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Adaptive Reuse Practice in Tower Houses of Old City Sana'a Yemen

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Abstract

The study aims to identify the existing practices of adaptive reuse of Sana'a heritage tower houses and their application to the new building use and interventions on the original fabric. A case study on Dawood Hotel was undertaken with the following instruments: 1) Structured interviews with the Building Authorities; 2) On-site observations of the building conditions; 3) Literature search on the previous conservation projects reports. The finding suggests improvements on conservation practices by highlighting the discrepancies of the existing heritage building control procedures and requirements. It facilitates the local building authorities to formulate new systematic and transparent conservation guidelines.

Keywords: Adaptive reuse; practice; Tower House; Old city Sana'a

1. Introduction

The adaptive reuse practice has become very frequent in the housing areas in the old city of Sana'a. The Inventory study in 2008 by UNESCO indicates increase in building rehabilitation that changed the urban fabric at the housing areas of privately owned houses (UNESCO, 2008). The consequence of frequent civil war and the weak
The poor economic condition of the house owners leads to any possible additional use of any available home space to generate income. In most cases, they will commence construction works without consulting experts or architects or approval from the Building Authority (Adams, Robert K., 1983).

The dilemma associated with the need for intervention on the existing tower houses is compounded by the owners’ lack of awareness of the limits on modification that may be applied to the building fabric. Lack of conservation control by the Authority also contributes to the damage of the building material which also poses a possible risk to the occupants.

This research, therefore, seeks to address the issue of adaptive reuse practice in the Old City of Sana’a based on the following objectives: I) to identify and elaborate the current process of adaptive reuse practice, II) to examine the existing building conditions after construction, degree of intervention on the original fabric and deviation from the Building Authority guidelines.

2. Literature review

2.1. Terminology of "adaptive reuse"

The International Charter (Article 21.1) stipulates "Adaptation is acceptable only where the works has minimal impact on the cultural significance of the place." Consequently prior to any conservation work, it is essential to investigate the building condition and history that will highlight the significant of place and materials in order to protect its authenticity. In essence, an intervention evaluation shall be conducted to achieve suitable alternatives to conserve the original building. Article 21.2 stated "Adaptation should involve minimal change to significant building materials, achieved only after considering alternatives" (ICOMOS, 1999).

There are few definitions of “adaptation” on the contexts of new building functions. Douglas (2002) defines building conversions to “undertake a modified change of use required by new or existing owners.” Latham (2000) look at it as “the process that keeps as much as possible of the building originality at the same time, upgrading the performance to fit the modern standard and shifting user's requirements.” The change of the original use is the central idea of adaptive reuse. There are types of intervention that should be integrated with buildings such as “renovation,” “refurbishment,” “remodelling,” “reinstatement,” “retrofitting,” “rehabilitation”, and “recycling”. On the other hand, Holyoake and Watt (2002) explanation of adaptation is “rehabilitation, renovation or restoration works that do not necessarily involve changes of use.”

2.2. Adaptive reuse practice and criteria

There are different approaches to adaptation that some agree on maintaining the same use by just to changing the building performance (Holyoake and Watt, 2002). Douglas, (2002) however stated "the difference is that the restoration returns a building to the condition it was when originally constructed, whereas renovation modifies a building so that it meets current standards and codes. Although it extends the useful life of the building, renovation does not involve a change in use." Heritage buildings will have some useful life that can be achieved through adaptation, hence their sustainability through a combination of improvement and conservation (Lowe, 2004; Kohler and Hassler, 2002; Douglas, 2002; Cooper, 2001).

There have been numerous researches regarding the adaptive reuse which contribute to the sustainability of the built environment, with different theories, examples such as the old city of Sana’a, Tunisia Medina and Morocco Fez Medina had practiced rehabilitation of existing housing units with respect to the architectural features (Bigio & Licciardi, 2010). Both Medina Tunisia and Fez private owners will be supported by a number of local NGOs and foundations get involved in planning design highlighted the expectations of the resident population. This difference of practice might be the reason that caused the increment in the tower houses intervention. The practice of building
adaptation should ideally respect the existing space by a selection of an appropriate function that could be accommodated by the space layout with a minimum intervention to the original building fabrics. It is essential to preserve the cultural significance along with the adaptation process to ensure a successful building adaptation.

2.3. Adaptive reuse projects in Yemen

The practice of building conservation commenced in Yemen after the designation of the Old City of Sana'a as a world heritage site listed by UNESCO in 1984. It became the interest of the international world to save the outstanding heritage. The official governmental Yemeni body responsible for the protection is the General Organization for the Preservation of the Historic Cities of Yemen (GOPHCY). The conservation practice in Yemen may be categorized into two types as follow:

- The Government sponsored projects
  These consist of two types; firstly the collaboration with the international organizations, which is the most common practice especially for the historical significant sites, either as full funding or as a part financial supporter. The Old City of Sana'a was a conservation project under GOPHCY with the assistance of UNESCO and UNDP establishing action plans and guidelines. In addition, some foreign embassies have also raised fund for the Old City building maintenance. GOPHCY undertakes few projects as their resource is limited, whereas The Social Fund and Development as a local authority have a basket of funds from different sources.

- Private ownership houses or investors
  This category considered as a widespread practice due to the high number of private houses specially the vicinity of Bab El Yemen in the Old City of Sana'a. The project is self-funded by the owner whereas the authority approves and controls the building conservation works.

The research by (Miles, 1984) highlighted few issues of the local contractors not following the international standard and the architecture organization lack of awareness. Notice until today it's still not followed. (Wahren, 1993-94) Reported the problems of maintenance and modernization that have been considered in the study of tower houses.

The confusing choices of materials which are not compatible with the old structure. Besides new fashions and elements are emerging in the old fabric. Recommended for conservation standard and set for building activities, the residents must induce an efficient strategy of conservation. Also the researcher (Lamprakos, 2005) reassessment of the critical framework of conservation, and a reevaluation of the conceptual and disciplinary boundaries that reinforce the divisions between the new and the old, accommodating change within the context of an accepted aesthetic. The researcher derived from the previous studies on the building conservation practice in Yemen.

2.4. The conservation and adaptive reuse guidelines in Yemen

A Constituent Declaration was issued in 8th of May, 1979 to enhance some of its previous acts to enlarge and specialize more on the Old City of Sana'a in favour for its rich culture and architecture, with the approval of the Council of Ministers. The first Constitution Act was published on the 15th December, 1984, with guidelines published according to the international standards. The latest Conservation Act was drafted in the GOPHCY in 2000. A Ministerial Decree (number-204) was established by the Minister of Culture and Tourism concerning guidelines and policy of construction in the Old City.

The current conservation principles and guidelines provided for the house exterior façade to be maintained the original conditions. The guidelines also include a manual for maintenance work. Article 5-11 prohibits any change of building usage without legal permission from the GOPHCY. Non-compliance to the Acts will be charged with penalties.

However, in practice the conservation manual is not offered or referred by the house owners nor on-site inspectors. It is imperative that the manual be established and enforced by the Authority to ensure that building restorations are authentically implemented. The Conservation Act is also insufficiently detailed to cover all the pertinent issues of conservation and adaptive reuse on the tower houses. Similarly, the existing application forms are
not sufficient to record the exact building conditions. The new Act is expected to be published by 2014 that would overcome some of the highlighted issues.

3. Research methodology

The study was based on a case study of the Dawood Hotel at Talha Hara as a private ownership house. Measurements were made with the following instruments: In-depth structured interviews with experts, On-site building observations, building spatial measurements and secondary data from various Departments (Creswell, 2006).

The data collection commenced with an in-depth structured interview, to obtain a comprehensive understanding of the current practices. It involves various authorities’ with twenty interviewees and the structured questions according to the research objectives. Interviews were conducted with the general manager of GOPHCY, the site inspectors, and architects. The questions investigate the adaptive reuse application, approach, and procedures. Consequent interviews include the Tourism Sector of the Ministry of Tourism and Culture (responsible for the approval for a hotel proposal), with the Ministry of Construction and Road, and finally with the Local Council-Directorate of Old Sana'a.

On-site observations and measurements on the Dawood Hotel were carried out on several visits within duration of a month, recorded systematically in pictorial documentation of plans and photos. The inspection of the current condition is to develop an in-depth analysis of the degree of intervention on the original building façade and materials.

Table 1. Categories of damages of the tower houses by the Italian project in the old city of Sana'a (1984).

<table>
<thead>
<tr>
<th>Categories of Damages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Insufficient structure efficiency</td>
</tr>
<tr>
<td>2 Cracks signs</td>
</tr>
<tr>
<td>3 Weakened building stability</td>
</tr>
<tr>
<td>4 Structure condition; particular cracks</td>
</tr>
<tr>
<td>5 Foundation slabs crumbling</td>
</tr>
<tr>
<td>6 Resting on the rubble of collapsed walls</td>
</tr>
<tr>
<td>7 Collapsed walls</td>
</tr>
<tr>
<td>8 Masonry and the underlying soil</td>
</tr>
<tr>
<td>9 State of disintegration of the habitations and the shelters built with cast-off materials</td>
</tr>
</tbody>
</table>

Source: Adopted from CAT’s library data collection June (2012)

Other secondary data collection and analysis of scaled building drawings, site inspection forms, and previous restoration projects were obtained from the Centre Architectural Training and Research Studies (CATS). CATS provide valuable insight into past practices of restoration works and categories of damages incurred to the original fabric (Refer to Table 1).

4. The current practice and process of adaptive reuse by private owners in the old city

The practice of adaptive reuse is usually established by the owner's choice for a new function and space organization either fully or partial usage of the heritage building. (The owner applies for official permission for conservation work. The authority's primary concern is to maintain the traditional building facade with similar traditional materials while the owners are given freedom and flexibility to modify the building interiors. To
commence with the conservation works, a house owner shall obtain two building permissions as explained refer to Table 2.

Table 2. Types of permission and required criteria.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Conservation permission</th>
<th>Commercial permission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authority</td>
<td>General organization for the preservation of the historic cities of Yemen (GOPHCY)</td>
<td>Type of practice- hotel the ministry of tourism</td>
</tr>
<tr>
<td>Applicant</td>
<td>Owner</td>
<td>Investor/ owner</td>
</tr>
<tr>
<td>Application sections</td>
<td>Building location, orientation, and type of maintenance</td>
<td>General description of the owner information and required practice</td>
</tr>
<tr>
<td>Main guideline</td>
<td>Maintain the building exterior on the Traditional styles</td>
<td>Not to follow the modern style in the hotel room keep the traditional style to attract tourists</td>
</tr>
<tr>
<td>On-site inspection}</td>
<td>Before, during and after conservation works</td>
<td>They check after the conservation and intervention took place in the building</td>
</tr>
</tbody>
</table>

Source: Researcher structured interview and data collection June (2012)

In the current study, the project implementation is divided into three main stages as follow:

- **Inception Stage**: Prior to commencing any work, the owner shall obtain the approval from the authority by filling in permission forms with the assistance of on-site inspector assigned by the authority. He shall be responsible for making inspections during the construction works.
- **Project Development Stage**: The conservation practices will be implemented in accordance with the authorities’ approval, with supervision by an on-site inspector to ensure the material and construction methods on the exterior facades comply with the traditional standards. Any non-compliance shall be subjected to the imposition of a penalty and a stop-work order. The owner, however reserves the right to change the interior spaces without any design approval or building the inspector involvement provided except for structure demolition or alteration.
- **Project Completion**: In the final stage, the owner will apply for commercial practice permission from the related authority, depending on the venture. The Ministry of Culture and Tourism will process the applications and permit for hotel ventures. The Ministry will examine the building upon completion, with the required documents submitted hotel operations approval from the Director-General.

The study limitation in the secondary data collection of the original building construction drawing plans either from owners or authority as refer for on-site observations for before intervention of the case study.

5. **The original and current condition at the Hotel Dawood (Case study)**

The case study is Dawood Hotel, privately owned and located at East Zone at Talha Quarter nearby the Talha Mosque and facing the plantation garden. The hotel is 422metres from the main Sailah Road. The same route will lead to the Souq (Marketplace) and walking distance to the 7th Century Great Mosque. The routes are narrow for one-way car access with five parking bays in front the hotel across the road (refer to Fig. 1.).

The site is composed of the following zones; (1) Parking lot located on the road opposite the building, (2) The main entrance (with a disused water wheel of 80meters deep) leading to reception into (3) The tower house containing the rooms. (4) The outdoor service area accommodates the western and traditional kitchens as well as the restaurant terrace with a direct view of the plantation garden (Fig.2).

This original tower house consists of various spaces such as a water well, animals and grains storage located at the ground floor. The first and second floors contain small rooms and living areas for visitors and dry toilets. Above that is the main family room, used for ceremonial occasions, and other living rooms. The fourth floor contains the kitchen and the bread oven. It also has a toilet with a system that separates the urine and the stools, which drops on
straw mixture as dry fuel at the ground level. The fifth floor has two rooms while the sixth floor/highest floor contains the entertaining room or manzar meaning a reception room with a view. The roof top is a flat plastered surface used for clothes drying.

Fig. 1. Map on case study location, routes, surrounding & site zoning.

Source: Adopted from Google map.

5.1. The current building condition

The building had been upgraded in different periods, with its original age estimated at 250 years. From the brick walls, it is noticeable from used of building materials on the first two floors are older than the upper floors whereas the fifth, sixth and roof top floors are not more than 30 years (refer to Fig. 2.(a)).

The original building façades, brick walls, and openings were similar to that of the neighbouring houses. The building structure is in good condition, and the various wall facades reveal no bending/curves to any side, the West façade is not accessible or visible from neighboring houses. The front/South and East facade is in good original condition.

The building exterior condition is still with original materials as follow. The ground and first-floor walls of volcano black stones, some mix with other local stones and small openings with Qamariah (colored glass and gypsum). The second and third floor commences with a decorative gypsum belt below the windows to emphasize the level supporting the brick walls. The fourth floor has a bigger windows and decorative glass (Qamariah) on top of it. Openings on the last floor are made larger to take full advantage of the mountain scenery whilst the roof top terrace is decorated with open arches.

The interior newly adapted main building now contains 17 rooms and 15 toilets with the hotel reception on the ground floor. Two new toilets were constructed at each floor, alongside the installation of electrical and plumbing facilities. The interior space layout had two types of changes; one is using the original spaces with new functions, such as a hotel reception, office, and workers room and roof top terrace. The second type is creating additional spaces by new party walls, such as dividing the living area (Diwan) into two separate rooms.

5.2. Degree of interventions

The site measurements demonstrate the different type of intervention for the exterior and interior types, previous studies researcher on building condition had been adopted in this study. The internal conservation works have a high degree of interventions such as; extension in the exterior structure west façade refer to Fig. 2. (b). that cause unbalanced floor levels in the interior, besides the additions of two toilets on every floor. The North façade, with the
introduction of new toilets and window openings, are also not visually aligned with the entire façade of building openings.

Fig. 2. (a) East facade indicating floor levels and decorative wall elements; (b) The connection of new extension on the west side.

Source: Author site observation and data collection June (2012)

The extension of the Vertical structure and changes of the staircase location of unbalanced levels, It is evident that these changes were implemented without following; professional measurements standards, building structure capacity, limitations of electrical and plumbing services installations. The researcher introduced a new conservation checklist for the building condition from the previous studies (Chuan & Deguchi, 2011) (Feilden, 2003) (Langston & Shen, 2007) (Wahren, 1993-94) (Varanda, 1998) and the current by on-site observations of the building defects (Table 3).

### Table 3. Building defects on exterior and interior of tower house.

<table>
<thead>
<tr>
<th>Exterior intervention</th>
<th>Interior intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Plastering</td>
<td>Yes</td>
</tr>
<tr>
<td>2 Roof covering and finishes</td>
<td>Yes extra tiles extra load</td>
</tr>
<tr>
<td>3 Doors and windows</td>
<td>New windows bigger on the 5th and 6th floor beside new opening for new spaces.</td>
</tr>
<tr>
<td>4 External wall</td>
<td>Additional side building on the west façade</td>
</tr>
<tr>
<td>5 Sanitary and plumbing</td>
<td>Yes on north and west façade for additional toilets</td>
</tr>
<tr>
<td>6 Roof structure</td>
<td>New structure 5&amp;6 floor</td>
</tr>
<tr>
<td>7 Sanitary wares and Fittings</td>
<td>Modern toilets and tiles instead of traditional materials</td>
</tr>
<tr>
<td>8 Ceiling finishes</td>
<td>Paint the original wood structure</td>
</tr>
</tbody>
</table>
The hotel rooms are finished with new paint materials which are not of the traditional white plaster. The introduction of additional brick walls, floor tiles, sanitary fittings, furniture and water and sewage pipes creates extra weight on each floor that was constructed of wood and mud (Fig. 3. (a,b,c).

![Fig. 3. (a) New toilets installation with new windows; (b) Water piping installations on the walls of old toilets; (c) Refurbishments old toilet with Alabaster opening.](image)

Source: Author site observation and data collection June, (2012)

The new tower house extension building has higher floor-to-ceiling height, and wider rooms and openings dimensions, as compared to the original (Fig. 4. (a; b) The adaptation process requires precise planning for a new use to avoid conflict with the spatial structural or nature of an existing building.

![Fig. 4. (a) Old bedroom refurbishment (at second floor) with traditional plaster ceiling construction; (b) New bedroom construction (at fourth floor) with straw stalk ceiling finishes.](image)

Source: Author site observation and data collection June, (2012)
5.3. The deviation from the existing guidelines

The researcher compared the building condition result with the current guidelines. It was observed that those project implementation stages are very general, compared to such a complicated site heritage components and elements. Noticed that the building condition assessment is up to the inspector observation; there are no manual on the assessment of building conditions as a checklist. The application form requires information on the building conservation for facades and conditions only; not on interior changes which is higher. Logically applications on building adaptation involving the house interiors must be accompanied with scaled architectural drawings.

Clearly there should be more detailed architectural and craftsmen drawings as the construction proposal showing materials and construction techniques. These drawings must be submitted for comments, corrections and approvals. Similarly, as-built drawings of the completed works must also be documented and provided for archives. It was also observed that there is no close coordination among the various building approval and heritage authorities.

The disparity between the various authorities involved with vague scope of responsibilities need to be critically addressed to ensure effective and efficient protection of the tower houses whereby for example, The Ministry of Construction and Road which assumes no involvement with any development within the old city of Sana'a.

The challenge arises when these processes accommodate both old and new features with a creative solution in response to the historical style of the interior and exterior spaces. The renewal process requires clear phases of planning, along with the guidelines to control the degree of intervention. The redevelopment plan should be prepared by the owner, professional designer architects engineer and local authorities.

6. Conclusion

The practice of adaptive reuse of tower houses in the old city of Sana'a is expanding but faced with the lack of clear and detailed guidelines/construction manuals by the building and heritage authorities. There is also a lack of constant supervision of site inspectors. The current practice allows uncontrolled interventions on the building interiors which may cause serious problems on the century's old building structure.

The study recommends control on the degree of intervention through justifiable choice of adaptations, and the creation of new space must be implemented based on specific building criteria to be supervised by the on-site inspector. This shall cover issues related to the location surrounding and accessibility, the building’s structural capacity, and space functional layout. The regulation shall also encourage minimal intervention as possible; specify standards for new facilities installation of electricity and plumbing whilst maintaining the original building fabric.

The building authority has the responsibility to formulate new systematic implementation guidelines for conservation and adaptive reuse specifically for the tower houses by stipulating the criteria relating to the building limitation and possible types of function with minimum intervention. Besides, the process to obtain the building permission must be clearly indicated in the application form with elimination of overlapping scope of responsibilities between the different authority departments. A manual guideline should also be provided for owners willing to commence conservation on the houses in order to create awareness of building defects, degree of intervention and installation of new facilities. All this will promote lesser unregulated intervention while providing guidance on better practice of adaptive reuse and conservation of the houses in a sustainable and authentic way.

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