

# SAFEGUARDING BUILT HERITAGE WITH ADAPTIVE REUSE: CASE OF PUNE

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## ABSTRACT

*In the wake of urbanization, many buildings face demolition even before completing their service life. This phenomenon results in the loss of valuable architectural heritage in many historical cities worldwide, such as is also in Pune. Refurbishing underused or relinquished structures is a promising solution to revitalising the urban fabric. It also achieves environmental and socio-economic benefits. This research put forth the Adaptive Reuse (AR) phenomenon of urban old-built stock. The analysis presented to advance the conceptual and theoretical understanding of the AR phenomenon. Various advantages offered by AR and risk and constraints in the manifestation of this proposition are discussed. It presents the case of the adaptive reuse of a historic building from a residential to an office, located in Pune city. It includes the theoretical and practical background to support AR architecture precedent. The analysis demonstrated that using AR is a successful approach for conserving heritage structures, which provides several benefits, albeit not widely espoused in practice. Furthermore, the analysis indicated the necessity to reshape and retrofit existing built stock to contribute toward sustainable future development and preserve the intrinsic value of architectural heritage for posterity.*

**Keywords:** sustainability, heritage, residential, office, conservation, restoration, retrofitting, energy, repurpose.

## 1. INTRODUCTION

Historic built stock represents a nation's physical, socio-economic and cultural capital. The obsolescence or redundancy of old structures calls for demolition that impacts the constructed environment negatively. Adaptive Reuse (AR), creative reuse, and 'brownfield development' are commonly used strategies adopted to conserve existing old built stock (Manewa, Ross, & Madanayake, 2016). Deterioration and ageing result in reduction or deprivation of structural adequacy of buildings. Obsolescence is often described with physical, technological, functional, economic, legal, social, and political attributes (Langston, 2008). AR emanates in increased building life, reduced material cost, energy and transportation, and pollution, advancing environmental sustainability (Bullen, 2010).

AR is repurposing an activity in which structurally strong structures are modified for economic benefits. This concept protects heritage structures by avoiding demolition. In this process, a historic often dilapidated building is repaired or altered for contemporary use with keeping past features intact (Cantell, 2005). In old areas, many buildings are adequately maintained with minor changes to suit modern requirements but they are often ignored, leaving them to deteriorate with time. A significant number of structures are indeed worth preservation at varying levels (Bond, 2011) which is true in historic cities like Pune.

Old built stock represents the cultural heritage considered as a 'resource' (Kohler, 2002). The research established that only 0.5-1.0 % of existing built stock requires demolition, while the rest is substantially strong to stand for the next 30-50 years for reuse to meet new spatial and structural requirements. The venerable historic structures located in strategic locations have high commercial value and are recognized as the country's assets and need preservation for future

generations (De Silva D., 2016). This research puts forth the AR phenomenon from diverse perspectives for contemporary Indian cities.

## 2. THE AR PHENOMENON

AR represents a strategy adopted for conserving heritage buildings efficiently. Theoretically, this concept was developed in the 19th century to preserve historical monuments by Eugène Emmanuel Viollet-le-Duc. Later it was dealt with from diverse perspectives by historians and conservation architects covering technical and aesthetic aspects. AR includes restoring, repairing and retrofitting existing building components that pose a daunting challenge for conservation experts and planning authorities (Plevoets, 2011). The phenomenon of AR is studied from diverse perspectives in past research scholarship. It is recognized as a creative adaptation aimed at creating a link with the past, facilitating problem-solving and architectural interventions. It is looked at in light of functional, physical, economic, socio-legal and technological aspects. The inability of urban built stock to cater to the user's needs and for economic gains and achieving sustainability calls for AR. These reasons support the wide use of AR strategies for conservation efforts from historical times (Kalaci, 2014).

Repurposing old structures is a time-tested concept. It includes reconfiguration, embellishment, enlargement and other required structural changes that modify the structure. It is stated that the AR strategy applies to structurally strong structures (Conejos S., 2013). With this process, the buildings can accommodate socio-economic and environmental changes. Decision-making is complex in nature and based on four criteria: social, economic, environmental and governance (Perovic, 2015).

## 3. THE HISTORIC AND THEORETICAL ASPECTS OF AR

Transforming buildings to suit other functions and uses has been in practice from historical times. However, AR as a theory and formal practice came into being in the 1970s. In the wake of the French Revolution, converting a building's structurally sound function was a common practice where many religious establishments were converted to cater to military or industrial uses. For this, the buildings were sold and confiscated without a conscious consideration for keeping their heritage value intact (Mehr, 2019). A glaring example of AR is the Old City Hall, Boston, US, owned and used by the City Council from 1865 to 1969. The American Heritage Foundation preserved this building of historical interest and later converted it for commercial use with high-end restaurants and business offices (Al-Ghamdi, 2011). Viollet-le-Duc was the pioneer of the stylistic restoration movement initiated in the 19th century after the French Revolution. This movement stressed reinstating heritage by inserting new structural elements without changing its original character. Ruskin, the leader of the anti-restoration movement, criticized the approach adopted in the Victorian era, instead suggesting the caring of built stock daily, with repairs and maintenance.

In the 20th century, Boito initiated the 'restoration-conservation movement' reconciling Ruskin and Viollet-le-Duc's approaches. Riegl (1996) suggested

prioritizing the structure's heritage value for restoration and reproduction, believing that absolute conservation is not feasible. Reproduction was justified even if the decorative parts were lost. The first document was the Athens Charter regarding heritage restoration initiating the movement of modern conservation in 1931. Brandi pioneered this movement developing conservation policies. The Venice Charter introduced the AR phenomenon post-second World War (Mehr, 2019). Various conservation and restoration theories guided contemporary movements having different concepts and forms of AR over time. Such theories exhibited the changed priorities from a value-based approach to a technological need base addressing user demands. Some theories specified within-use adaptation with some introductions of interventions based on the heritage building's primary function. In contrast, across-use adaptation includes functional changes, as mentioned in the Venice Charter. The modern conservation theory defines design material and authenticity of workmanship as per the Nara document. Here, the authenticity judgment addressed various aspects, including design and form, design, materials, function and use, techniques and traditions, settings and location, and spirit (Petzet, 2004).

#### 4. NEED FOR AR

It is established in research scholarship that an efficacious adaptation represents a gesture of respect towards the place's historical character while allowing for changing functions enhancing the building's character instead of destroying it. UNESCO's Historic Urban Landscape (HUL) approach includes adaptation, dissemination, and monitoring (Li, 2021).

There are two ways to address the issues posed by abandoned structures- bulldozing the whole property or reconstructing it. AR is a sustainable answer as it :

- extends the building's life
- supports sustainability by reducing material and transport
- reduces consumption of resources and pollution
- revives the neighborhood while respecting and retaining the building's heritage and significance

A structure is abandoned for various reasons, including unsatisfactory spatial-visual quality, deterioration, decreased structural strength, malfunctioning installations, shabbiness and vandalism and a subsequent negative image. A building loses its functional lifespan because it cannot cater to the current users' demands because of the inefficiency of building layout for modification and rearrangement with minimum interventions (Remoy, 2007). Many older buildings present in historic districts suit repurposing and become significant sites in conservation schemes (Shipley, 2006). The parameters that qualify an architectural establishment for AR include its historical significance, its age, and the rules and regulations for appropriate interventions (Young, 2014). Heritage conservation is referred to as a luxury, not a necessity (Said, 2017).

##### 4.1. Functional and physical obsolescence:

This phenomenon represents the inadequacy of an architectural product for the intended function, that

is, for which it was designed. Physical obsolescence is the degradation of the structural part, building facade, components or installations, rendering the building incapable of supporting required functions. A building's viability depends on its physical characteristics. In many instances, the repurposing of an old structure constructed with age-old technology and materials is difficult and often leads to obsolescence in economic terms.

##### 4.2. Economic obsolescence:

It occurs on the depreciation of a building's economic viability in continuing operations as per its intended functions and purpose due to increased land cost or change in land use. Often, fewer business opportunities and the insignificant schemes offering incentives and compensation decrease the investors' interest (Nurul, 2016).

## 5. BENEFITS OF AR

AR reconnects old structures with society giving them a second life (Wilkinson, 2009). The increased life due to the transformation aimed at creating usable and accessible spaces results in reduced socio-economic and environmental costs. This continued urban development process revitalizes an old heritage structure enhancing social cohesion and human interaction (Bullen, 2010). AR offers substantial savings in energy required for rebuilding or demolishing and subsequent economic and commercial viability (Othman, 2020). AR represents a socio-economic agenda promoting heritage and it also contributes to sustainability and resource efficiency, reducing maintenance costs and enhancing the building's economic viability (Kalaci, 2014).

Preserving old structures is a pre-condition for maintaining socio-cultural continuity (Chiu R. L., 2003). Reuse of significant buildings is preferred against their demolition as it revitalizes the old built stock to achieve environmental sustainability. It is referred to as a meaningful action taken toward self-sustaining architectural conservation that also has economic benefits (Wilkinson, 2009). Although the process adopted for AR calls for some changes and modifications, their identity and architectural character are kept intact. It offers a structure or area an extended life, protecting the historic spatial character and place's historic fabric (Günçe, 2016). The benefits offered by AR are graphically illustrated in Fig.1.

## 6. RISKS AND CONSTRAINTS FOR AR

AR has several benefits but lacks extensive usage because of associated serious challenges for architects, developers and government bodies. It includes justification of a building's heritage value and choice of strategies that assure minimal impact on the constructional features, setting and its importance in the historical context. Decision-making for AR is primarily focused on economic aspects rather than assessing the benefits objectively and risks involved (Bullen, 2010).

##### 6.1. Functional physical constraints

AR interventions are affected by the existing building's architectural character which comprises floor layout, openings, columns, walls and structural details. The

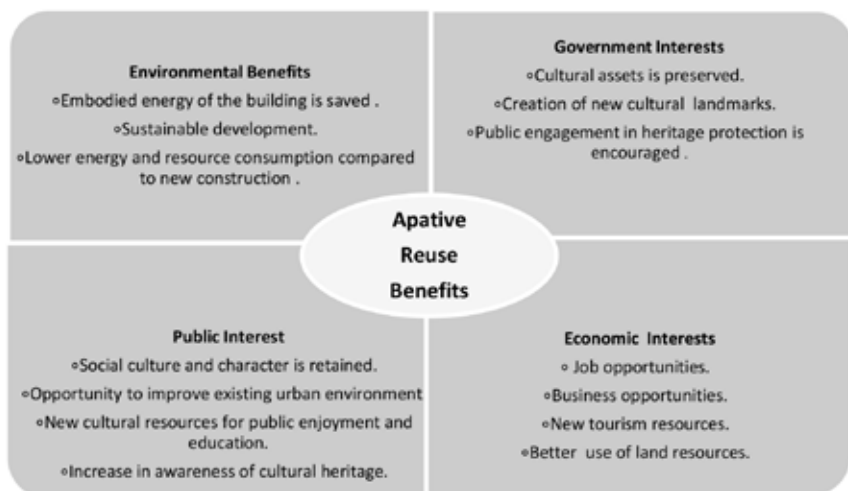


Figure 1: Benefits of AR  
(Source: Adapted from Othman, 2020)

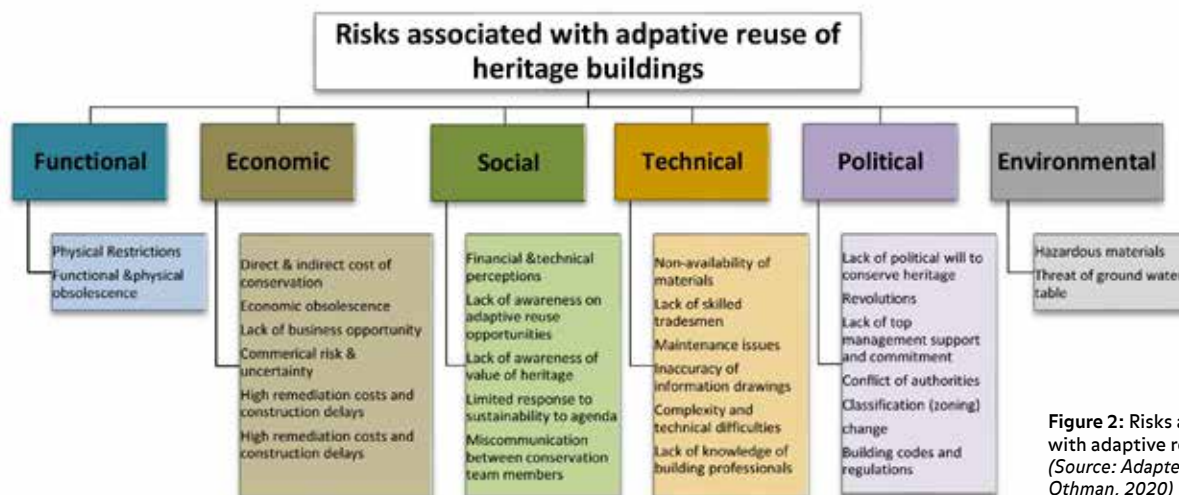


Figure 2: Risks associated with adaptive reuse  
(Source: Adapted from Othman, 2020)

building's spatial configuration requires modifications addressing emerging spatial needs and often requires high costs (Wilkinson, 2009).

### 6.2. Awareness deficit regarding AR potential

Persistent lack of awareness about the intrinsic value and perception that old buildings have limited functional life leads to bulldozing and vandalism, hindering the upgradation process. Furthermore, the scant availability of sustainable AR projects exhibits people's misconception about their success. Besides, less support from owners and the commercial market supports the reluctance to select AR by and large (De Silva, 2016).

### 6.3. Technical constraints

AR calls for using veritable, scarcely available materials or integrants, besides they are often expensive. This phenomenon results in the adoption of incompatible materials, adversely affecting the project's authenticity in hand. Besides un-trained workforce to handle old materials and technology hinders AR. Besides the technical problems and complexity involved, issues emerge such as unsatisfactory availability of space and access for installation of new services. The accomplishment of AR relies on precise examination of the structures, where its non-attendance generates latent problems like inconsistency in dimensions and materials and structural defects (Nurul, 2016).

### 6.4. Constraints due to building regulations and codes

AR projects need to comply with building regulations, codes and conservation guidelines which are often confusing and inconsistent. Contractors are not interested in the adaptation of old structures because of lengthy processes and associated risks posed by delays, design constraints, material compatibility and vacating occupants (Bullen, 2010). Architectural analysis for AR is a complex process comprising a detailed investigation of the design pattern (Fisher-Gewirtzman, 2016).

### 6.5. Process of AR

According to Bullen (2010), the AR process is different for each project. However, it should be initiated only after examining the following parameters:

- Ability to aesthetically fit the streetscape
- Availability of materials to match the existing palette
- Public awareness of AR
- Planning approval process
- Orientation of building
- Opportunity for technical innovation
- Market opportunity due to location
- Increasing urban density
- Impact on visual amenity
- Heritage Council guidelines
- Demand for building after AR
- Creative value
- Building codes



Various aspects that govern the decision of opting for AR include structural integrity, material durability, workmanship, maintainability, design complexity, and prevailing climate (Conejos, 2011). The selection of strategies for AR includes minimal interventions, the reversibility of actions, livability, sustainability, compatibility and accessibility (Li, 2021). The risks associated with AR are presented in the figure 2.

## 7. METHODOLOGY

The methodology adopted is through case studies, for which a residence that has been through the AR process is selected. The method used included a semi-structured interview of the owner, a photographic survey and a documentary analysis. The interview was audio-recorded, and the recorded data was processed with Verbatim Transcription. This research adopted three approaches for analysis that include the study of the primary building form, the reshaped building form, and tactics, strategies and interventions.

### 7.1. The Primary building form

The selected building is located in Pune Cantonment's Camp area, characterized by British colonial buildings, low-rise residential development and commercial establishments. The civil population, predominantly the business class commonly known as 'camp followers,' settled there to cater to the army's needs (Petkar, 2012). The reason behind the AR of this residential building is attributed to its distinct character with verandahs, high ceilings, balconies, sloping roofs, and windows having colonial influence and holding imperial charm. Besides, it reflects Pune's cosmopolitan character and rich heritage, which was constructed 100 years ago as a residence. This 1200 sq. feet ancestral property was put to AR to satisfy the emergent need for office space by the owner, an architect by profession. The determination to opt for AR was affirmed by functional, physical and economic obsolescence. The retrofitting took about four years to reshape the structure while keeping the original scale and proportions intact. The residence has a double-storeyed load-bearing structure with wooden structural members and a pitched roof and a long projected balcony overlooking the road in the front.

### 7.2. Reshaping the building form

The residential unit was structurally restored, replacing wooden structural members with steel. The wooden roof trusses were not in good condition; however, the structural members were comparatively strong, but they were also replaced to attain uniformity of the structural frame (see Fig. 3). The unique form of the residence is maintained with utmost care. The interior layout is remodelled to cater to the changed use from residential to office. The doors and windows were reused with minor changes and repairs. However, more openings were created with steel and glass, providing spaciousness and facilitating penetration of daylight. (see Fig. 4).

### 7.3. Tactics, strategies, and interventions

Traditional antique furniture combined with modern steel and wood furniture was selected to provide functional efficiency and aesthetic appeal. Modern materials are introduced sensibly to the context



Figure 3: Loft area (Source: <https://localground.in/work/studio-877/>)



Figure 4: Balcony (Source: <https://thinkmatter.in/2015/12/08/studio877/>)



Figure 5: Corridor (Source: <https://localground.in/work/studio-877/>)



Figure 6: Office space (Source: <https://localground.in/work/studio-877/>)

complementing the quasi-old architectural vocabulary and aesthetical quality. The corridors peeping onto the street of the cantonment were retrofitted with restored wooden railings and bamboo blinds. It was kept to disconnect the external environment and workspace



Figure 7: Meeting room (Source: <https://thinkmatter.in/2015/12/08/studio877/>)



Figure 8: Spiral Staircase leading to the loft (Source: <https://localground.in/work/studio-877/>)

with the purpose to render the interiors cool and for acoustic comfort by reducing external noise. Bamboo mats ensure continuous airflow modifying micro-climate and reducing air-conditioning demand and subsequent energy consumption. (see Fig. 5). An open office plan has simple furniture demarcating the functional spaces. The absence of partition walls provides visual connectivity and spaciousness. The wooden members are kept unchanged, with some strengthening enhancing the ambience and authenticity of character. The windows and doors are reused by fixing tinted glass in window frames to let diffused light in. (see Fig. 6)

The interiors exhibit an assemblage of artefacts such as paintings, sculptures and clay pots acting as an interface between the current and historical period (see Fig. 7). The spiral staircase leading to the mezzanine space of the studio is a critical element of the interior space. It offers a pause point and a transition space. The perforation in the tread of the metal staircase makes it look lighter in appearance and well-integrated with the space (see Fig. 8).

During the process building regulations, codes and conservation guidelines were followed. It was stated that Pune Municipal Corporation's (PMC) Development Control rules are confusing, and lacking clarity regarding planning and licensing requirements. Besides this, getting the plan approved by the municipal bodies was a daunting task as per the interview data.

## 8. RESULTS AND DISCUSSION

Old-built stock is a significant, under-utilized resource

for the historic city of Pune. It has various architectural marvels built in different styles and eras, providing the city with an individualistic and unique identity. The venerable old residences in the Camp area are relatively in good condition than the city core's building stock facilitating AR. In this inquiry, the AR phenomenon is analyzed by studying a residence for a detailed evidence-based examination of this approach. The analysis of AR presented here demonstrated how a structure is adapted for a new use while keeping the original structure's authenticity intact as per the modern conservation theory. The adoption of various architectural, and decorative elements and retrofitting with minimal interventions catering to the changed spatial requirements of the new use is noticeable. This case represents an across-use adaptation that includes functional changes specified in the Venice Charter. The structure is currently in operation, fully equipped with modern amenities as an office building satisfying physical and environmental comfort conditions having a historical character. The process was efficiently handled by addressing many procedural problems encountered that restrained the stakeholders from opting to repurpose an old building smoothly. The analysis indicated the complexity and risks associated affects the frequent AR in cities. Older built stock in the Camp, Pune represents a significant cultural and aesthetic resource. A few of them are refurbished and adapted for reuse; however, dozens and perhaps hundreds are waiting for knocking down given the high cost of restructuring and renovating them for a fresh use.

It is noticed that the reuse and retention of old structures with adequate interventions is the ultimate form of recycling that add to the sustainability of the built environment. Although attitudes about heritage bear various socio-economic pressures, people still need to reconnect with their roots to celebrate the community's unique identity. This research advocates AR because of its environmental benefits and encourages people to invest in old neighbourhoods, and renew and retrofit old built stock to achieve resource efficiency while respecting historical integrity. However, AR is coupled with complex challenges for conservation professionals, such as addressing the functional changes following regulatory conditions to obtain approval for execution. Nevertheless, the numerous social, economic, spatial, and environmental gains offered can render this option attractive and feasible. Although AR often results in interference with the architectural tissue with reconstruction and extension activities, their dominance over the original structural and architectural form should be limited. In such efforts, the inadequate juxtaposition of forms, scale and using materials alien to the context should be excluded. The need to examine the suitability of the new use while re-functioning heritage buildings and to decide the most appropriate adaptive reuse strategy is stressed.

## 9. CONCLUSION

Old buildings in cities hold an extraordinary part of the city's setting and need preservation with various strategies and approaches. This research highlighted the significance of more AR projects aiming at sustainability



and presented a process-based design approach. It demonstrated how AR results in keeping the aesthetic expression intact yielding novelty in functional, environmentally sensitive and reflexive architecture. It is noticed that the AR of old built stock is not widely used given the myths and misperceptions. It is established that this concept plays an integral role in sustainability. The pressing need for dynamic, risk-taking and creative people is to be realized. It is visible that AR surpasses maintenance enhancing the building's performance. It represents an effort and intervention to upgrade, and modify an existing architectural facility to suit emergent spatial and technical requirements. In this process, the originality of the residence was protected significantly, and its performance was upgraded by adding a

coinciding layer following current standards to satisfy the requirements of changed activity and subsequent users. This research stressed that preserving heritage and transferring them to upcoming generations could be accomplished through AR. Preserving and reusing dilapidated traditional structures in the cities of historical importance, such as Pune, will enrich the city's socio-sustainability, continuity and livability. AR is a successful approach to architectural conservation that helps preserve the intrinsic character of structures and spaces economically. This research explored the basic tenets of AR providing insights from an interdisciplinary perspective aimed to promote this concept as a propitious sustainable approach for keeping the legacy of historical city districts intact.

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