ADAPTIVE RE-USE AND URBAN REGENERATION IN DHAKA - A theoretical exploration

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Abstract

At a time, when there are world-wide calls for sustainable building design and construction focusing on building adaptation and remodeling rather than demolition and replacement, a local system of remodeling and functional adaptation has been applied in many residential and commercial buildings in Bangladesh. Focusing on case studies in Dhaka city where major urban regeneration takes place, building adaptation is an emerging practice where economy has a critical role to play in convincing client, users, designers and builders to encourage the local method of adaptation process to suit the changing need of the occupants.

A case of adaptation of a residential building has been studied to generate an understanding of the local adaptation process. This process is found in many parts of the inner city built environment, which collectively affects urban regeneration process and reshape the urban form of the city and its edge condition. Findings from the exploratory studies suggest that despite the absence of Habraken's support-infill knowledge, the local practice of adaptation can be institutionalized as a sustainable building development process that is more economic and place-responsive approach than rebuilding.

Keywords: *Adaptability, Habraken, Urban Regeneration, Urban Form, Sustainable.*

INTRODUCTION

This paper is an upshot of an exploratory study of the contemporary trends and practice of urbanization process in Dhaka, capital of Bangladesh, where building adaptation is a growing trend and a method popular among business entrepreneurs. Adaptive reuse is considered to be one of the several methods of urban regeneration. Despite the common process of building demolition and rebuilding being popular methods of increasing density and transforming land uses, adaptive reuse has generated an interest of making perpetual signature of landmark buildings – a desire for both architects and new users, such as, private banks, restaurants, customer services of key mobile phone companies, corporate offices, boutique shops, and guest houses.

RESEARCH QUESTIONS: AIMS AND OBJECTIVES OF THE EXPLORATORY STUDY

The exploratory study which is discussed in this paper highlights the underlying notion and praxis of local adaptive reuse. The paper attempts to respond to several research questions by ways of theoretical underpinning of the subject of adaptable design; its effects on urban regeneration; historical reasons for the emergence of adaptive reuse in urban development; and economic and environmental benefits of adaptive reuse.

The research questions, which reflect the aims and objectives and are central to the exploratory study, are:

- Why adaptive reuse is becoming attractive to architects and corporate clients?
- Why the praxis of adaptive reuse sustains in

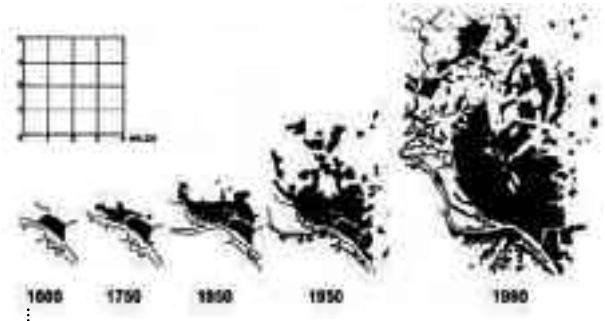

Figure 1. Dhaka transformation (source: Shankland and Cox. 1979, 1981 and 1981a)

Figure 3. High rise high density urban form – a major regeneration in residential district of Dhaka (source: Google Earth. 2006)

the changing market of real estate where adoption of high density new development is a growing trend?

- What are the tangible outcomes of adaptive reuse in urban design and development of the city as a whole?
- Is there any potentiality of the local adaptation methods to be institutionalized?

To seek for the answers to the research questions, a closer look at the urban regeneration of selected part of Dhaka city is taken as a case of analysis where building adaptation is seen as a proponent of generating new urban forms and edge condition for the city .

Figure 2. Low-rise and low-density – potential for redevelopment or adaptation (source: Abul Abdullah. 2005)

Figure 4. New edge condition after redevelopment (photo courtesy: Abul Abdullah. 2004)

RESEARCH CONTEXT

Dhaka city has been in a process of transformation (figure 1) due to the demographic shift (Mahtab-uz-Zaman et al. 2000); emerging real estate market and the globalization of trade and production. These have generated rapid inner city regeneration by way of redeveloping low rise and low density built forms (figure 2) into high rise and high density built forms (figure 3, 4, 5 and 6).

Figure 5. New edge condition after redevelopment (photo courtesy: Abul Abdullah. 2004)

Figure 6. High rise-high density edge (photo: author. 2006)

BACKGROUND TO HISTORICAL REASONS FOR ADAPTATION

Theoretical underpinning: Adaptive Reuse

Burchell and Listokin (1981) defined adaptive reuse as a process of revitalization that utilize a sequence of simultaneous methods of planning, making inventory, acquiring, managing and reusing surplus of abandoned real estate. The land or building which is being considered for adaptive reuse had a previous use that is no longer suitable and profitable in the current economic environment, thus require demolition or rebuilding. By adaptive reuse, potential value of the property can be maximized by infilling new use and adding aesthetic value while retaining its structure and character. Adaptive reuse fundamentally responds to the changing real estate market, economic demand, and need of new land uses in a city, all of which collectively bring vitality to the city.

Arrivals of new gadgets, information technology, electronic transaction, new appliances, modern interior finishes are demanding spaces that embody state-of-art interior design and innovative space planning. The inclusion of new space standards is easy to accommodate within the existing structural framework by fit-in process and retrofitting existing fabric and structure. Although inclusion of new elements reflects rising expectations that is often costly, but failing to respond and accommodate such changes is costly as old fabric is difficult to maintain and generates low rental values while maintaining high land value and tax. Obsolete facilities, such as, antiquated, old fashioned and out of date infrastructure and services attached to the old buildings remain as burdens on their owners and users (Iselin D. J. & Lemer A. C. 1993). The presence of out-of-date electrical networks and service systems poses additional cost to maintain and rather demand for demolition. Retrofitting is seen as one of the options that categorise the adaptable building as 'green' building by extending the life span and reusing the embodied energy of the structure.

SUSTAINABLE ISSUE OF BUILDING LIFE CYCLE IN ADAPTIVE REUSE

The life of a building is considered to be the economic life, reflecting the time frame during which the asset is able to make a positive contribution to the financial position of its owners, both present and future (Ballesty S. & Orlovic M. 2004). Myers and Wyatt (2004) stated that sustainable urban development means the significance of the inert values of building stock as referred in terms of economic, social and cultural capital that should not be neglected. Adaptability refers to the ability of building structures to contain significant transformation to accommodate changing need of users, over the course of a building's lifespan. This change is essential as evident from social, economic and physical demand, and in the needs and expectations of occupants. When a building is more adaptable, it will be utilized more efficiently, and remains in use for a longer period of time at

lower cost and improved environmental performance (Russell P. and Moffatt S. 2001) than would be the case if demolished and replaced. Therefore, the life span of a house reflects the changing needs of the inhabitants as they continuously refurbish and readjust their living environment (Premius H. 1993).

As building design and development process is regarded as complex, non-liners, and uncertain, and also involving both natural processes and human values (Lifson M. W. and Shaifer E. 1992), adaptive reuse reduces the complexity of time, cost and energy. The concept of adaptability originates with the idea of simple strategies, such as, Flexibility, or enabling minor shifts in space planning; Convertibility, or allowing for changes in use within the building; and Expandability,

(alternatively shrinkability) or facilitating additions to the quantity of space in a building (Habraken J. 1972). In practice these strategies can be achieved through changes in design, and through the use of alternative materials and technologies.

URBAN REGENERATION AND IMPLICATION OF ADAPTIVE REUSE

Adaptive reuse has become a popular and widely accepted strategy in architectural conservation and urban regeneration. In America, it has developed from the concept to industry creating 24 billion dollar tax per year (Diamonstein B. 1986). Adaptive reuse of old buildings has demonstrated the probability of extending and maximizing the hidden value of real property and provides a process for re-employment in terms of building remodelling for new uses, creating new tenants and employment, and recreating business opportunities adjacent to new uses (Burchell R. W. and Listokin D. 1981). In case of adaptable reuse in Dhaka, a market for specialist construction workers have been generated with the skill and knowledge on various techniques involved in remodelling works. Adaptive design process is seen as a strategic tool to revitalize neighbourhoods and renew dilapidated urban areas as part of regeneration objectives. Adaptive reuse focuses on enhancing the vital attributes of a building by increasing the value of the reused property and, thereby, generating additional government revenue and stimulating local economy, which otherwise cannot happen in old and unused buildings (Latham D. 2000). Adaptive reuse significantly changes the neighbourhood profile by adding new residents and commercial tenants to run down neighbourhood and triggers renovation or development of the surrounding infrastructure (Zielenbach S. 2000), although most sociological studies downplay or ignore the theoretical stance that building conversion and adaptive reuse are significant factors in neighborhood transformation (Grogan P. and Proscio T. 2000; Greenberg M. 1999; Kromer J. 2000).

Burchell and Listokin (1981) also speculate that the conditions of a property and its building features should be considered in the decision making process of selecting a reuse outcome. According to them, residential conversion is the best option for good structural conditions as seen in many instances in the residential properties in Dhaka, which were built in strong load bearing structures that can easily be remodelled. Economically the process of adaptive reuse helps to capitalize the inert value of the property and use that value to extend the life span of the building.

Mallach (2006) pointed out several attributes as prerequisites to a successful reusable potential of an adaptable building, such as, the size of the building; the architectural or historic quality of the building; character of the building relative to potential market demand; and recognising the environmental implication of adaptive reuse. Urban regeneration process is inevitable in a city due to the demand for revised density and function. Demolition without remodeling requires very high leverage on energy use and wastage of embodied energy.

CASE OF DHAKA MEGA CITY AND URBAN REGENERATION

Dhaka city reached mega-city status having population of 15 million seeking housing increasingly on 304 square kilometer of land. Urban regeneration is the only method being adopted to accommodate additional population that supports the underlying arguments of Simons and Choi (2010) that the redevelopment activities of underused properties

Figure 7. Office converted from residential building (source: STS Holdings LTD.)

Figure 8. Main road of diplomatic zone is regenerated into commercial zone making a new urban edge condition (source: http://www.skyscrapercity.com, accessed on 28 December 2010)

are caused by demographic changes of neighbourhoods (Burchell R. W. and Listokin D. 1981; Mallach A. 2006 and Mian N. A. 2009). Higher density housing through remodeling is seen as a strategic development option (Mahtab-uz-Zaman Q. M. 2003), although evidence suggests that underused public lands could be utilized efficiently to accommodate additional number of population. It is also profitable for land owners to invest on land by pulling developers in partnership with them, which allows robust development on the potential land (Mahtab-uz-Zaman et al. 2000). Government can enforce land and property tax to instigate productive uses on under-used land and properties.

There are reasons for remodeling as seen in the case of Dhaka, which are:

a. locational advantage;
b. land owner resistance in establishing partnership with developers, as land owners often being immigrated to overseas countries leaving no one to look after their properties;
c. corporate offices offers high-end rent and deposits to land owners;
d. high income on limited investment as most of the redevelopment is being carried out by the corporate offices or banks;
e. land can be retained by the land owner for a longer period of time which would allow owners to explore more options, such as, high return on low investment through developer-built houses or corporate offices.

CHANGING ECONOMY AND EMERGING SERVICE SECTORS

Bangladesh has been in a process of moving into service sector by generating banks and retail outlets, which aim for central location in the city for corporate advantage and demands. Private Banks emerged as a response to the increasing export-led businesses and manufacture industries in the country, which demands for more office spaces in central locations, thus, creating pressure for land and building re-adjustment. This re-adjustment is causing land price to increase and create pressure for residential spaces to move out and make way for commercial buildings being economically viable (Figure 7 and 8).

CORPORATE IDENTITY AND ADAPTIVE REUSE

Buildings reused for banks and private enterprises are taking advantage of the adaptation method. This process originated mostly from one or two storied residential building with ample surrounding open spaces. In order to sustain images in the corporate market, banks and private enterprises use these residential buildings taking advantages of landscape and parking spaces (Figure 9 & 10).

Figure 9. Adaptive reuse of residential building as bank (source: http://vdlbd.com/mprojects.html, accessed on 20 December, 2010)

Figure 10. Closer look at the adaptive reuse as bank (source: http://vdlbd.com/mprojects.html, accessed on 20 December, 2010)

REASONS FOR EMERGING MARKET OF ADAPTIVE REUSE IN DHAKA

There are advantages to the adaptation process, as seen by the developer and lease holders:

1. It is cheaper to remodel than demolish and reconstruct the entire building to remain functional,
2. As corporate offices demands for individual identity and independent space, these offices find lower cost to invest on remodeling than buying small space in high-rise office buildings,
3. Land owners receive high profit on 'no investment' as the remodeling is being carried out by the corporate offices themselves,
4. Landscape can be an additional element of attraction for the corporate offices, which enhances the image of their corporate identity,
5. Building users or corporate office users have full to partial control over the design development of their premises, which supports the notion of Zeisel (Zeisel J. 1984) where 'user-needs' gaps can be lessen to a greater degree,
6. Extending economic life of building is seen as sustainable (Civan I. 2008).

Observing the local practice in Dhaka and by interviewing few architects engaged in the adaptive process, adaptive buildings are economically lucrative due to the lower development cost. The various methods of saving the development cost are: a) removing the cost of building demolition and clearance of the site; b) lowering the design; structural, materials and civil engineering cost by reusing the old super-structure, services and foundation; c) minimizing the redevelopment cost by shorter construction time and downsizing construction related workers (in most of the cases, a soft changes in structure were applied); d) fast recovery of investment due to shorter construction process; and e) lowering interest on loan or capital investment.

ZONING LAW AND INSTITUTE OF ARCHITECTS FAVORING ADAPTATION PROCESS

Professional Institutes in Bangladesh begin to recognize the importance of adaptive reuse as evident in one of the jury citation of adaptive reuse of office for Syngenta (BD) Ltd. at Lalmatia, Dhaka, Bangladesh (Figure 11a & 11b).

> ***Jury Citation:*** *"An ordinary residential building has been dexterously converted into a well-integrated building with a simple well-proportioned four-storied exterior, housing two extremely different uses. Structural clarity, a welcome restraint in the use of materials, careful detailing, a good understanding of the techniques of modulating spaces permeate through both the sections, setting a strong single theme. ……."– Excerpts from Institute of Architects Bangladesh Jury Citation.*

CORPORATE HEAD OFFICE OF

Figure 11a. Award winning adaptive reuse (OFFICE for SYNGENTA (BD) LTD at Lalmatia, source: Taimur Islam and Homaira Zaman, 2001)

Figure 11b. Award winning adaptive reuse (OFFICE for SYNGENTA (BD) LTD at Lalmatia, source: Taimur Islam and Homaira Zaman, 2001)

Figure 12. Satellite Picture showing major arterial road where adaptive reuse is common (source: Google Earth 2010, accessed on 28 December 2010)

Figure 13. Major road where adaptive reuse brings pleasant environment having spaces for landscape (source: Faruque Abu Sayed, 2005)

Figure 14. Premier Bank adaptive reuse from residential building (source: http://www.premierbankltd.com/html/branches/branch_gulshan.htm, accessed on 20 December 2011)

SYNGENTA BANGLADESH LIMITED AND FOUNDATION SCHOOL DHAKA, 2001

Quote from Architect Taimur Islam: „Working within a very compact design brief, the architects had to make calculated interventions in an existing building to create a number of focal points accentuating different architectural elements such as entry, court, lobby, circulation, etc. ....."(Source: http://www.worldviewcities.org/dhaka/environmates.html, accessed on 30 December 2010, 19:57 GMT).

Further zoning law, as stated in the Building Regulation Act 2005, favors conversion of residential into commercial use only in the cases where

Figure 15. Interior design as strategic tool: Premier Bank (source: http://www.premierbankltd.com /html/branches/branch_gulshan.htm, accessed on 20 December 2011)

land uses are located along the major roads. Figures 12 and 13 indicate significant road network and changing urban edge condition.

INTERIOR DESIGN AS A MAJOR STRATEGY IN ADAPTIVE REUSE

Interior design plays a major role in the refurbishment of converted structure (Figure 14). It is the responsibility and skill levels of the interior designers and architects, which produces corporate images of the clients (Figure 15).

LOCAL METHODS OF ADAPTIVE REUSE

For most of the cases of remodeling being carried out, the original construction method poses challenge in reconstruction works as buildings often are made of load bearing construction walls.

Architects use innovative ways to apply adaptation methods (Figure 16 to 19), such as,

1. Underpinning method to infill frame structure within the load bearing structure,
2. Soft to hard changes to existing load bearing wall depending on the spatial planning,
3. Infill of additional services, such as toilets and fixtures,
4. Partial demolition of roofs to create double height space in the main lounge and lobby, and
5. Precast and prefabricated stairs to connect to various levels of space being created by remodeling.

Remodeling of old buildings allows lower wastage of materials and enhances higher reusable capacity of the existing materials and spaces.

It is a common practice to reuse the demolition waste for pavement and parking spaces. Remaining construction waste is taken to other construction sites for land filling. By doing this, cost of building for new use can be minimized as seen in the case of two adaptive reuse cases: Mobil House in Gulshan and Syngenta (BD) in Lalmatia. Architects involved indicated an approximation of the cost components of adaptive reuse:

1. Cost of demolition – labor cost (minus demolition waste, which were sold to other land fill site);
2. Cost of architect, engineers, surveyor, contractor and estimator fees (20% less than new building design);
3. Cost of new materials on same building volume and footprint (30-40% added to old structure)
4. Cost of electrical and plumbing repositioning (30% more that a new building construction due to increase of lighting, appliance, gadgets, air-condition, additional toilets and fixtures);
5. New landscape and parking layout (new cost added to the total cost)
6. Cost of planning permission for change of use and layout of the building (similar to the cost of a new building design)

Above costs are indicative of the actual cost incurred in the adaptive reuse. The remodeling cost is approximately 30% less than the cost of new comparable structure at the current market price in 2005 (source: Architect Mahbuba Haque). In these cases, land price was not included as the owner

Figure 16. Existing Residential Building (source: Mahbuba Haque. 2006)

Figure 17. Conversion of the same residential building into corporate office (Mobil House) (source: Mahbuba Haque. 2006)

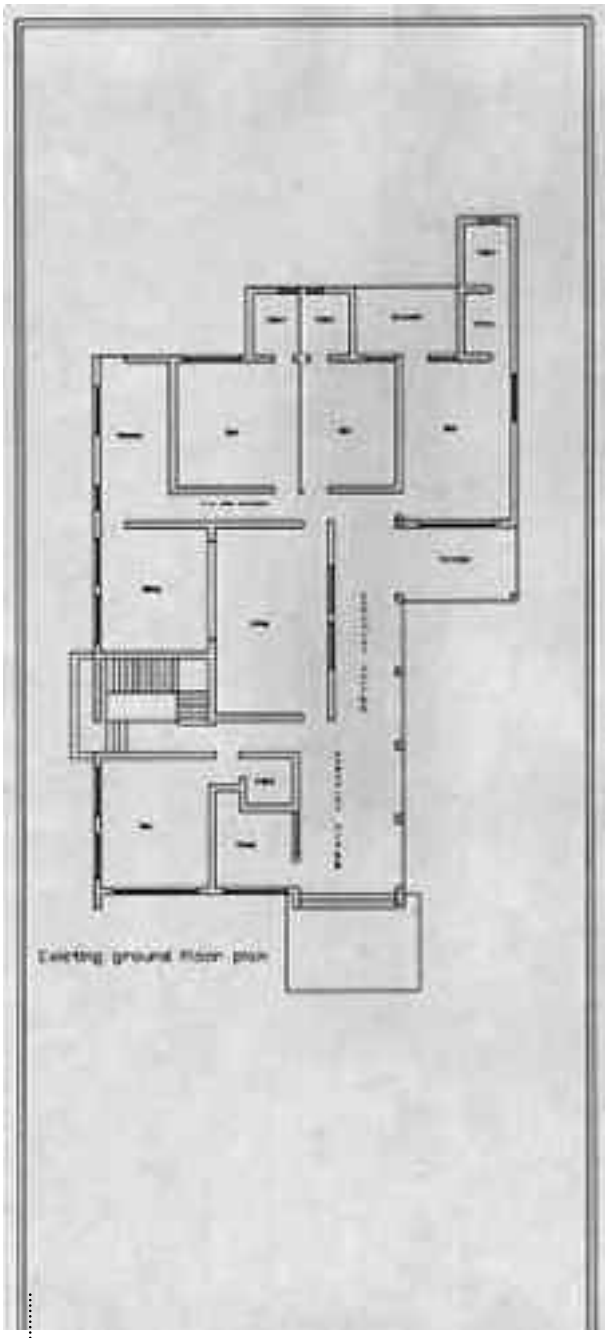

Figure 18. Existing Plan of residential building (not to scale) (source: Mahbuba Haque. 2006)

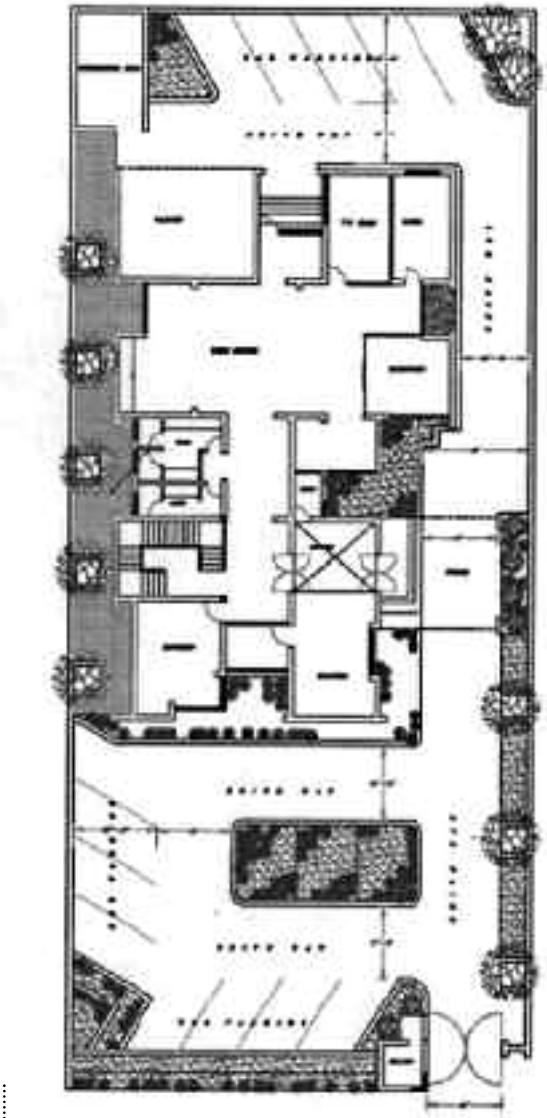

Figure 19. Converted Plan of Mobil House (not to scale) through adaptive reuse (source: Mahbuba Haque. 2006)

Figure 20. Conversion of residential building (source: http://kevinbangladesh.spaces.live.com/, accessed on 20 December 2010)

retains the land ownership until the market shows high return on investment.

SIGNIFICANT OF THE CASE STUDY-LESSONS FROM LOCAL PRACTICE

Adaptation of structures to new uses plays significant and diverse role in urban change reflecting on social, economic and cultural revitalization of cities (Dickinson J. 2004).

The case study illustrated in this paper raises number of issues addressing urban values, such as,

a. Environmental sustainability
b. Economic benefits
c. Urban environment
d. New urban edge condition
e. Green building initiative

a. Environmental Sustainability: In case of Dhaka, old structures contain materials with high embodied energy and cost (adding inflation cost), which can be preserved and recycled. Extending the residual life of existing buildings indicates the notion of sustainability by lowering material, transport and energy consumption and pollution (Bullen B. A. 2007; Douglas J. 2002).

b. Economic Benefits: According to 'American National Trust of Historic Preservation' conference in 1976, discussion held on the likelihood of rehabilitating old building can save 1/4 to 1/3 cost compared to that a new one (Qingquan L. 1995). In Britain, evidence shows a 50-80% cost saving compared to new construction (Highfield D. 1987). A successful adaptive reuse should be less costly than rebuilding comparable volume of structure, as demonstrated in the cases in Dhaka.

c. Urban Environment: By conserving the low rise buildings along the main road, a degree of visual relief is being created. Most of the adaptable buildings have greeneries and open space which serves collectively as breathing space. This coincides with the new building regulation of Dhaka city, which strictly stated the need for keeping designated open space for greeneries and for ground water recharging. Bromley et al. (2005) and

Figure 21. Heritage Restaurant in Gulshan: converted from Residential building (source: http://kevinbangladesh.spaces.live.com/ accessed on 20 December 2010)

Balaras et al. (2004) advocated that the existing building stock has the greatest potential to lower the environmental load of the built environment by way of reducing construction related pollution and avoiding loss of potential embodied energy old buildings posses.

d. New urban edge condition: A series of adaptable buildings together with newly built multi-storied buildings create a variety of urban edges that are aesthetically enriching and help break monotonous skyline (Figure 20 to 22).

e. Green Building Initiative: Adaptable reuse of building maintains a process that relates to green building practice elsewhere and require calculations against the established international parameters. The number of adaptive reuse is not high compared to new building construction in Dhaka. However, looking at the scale of selected adaptive reuse buildings significantly pointed out on the aspect of structural solutions which required efficient and innovative engineers. In most of the cases, structural engineers paid attention to tailor-made structural solutions to accommodate new structure within the old fabric. Therefore, reusing the old structural system is a challenge for engineers and architects. It extends the service life of the materials and reduces environmental impacts by reusing embodied energy.

IMPLICATION OF THE CASE STUDY

In mid-1980, 80% of American architects have reported to have engaged in adaptive reuse, which is the evident in their practice; and in Europe, rehabilitation and re-use of old buildings also became a major element of construction activities (Wilkes J. A. 1998); While in the west, adaptable design has been transformed from a trivial practice to a full-grown industry, local inventiveness of adaptable design in Bangladesh is a budding industry. Adaptive building is a collective endeavor from architects, entrepreneurs and land owners. Fundamentally, adaptive reuse in architectural praxis demonstrates an underlying relationship between a building's outer structure and its internal

Figure 22. New urban edge condition (source: Baggins David (2008))

program of spaces, relationship of which must be flexible and dynamic if salvage is to transpire (Banham R. 1986).

WAY FORWARD - LESSONS FOR FURTHER RESEARCH

Adaptive reuse is recognised as an effective way of maintaining the sustainability of existing buildings (Ball R. 1999; Brand S. 1994; Pickard R. D. 1996; Kohler N. 1999; Latham D. 2000; Cooper I. 2001; Kohler N. and Hassler U. 2002; Douglas J. 2002). To create opportunity for a local industry on adaptive reuse to flourish, incentive from government is a pre-requisite that may emerge in the form of a) lowering land and building tax for adaptive reuse; b) tax holiday; and c) low interest loan for rebuilding and remodelling purpose. It is also imperative for architects and developers to establish showcases for adaptive reuse that can demonstrate environmental benefits; economic gain; urban improvement through regeneration – all these will create enthusiasm, confidence and endorsement from both public and private sectors. To receive further support from the community requires adaptive reuse of buildings to play a major role in the sustainable development of communities, evading the common practice of wasteful demolition and reconstruction and to allow the society to enjoy the benefits of adaptive reuse (Department of Environment and Heritage. 2004). Adaptive reuse can turn unproductive property into valuable and useful community resources and substantially reduce land acquisition and construction costs, revitalize existing neighbourhoods, and help control. Bullen (2007) stated through a survey that adaptive reuse is a method for achieving sustainable development, which is illustrated in the findings that environmental sustainability, heritage significance, and effectiveness in meeting sustainability benchmarks of the building are the significant aspects that should be judged throughout the decision-making process for achieving adaptive reuse projects. Therefore, need of research is imperative on the issues, such as, measuring material sustainability; embodied energy calculations; advanced soft and hard alterations techniques derived from architects and builders' various cases.

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