DOI: https://doi.org/10.38027/iccaua2023en0166

Adaptive Reuse of Abandoned Jute Mills Along the Hooghly River in Bengal: A Sustainable Approach

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Abstract

Heritage structures presently in dilapidated state, abandoned due to social, cultural, or demographic shifts are experiencing unprecedented revitalization as they are being used as anchors for redevelopment. Today we can build energy efficient structures that require almost no carbon footprint to operate annually but still require plenty of resources and energy to build them. Thus, preserving, and repurposing old structures into new, mixed-use developments becomes a more sustainable option. Parts of the Bengal region of India were once colonial settlements of Europe and therefore, the colourful heritage of the Europeans continues to be visible in towns along the Hooghly River. This paper aims to explore the possibilities of adaptive reuse of the abandoned Jute Mills along the Hooghly River with the objective of historic preservation and sustainable design to create functionally efficient spaces. **Keywords:** Adaptive reuse, preservation, heritage, sustainable, jute mills.

1. Introduction

Aim

To explore the possibilities of adaptive reuse of the abandoned Jute Mills along the Hooghly River with the intention of historic preservation and sustainable design to create functionally efficient spaces.



Figure 1. Abandoned Jute Mills (Photos by Author).

Objectives

- To review the possibilities of how the abandoned mills can be rehabilitated by revitalizing them.
- To explore the impact of urbanization on the Jute mills in West Bengal.
- To study similar cases of adaptive reuse worldwide and draw conclusions from them, which will provide valuable insights for developing feasible solutions.
- To incorporate sustainable design principles in restoring the structures.
- To illustrate the importance of repurposing historic structures and renovating them to preserve part of the memory and their vital role in the 'life course' of these structures.

• For people to be able to accept and participate in this process, we must gradually develop the structures and their surroundings.

Scope

A theoretical and practical approach towards sustainable design principles that could be applied in the revitalization of the mills and their surroundings.

Limitation

Considering the scale of the structures, the study relies on readily available drawings from credible sources, information available in books and online and the field study of several jute mills in and around Kolkata.

Need of the study

- Many of these old buildings are often turned into warehouses, abandoned, or sold outright, leading to their demolition and replacement by new buildings, hence, the cycle continues.
- To ensure a sustainable future, these buildings must be preserved for their future potential and their cultural significance.
- Re-use of these buildings will save energy and resources that are needed to build new ones.
- Repurposing these structures will also address unplanned urban sprawl and the need for new development in suburban areas.

History

- In 1832-33, a spinner in Dundee, UK attempted to spin jute for the first time. He blended jute with other fibers with the help of machines. A procedure for spinning 100% jute yarn using whale oil and water was discovered two years later.
- The first jute mill in India was Acland Mill, started in 1855 at Rishra, West Bengal, India.
- The quality of jute produced in India surpassed the one produced in Dundee within 10 years. Thus, making Calcutta the biggest jute producer in the world by 1908.
- 70 % of the jute products manufactured in Indian mills were exported to the global market till 1947. Since most of the jute mills were in East Pakistan (now Bangladesh), partition of India was a major setback to the industry.
- The Indian government recognized the importance of the jute industry and established the Jute Corporation of India Limited in 1971, which regulates and promotes the jute industry in the country.



Figure 2. Old pictures of Jute Mills in India (Dundee Exhibition).

2. Material and Methods

2.1 Methodology

- To establish the aim of the study, objectives, scope, and limitation.
- To analyze the location and history of the study area.
- To study similar cases and extract inferences from them.
- To formulate strategies and reviewing possible options of adaptive reuse.

To assess the feasibility of adaptive reuse of abandoned jute mills, a qualitative research method is employed in the study. The primary data was gathered through site visits and interviews with local people and experts in urban planning, architecture, and heritage conservation.



Figure 3. Structure of the Study (Developed by Author).

The secondary data were compiled by studying various existing research articles, journals, and government policies related to adaptive reuse and sustainable design.

2.2 Similar Cases across the world:

Located in the Town of Ludlow, Massachusetts, the historic **Ludlow Mills** complex once employed more than 5,000 people for production of jute yarns, twine, and webbing and was one of the primary economic generators for the region.

- The historic complex currently encompasses approximately 130 acres, and more than 50 historic mill buildings with 1.1 million square feet of developable space.
- Today, this more than 120-year-old historic mill complex has been converted into a modern, mixed-use development which balances residential, commercial, and industrial uses with greenspace and recreational amenities.

The **Tate Modern** is an art gallery in London. From 1900 to the present, it has been one of the world's biggest art museums devoted to Modern and Contemporary Art.

• The Bankside power station in London, which has been unused since 1981, was opened to the public as Tate Modern in 2000.

• In order to make room for the tower, the original boiler house of the power station has been turned into galleries, ateliers and public spaces, the Turbine Hall has been transformed into a vast open space for special projects and events, while the Switch House has been dismantled to accommodate the tower and has been reconstructed around it with gallery spaces and access routes.

Mad Bars House is an eight-storey nightclub that has 5 bars and restaurants in one building.

- It's a historical building, built in the late 17th century and turned into this bar house, situated on one of the streets that runs along the center of Lviv, Ukraine.
- The designers have honored a footwear workshop that was established 100 years ago, by cutting the shoulders out of wooden shoe boots and wrapping every banister in leather or partly exposing some brick walls.
- Human scale and work as the basis of unique visitor experience is included in all design solutions and details.

Cidade Bi4all is the industrial reconversion project of a Lisbon based IT service company.

- This project proposes new patterns of shared labor and revitalization of working relations, with a particular focus on space and time flexibility, especially in view of the post pandemic world.
- An urban and creative cluster has been formed, consisting of two warehouses from the old sugar factory, combining workspaces with leisure facilities, sports activities and temporary housing.
- The new floors, materials and furnishings have been introduced with added functions but retain a strong link to the past industrial memory.



Figure 4. 1- Ludlow Mills, 2- Tate Modern, 3- Mad Bars House, 4- Cidade Bi4all, 5- Alembic factory, 6- Imagine Studio.

Similar Cases in India:

The Alembic factory is located on a main railway line in the center of Baroda, Gujarat, India.

• The factory has experienced a number of changes in its functioning and design, from the manufacture of penicillin to alcohol.

- The building, which has been refurbished in 2018, is being converted into an area to be used for a museum, art studio, and exhibition space with additional areas for a library, audio visual room and café.
- The building's true character has been preserved with respect to its materials and space quality. New partition walls are the only new elements of architecture.

The **Imagine Studio by Trees** restores a large industrial campus in Vikhroli, Mumbai, India a site which is an essential part of the Godrej Group's history.

- It is stretched over an acre campus, two old power generation plants and a boiler plant were remodeled making room for new operations as a Studio, Workshop and Cafe, respectively.
- It's being converted to a marketing office with demonstration apartments, meeting rooms, small cafés and several open spaces for the dissemination of upcoming residential and commercial property developments.

3. Results

From the above case studies, we can conclude that adaptive reuse can be used to inject new life into structures that are abandoned or not in use anymore, while conserving resources and preserving its historic significance. Many architects and conservationists worldwide are increasingly adopting adaptive reuse as a solution to some of present built environment problems, whether due to environmental reasons, access to land or the desire for preservation of historic buildings. In addition to using less material than standard construction, these projects also reduce the construction time and the overall costs, making them an alternative for communities in need of regeneration. Cultural significance of spaces which extend or improve the historic context can have a particularly powerful role to play in any architectural typology that benefits from adaptive reuse.

Adaptive Reuse

Adaptive reuse is a way of reusing an existing structure with a different function while retaining some or all its original features. As a strategy for urban, architectural and conservation planning, adaptive reuse of all types of buildings and sites is gaining a lot of importance.

Advantages of Adaptive Reuse:

- It is often seen as a sustainable and cost-effective approach to development, as it can save energy and resources by repurposing existing structures rather than building new ones.
- It helps to preserve historic and cultural landmarks and contributes to the revitalization of communities and neighborhoods.
- It helps reduce urban sprawl by revitalizing existing buildings in urban areas and decreasing the demand for new development in rural areas.

4. Discussion

4.1 Jute

Jute is a natural fiber also known as the 'golden fiber' that is derived from the stem of the jute plant. It is a long, soft, shiny vegetable fiber that is usually woven into coarse, strong strands commonly used for making burlap sacks, twine, rope, and other similar products.

Jute Mills Today

Currently, jute mills in India are facing various challenges such as outdated machinery, inadequate infrastructure, and low productivity. Also, the fluctuating demand and competition from synthetic fibers have affected the profitability of jute mills.

- Thus, most jute mills are either abandoned or on the verge of demolition. Though some jute mills in Bengal are still running, low production might result in shutting down the mills all together.
- The workers who stayed in the surrounding areas have lost their livelihood and are forced to find jobs that are alien to their skills.
- The abandoned structures include the mills, large warehouses, staff quarters, jetties, offices and other working spaces.

Challenges of Repurposing Jute Mills:

Even though adaptive reuse of jute mills offers benefits, there are also certain challenges that need to be addressed.

• The buildings often have a specific purpose and may not be suitable for current needs, it can be hard to renovate them in order to use them appropriately.

• Many of these buildings may be in poor condition or in a state of neglect for a long time and are likely to require substantial repairs and restoration before being used again.



Figure 5. Current state of Jute Mills (Photos by Author).

4.2 Location Study

Over the few past decades, there have been many changes and challenges to the jute industry in India. There are large mill buildings with impressive architectural designs ranging from high productivity to idle for years. In view of the geographic location of mills, these compounds provide a distinctive opportunity to create new urban hubs for housing, business and public amenities spread all around the city.

In India, West Bengal is a major producer of jute, and Hooghly riverfront is a major location for jute mills. The Hooghly River flows through a number of districts in West Bengal, including Kolkata, Howrah and the North 24 Parganas. In these districts, Jute production is concentrated in the outskirts of Kolkata, Howrah and Hooghly with the highest number of mills on both sides of the Hooghly River.

In order to understand the industrial, social, economic and environmental aspects of the jute industry, it is important to study the location of the jute mills along the Hooghly River in West Bengal. The location of the mills has a significant impact on the regional economy, thereby creating employment and contributing to local economies but at the same time raising ecological concerns which need to be addressed.



Figure 6. 1- Map of India showing West Bengal and Kolkata, 2- Map showing the extent of Jute mills along the river Hooghly, 3- Map showing the population density around the Jute mills.

4.3 Sustainable Approach

Sustainable methods must be adopted in order to guarantee the success of adaptive reuse projects. The United Nations Sustainable Development Goal 11 has been incorporated as a possible solution to the study.

GOAL 11: Sustainable cities and communities

Make cities and human settlements inclusive, safe, resilient and sustainable.

- To incorporate sustainable design principles in restoring the structures.
- To restore a historic space, while preserving an area's sense of identity and authentic experiences that cannot be duplicated anywhere else.
- To stimulate local economies by creating new jobs and the generation of income.

11-3 - Inclusive and sustainable urbanization.

To enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries.

• By converting the abandoned mills into mixed-use developments that will include residential, commercial, and office spaces, which can become more sustainable and serve a wider range of users.

11-4 - Protect the world's cultural and natural heritage.

To strengthen efforts to protect and safeguard the world's cultural and natural heritage.

• To help preserve the valuable industrial heritage of the Bengal region by repurposing these buildings for new uses.

11-6 - Reduce the environmental impact of cities.

To reduce the adverse environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.

• In view of the reduction in resource consumption, adaptive reuse is considered to be sustainable as opposed to demolition and construction of a new building to replace it.

11-7 - Provide access to safe and inclusive green and public spaces.

To provide universal access to safe, inclusive and accessible, green and public spaces, for women and children, older persons and persons with disabilities.

• By repurposing abandoned structures for community gardens, public parks, and shared spaces, abandoned structures can become centers for community-building activities.

5. Conclusions

- The study established that one of the most successful approaches for retrofitting a building is to reuse it flexibly, while preserving its integrity.
- Through this study, the historic preservation of these culturally and architecturally important buildings can be ensured.
- Opportunities for the jute mills to become both a reflection of and a venue for the city and region's rich culture are to be introduced.
- The individual and collective potential of jute mills are highlighted, and Bengal's culture, economy, history and environment are uplifted.
- The study shows the need to move towards arts driven development through buildings, open public spaces and their importance in making a dynamic urban environment.
- A holistic approach is proposed and the intended outcomes for the revitalization of the mills and their surroundings are established.
- Infrastructure and amenities for the communities affected by the closure of these jute mills are also proposed.



Figure 7. Possible Solutions of Adaptive Reuse

Acknowledgements

I would like to express my sincere gratitude and appreciation to all individuals who have contributed towards the completion of this research paper. I would also like to thank all participants who have contributed their time and expertise in the research study. Their contributions have played a key role in the formulation of research findings. I have used their valuable feedback and suggestions to improve the structure of my research paper.

Furthermore, this research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of Interests

The authors declare no conflict of interest.

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