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Challenges & Opportunities Before Indian Business Environment

Renovation Techniques for Profitable Sustainability of Industrial Heritage

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ABSTRACT

Industrial Heritage has also been related to tourism. The legacy of Industrial Heritage is the product of economical mutations. This legacy comprises a great number of valuable buildings, structures, and sites. By giving a new use to those buildings, we could decrease the deterioration or loss of our Industrial Heritage. Many industries that once flourished have now become decadent because of economic, political, health, and social changes. Commitment and innovation must be the basis for decisions intended to rescue this legacy. Sustainable development of industrial heritage needs comprehensive planning and design. The conservation planning and design study Act and regulation are important to be developed in order to pressure for conservation. It includes:

Act of zoning activity and culture that is related to bind to historical building characteristic.

The role of contributor from all of sector; planners and designers, private society to determine the conservation policy, local people and tourist is required. The treatment of these old buildings plays an important in various aspects Architectural, functional and urban constraints, prevents an optimal rehabilitation of old buildings.

The goals of the research presented in this article are:

Find rehabilitation solutions in order to obtain energy performance closer to new buildings energy performance. Adapt actual construction's techniques to energy performance closer to new buildings energy performance. External & internal characteristics of the building must be maintained while using for profitability. Experimental control of building conditions for the validation for future. The control of active components (heating and ventilation and air-conditioning) to reduce affect of weather conditions

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1. INTRODUCTION

Heritage buildings are crucial to the human perception of culture and identity through time. Although being a part of history, some of these buildings are still used till today. However, some other buildings suffer from degradation problems, even so they have a wide potential of reuse. In order to enhance the performance of existing heritage buildings, or plan for the conservation of an unused building, high consideration of the special nature of heritage buildings is required. Old buildings play an important role in energy and emissions reduction strategies. Architectural, functional and urban constraints, prevents an optimal rehabilitation of old buildings. The historic patrimony preservation represents a strong challenge in old buildings rehabilitation: the appearance and external characteristics of the building must be maintained. According to ICOMOS Burra Charter (1999), conservation is based on a respect for the existing fabric, use, associations and meanings; cultural significance is embodied in the place itself, its fabric, setting, use, associations, meanings, records, related places and related objects. Rehabilitation and revitalization strategies for the heritage structure of rapid growth cities in Asia have changed since the 1980s, when it was realized that conservation must preserve not only individual objects but the ambience that surrounds such objects, rehabilitation and revitalization strategies have emphasized designated heritage zoning rather than the designation of individual monuments. Furthermore, the notion has been raised that the main concern in the conservation process must be the living environment of the local community. Heritage conservation is not only about preserving the physicality and character of an area but also its social fabric; traditional functions must be protected and conserved Rapid population growth is putting increasing pressure on Asian countries. Rehabilitating and revitalizing old inner-city area in Asian countries have become essential to preserving cultural assets. With the development of old inner-city areas as urban heritage sites, determining which sustainability approach is optimal has also been a concern. Many countries have aggressively developed unique strategies for heritage conservation. Although many countries have done much in the past to preserve the heritage of their city .A strong will and vision are necessary to ensure that efforts are efficacious. Through time and experience, people can learn how to effectively preserve their heritage.

Moreover, historic cities are host to exciting historical sites, outstanding heritage buildings, and unique local cultures; these represent a country and can be a source of pride. Nuryanti (1997) wrote that tourism and heritage marketing are crucial for two reasons:

i) To satisfy tourists' needs and demands and to maintain the profitability, manageability,
ii) Profitability of touristic activities.

Hence, the growth of the tourism industry is essential to highlight the important roles of heritage buildings furthermore, the tourism industry is not at odds with the premise of conservation.

2. Historic Building Information Modeling (HBIM)

Requirement of renovation techniques

- Maximizing the benefits of the building
- Enhancing the building performance
- Highlighting the heritage values of the building
- Achieving sustainable design goals, including reducing energy use, costs and environmental impacts of the property
- Adding green improvements and optimizing financial performance

Various challenges in profitable sustainability of heritages are

1. Design of new structure development as per requirement of setup
2. Maintaining or reducing traffic on structure
3. Intensive and uncontrolled development pressures
4. Insufficient legislations and enforcement
5. Changing lifestyles and consumption patterns of structure
6. Expectation of new tourists or visitor
7. Environmental degradation

The threats are categorized into five groups which are

1. The disruption of the urban pattern,
2. Disappearing townscape,
3. Changing activity pattern,
4. Visual monotony and obsolescence
5. Gentrification

3. Various factors of renovation techniques

Conservation planning and design study guidelines of study zones are very important to

Commemoration (a ceremony or celebration in which a person or event is remembered.) of the building and environment histories in the past. The development of the guidelines has to be maintained for a long time, where it is good planning and sustainable. Not only the factor of potentials but also need to plan several actions. There are many aspects in determine the planning and design guidelines of heritage building especially for building conservation when it is involving the authority guidelines and approval as

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their scope to control the development around their zone. Conserving a historic building is not only preserving the material but also the identity, historical & aesthetic value of building itself

The variety that characterized the architectural cultural heritage, from a typological, constructive and material point of view, makes it necessary to differentiate the tools for the buildings structural behavior evaluation, and, in particular, for the seismic vulnerability assessment. At the base of the architectural choices is the use of a "new" construction technology, the reinforced concrete. Because of its structural characteristics that made it preferable to the masonry construction.

Material with poor mechanical properties, structural details not adequate and not able to guarantee the structural behaviors that underlie the verification methods proposed by current Technical Code, and design principles very far from those that are at the basis of new buildings, contribute to make it very difficult to ensure the structural safety for these buildings. The calibration of the scores to be assigned to behavior modifiers, introduced for rationalist buildings, was done through parametrical analyses. The behavior modifiers, related to the constructive and structural characteristics, allow, by scores assigned to each of them, to increase or decrease the value of the Vulnerability Index that defines, according to the method, the propensity of structure to be damage by an earthquake

The environmental conditions in an area are the most important element that should be taken into account as they affect the residents' perceptions and quality of life. Considering the living environments of inhabitants first and foremost is a conservation principle that should not be ignored. Furthermore, paralleled with the advance technology and changing lifestyle, nowadays it is undeniable that modernization could provide safer (e.g. disaster prevention technologies), better and comfortable living condition for people. With the increasing of urbanization, how to balance between the preservation of heritage assets with development has become a pressing question. Thus, urban planners and decision makers must strike a fine balance between modernizations of a city while preserving urban unique characteristics without jeopardizing its cultural values

Ambience is the dimension deals with atmospherics that affect the five senses and set the tone or "ambiance" of an environment. These include attributes such as lighting, music, noise, temperature, signage, and wall color. Atmospherics that affect sight senses involve designs that use colors, typesetting, and graphics to convey the image a manager would like to project about the attraction. In the case of heritage attractions, managers can manipulate wall color, signage and mood lighting to ensure that visitors enjoy their cultural experience. These elements can emphasize certain characteristics in a display or bring out the mystique in heritage. Sound can also be used to set the mood and create ambiance. Elements that affect sound senses such as music can create romance or nostalgia, or even help recreate historical moments in time. Similarly, temperature that addresses touch/feel senses can be used to recreate environments or create calm and comfort, thereby allowing the visitor to better focus on the display at hand.

The next dimension deals with layout and design functionality. In the heritage/cultural attraction context, this would encompass atmospheric elements that aid in ease of movement and location of in-house displays and exhibits. It also deals with the actual design of the exhibits themselves. Tourist attractions of this nature use several elements to improve the visitor's experience such as interactive displays, technological designs (i.e., big-screen displays, interactive kiosks, and interactive panels at displays), and educational games to enhance the design of the actual exhibit. All of these elements can affect the extent to which a visitor enjoys the experience or is disappointed by the visit. Everything from traffic flow and display location to design, aisle space, and seating can affect how much a visitor enjoys a specific visit. Poor aisle space can facilitate crowding and a lack of flow. Bad layout can cause confusion and fatigue, and even turn off a visitor from seeing all of the attractions or staying for an entire show.

Post-occupancy evaluation (POE) is the process of evaluating any type of buildings in a systematic and rigorous approach after they have been built and occupied). This type of evaluation methodology emerged in the1960s. Over the years, the scope and nature of POE shave evolved and expanded, and new nomenclature has been propose to reflect those changes, such as building performance evaluation (BPE) and universal design evaluation(UDE). POE studies focus on the occupants 'limits of acceptability and evaluation of building performance mandates ,including interior environmental quality, visual, lighting, thermal, and acoustic comfort; spatial and building integrity, energy consumption in relation to occupancy schedules, HVAC equipment efficiency ,communications and other type of equipment efficacy, energy sources, and so on. POE process can be applied to any type of building, even if it was designed to assess higher education buildings. This process is formed by seven steps:
(1) Identify the need for the evaluation;
(2) Decide on which approach;
(3) Brief for the POE;
(4) Plan the POE;
(5) Carry out the POE;
(6) Prepare the report; and
(7) Take action in response to the POE findings, such as feed information in to the organization policies and into future projects or publications.
The method adopted for this evaluation is a qualitative study including a historical research of the building and the area, an analysis of the conversion strategy of the case study building, a walkthrough investigation within the building, and a user survey.

4. Techniques of building construction material

Mortars are composed of an inorganic or organic binder and sand or gravel aggregate with or without pigments. Inorganic binders may be lime, cement or gypsum, while organic binders can be animal glue. The kind of binder depends on the area where it is to be applied. It acts as a link between other materials, such as stones, bricks and so on, in mortars. Gypsum usually includes small percentages of sand and limestone powder.

Plaster (the skin of the building) covers the walls, columns and façades of the building, preserving them from external weathering conditions and providing a paintable surface
Changes in temperature and moisture, salt, earthquakes, and human malpractice, are the main factors that accelerate stone decay processes of the heritage buildings, the building has suffered from many aspects of damage such as powdering of stone, efflorescence of salts, cracks, missing parts, and destroyed columns.

Stone is one of the most durable materials when it is compared to weaker building materials, such as wood or mud. But stone can deteriorate and many factors will affect it. The nature of the stone is critical in determining its resistance to the various deterioration factors. The most important one is salt. Salt weathering is one of the principal causes of deterioration of stonework and masonry used in architectural heritage all over the world. Physical stress resulting from salt crystallization in pores is the most important deterioration mechanism causing breakage of carbonaceous building materials. Salts can be originated from incompatible building materials and inappropriate treatments, air pollution; meanwhile, at coastal sites marine aerosols are the main sources of deposited salts.

The growth of salt crystals within the pores of a stone can generate stresses that are sufficient to overcome the stone's tensile strength and turn the stone to a powder. However, salt by itself is not necessarily damaging. It requires the presence of water for its aggressiveness to become evident, and water is needed for bio-colonization to occur, for freeze-thaw phenomena and for wet-dry expansion. Control of this single factor can decrease significantly the deterioration potential of a stone and any structure built from it

Deposition of acidity from the atmosphere is an important source of salt enrichment in building materials. The major anions associated with atmospheric acid forming species are sulphate and nitrate. Therefore, the processes described lead to the enrichment of sulphates and nitrates of calcium, in the case of mortars and calcitic stones, as well as sodium, potassium and magnesium in the case of other stone materials. In addition to these salts formed through chemical reaction, there is also a direct input of salts from the atmosphere.

In a marine environment, sea salt has an important presence in the local atmosphere. On a global scale, emissions of sea salt droplets ejected from the oceans are considered as one of the most important primary sources of the atmospheric aerosol. Sea salt particles will undergo both wet and dry deposition, the major processes leading to their enrichment in building materials. Changes in temperature and moisture are supposed to be important factors in stone degradation. The expansion suffered during heating to high temperatures will result in the literal shattering of the external layers of the stone blocks leaving a typical rounded surface behind, Even if the temperature changes are not particularly large, the repeated heating and cooling of the stone will eventually lead to its deterioration over time. Changes in temperature, either increases or decreases, will result respectively in volume expansion or contraction of stone, and may be the cause of the cracks in structure, while catastrophic events such as earthquakes are responsible for heavy damage to buildings.

All porous materials will absorb water vapor from the atmosphere and expand. Although stone does not suffer this hygric expansion to the degree that wood does, it will still be affected by the inevitable cycling that it is subjected to by the normal changes in relative humidity in the air. Most affected by this process are the stones that contain clays, because their platy structure makes them particularly susceptible to retaining moisture. Bio-deterioration of stone monuments and buildings is a well-recognized problem in tropical regions, where environmental factors such as high temperatures, high relative humidity levels, and heavy rainfall favor the growth and sustenance of a wide variety of living organisms on stone surfaces. The most decisive factor for microbial growth is the availability of water. Therefore, porous stones that are able to retain high amounts of water are easily colonized by a wide variety of bacteria and fungi.

The deteriorating effects of micro-organisms are based upon induced chemical and mechanical processes and are therefore relevant to the conservation of building stone. The contraction and expansion of microorganisms following wet-dry cycles causes mechanical stress by the disruption of the grain or crystal structure of the stone. Loosened stone particles accumulate within the lower layer but get lost completely upon removal of the microorganisms from the surface.

The worst bio-deterioration agents are humans ourselves, not considering catastrophic events such as wars; there are plenty of other examples that condemn us. To begin with, poor design in buildings, especially detailing, leads to water flowing over walls with the consequent bio-colonization of surfaces. Then, there is the ubiquitous problem of poor maintenance. Faulty gutters and drainpipes allow water penetration into walls, with the resulting problem of hygric expansion of the material, and, if salts are present, to their solubilization, mobilization and eventual re-crystallization, or to freeze-thaw damage. These problems are subsequently followed by the eventual restoration of the building.

Those restorations carried out in the past that used some conservation materials that would not now be used, Although in principle, the original methods of joining blocks were to be followed, i.e., metal pins or clamps embedded in lead, this was not correctly implemented, poor quality iron, rather than stainless steel was used, sometimes cement or similar materials were used for filling the holes. Since the condition of the joints between the blocks was not perfect, water penetrated and corroded the iron elements leading to their expansion with consequent mechanical damage to the stone blocks.

Wind can cause enormous damage to buildings. Wind driven rain is important for impelling water into different elements of a building and as a relevant factor in the dry and wet deposition of atmospheric pollutants to facades. Wind not only drives rain, but sand can also be a problem in arid regions.

5. Conclusion

We have discussed the different processes involved in the deterioration of heritage buildings through mechanical stresses. But in nature these seldom act alone and the observed damage is the result of their interaction. One of the difficulties faced when trying to find a remedy to a problem is the identification of the key deteriorating factor, or if there are several, as is more likely, then it is important to know if these act simultaneously or sequentially. To preserve all industrial heritage structure, we have to work at all level from basic preservation to renovation, restoration and during their daily usage.

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