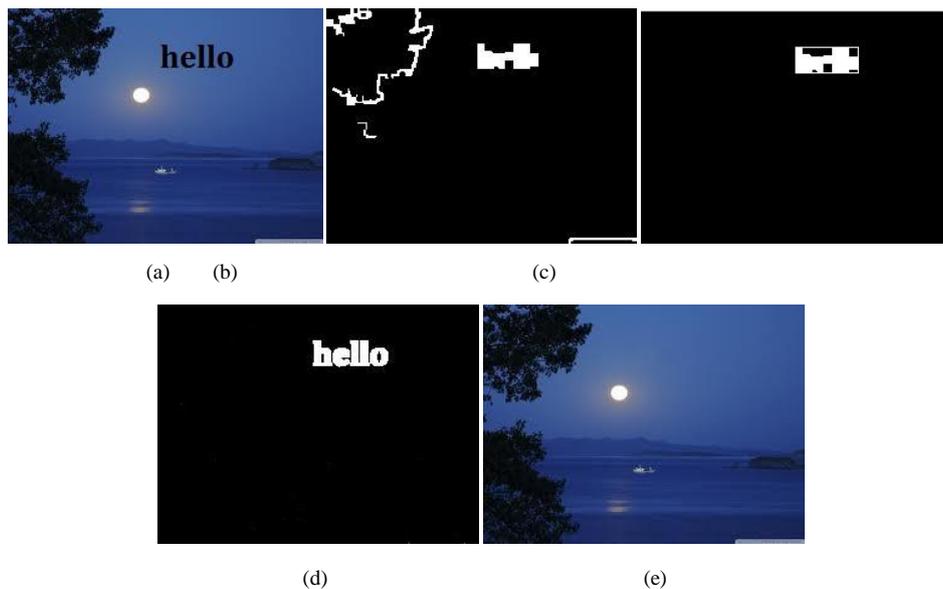


Fig. 3 Text Detection and Inpainting (a) Original image (b) Image after applying first set of criteria (c) Image after applying second set of criteria (d) Image mask (e) Inpainted image using patch size 5 x 5 and search window size 81 x 81

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(An ISO 3297: 2007 Certified Organization)

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Fig. 4 Text Detection and Inpainting (a) Original image (b) Image after applying first set of criteria (c) Image after applying second set of criteria (d) Image mask (e) Inpainted image using patch size 5 x 5 and search window size 81 x 81

To eliminate small objects, connected component labelling is applied to the resultant image.(c) represents text detection by applying second set of criteria which eliminates all the objects whose area is less than 300 and filled area is less than 500.

### III. CONCLUSION

We have implemented an automatic text detection technique from an image for Inpainting. Our algorithm successfully detects the text region from the image which consists of mixed text-picture-graphic regions. We have applied our algorithm on many images and found that it successfully detect the text region.

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ISSN(Online): 2319-8753  
ISSN (Print): 2347-6710

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**Vol. 4, Issue 12, December 2015**

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