An appropriate high-rise in Vietnam

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Declaration

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Signed
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INTRODUCTION

Currently in Vietnam there is an increasing demand for building and housing. Many high-rise housing developments have been built recently and continue to be constructed. This dissertation will not address the question of whether the high-rises should be built or not, it will focus on the question: What is appropriate high-rise housing in Vietnam?

The Vietnamese economy is growing rapidly leading to some sudden social and cultural changes. It is important to be aware of the Vietnamese context.

A. Historical and economic
• The economic situation:

From 1990 Vietnam economy has rapidly developed. The annual GNP (Gross National Product) improvement is 7.5%, the highest index among ASEAN countries and the economic improvement rate is 8.4% (approximately level with China’s).

Between 1975 and 1990, Vietnamese policy was “closed door” to allow the country to recover after the war. As a result, there was little investment from foreign countries. From 1990 the government has carried out a policy called “open door” so that foreign investment hasskyrocketed. In 2005 the GNP was up to 5.8 billion dollars with 771 projects from 42 countries around the world, an increase of 30% compared with the sum of the previous year. But local investors also play an important part in the progress of construction.

Marc Townsend, the managing director of CB Richard Ellis (CBRE) in Vietnam, says market demand will open more opportunities to investors who will eventually rush to build office blocks. “I believe domestic investors will play a major role in this movement, especially with small investment projects capitalized at US$2-6 million. Their biggest advantage remains with their owning land to build the project; all they need is capital and they will certainly find it under the current circumstances.”

The increase in development of high-rises in Vietnam is a result of a number of factors: the exceedingly high population, the fast growth of the economy and investment market, the demand for office space and the fact that more people can afford to purchase their own housing.

Since 1990 several tall buildings have been built. Most of them are housing, hotels and offices for lease. Currently the tallest building in Vietnam is the Saigon Trade Center in HoChiMinh city with 34 storeys. The increasing demand for offices and housing in high-rises has prompted investors, both local and foreign, to develop new projects. The success of the Vincom City Tower, which has turned a plot of wasteland in Hanoi into a profit-making office complex, has stimulated many landowners in the city. Recently, a licence was granted to build the Hanoi City Complex, a 65 storey high-rise project in Hanoi that will be office buildings and a commercial centre.

In Ho Chi Minh City the e.Town building owned by the REE Joint Stock Company leased all its 30,000-sq.m office space in two months. Binh Minh Trading and Import Export Company (Bitexco) has plans to invest US$90 million in a 60 floor tower. This will be a complex of offices, residential and service centres.

The city plans to build 100,000 tenements in the next six years, including 70,000 units for low in-

come workers, students, new settlers from site clearance projects and migrants from local provinces.

But most current tall buildings are poor quality. Nearly every one of them has been designed in the shape of a glass box. They are not appropriate for the hot tropical climate of Vietnam.

B. Environment and climatic
The Vietnamese climate is humid tropical with a monsoon season. There are two main seasons:

Rainy from July to December and Dry from January to June.
The rainfall is very high, especially in the rainy season. The annual rainfall in Vietnam is 2000mm (Melbourne is 660mm). It is very hot in the Dry season with high radiation levels. The average yearly temperature is 27°C (Melbourne 19.8°C).

There are three main wind systems:

- Wind from Asian continent (west): hot and arid. It is active in the dry season.
- Wind from Asian continent (north): cold and dry. It is active in the rainy season.
- Wind from Pacific Ocean (east): cool and humid. It is active in both seasons.

C. Social and cultural

1. Housing type: There are two main housing types

   - Row houses: The most common type with standard plan size is: 5m x 20m; height: 2-5 floors. The ground floor is usually used for trading purpose (small business).
   - Flats: There are a wide range of sizes and costs and these have sharply increased in number recently.
     - Flats for relocated people.
     - Flats for low income bracket.
     - Flat for medium income bracket.
     - High standard flats.

2. Family type

   - The most common type is the three generation family. This is a traditional family structure.
   - Couples with children is a standard family type for the young.
   - Couples without children or singles are considered a new type of family.

3. Cultural activities

   - Office work is the most common.

Typical row house in Saigon with 3.9 wide facade.  

• Retail along streets (small business): variety of trading types.

4. Lifestyle and living habit
• People are always busy and the streets crowded. Face-to-face contact is very important in social life.

For many reasons, most high-rise housing has a hotel structure in which the communication is limited by a lack of common space. This is not appropriate in the Vietnamese context where traditionally people live in a close community with high rates of contact and communication.

High-rise buildings are isolated within the surroundings. There is a lack of space for cultural activities such as street vending, shift-shopping, motorbike parking and market streets.

The total floor area of a standard apartment in a high-rise is usually small, around sixty square meters with one or two bedrooms. It is not appropriate for the multi-generation family, which is the most common type in Vietnam. The floor area in student housing is tiny. Reports have been submitted to the government and some of them noticeably increase the average area per person. However the dwelling is not really felicitous in structure and students do not have enough common space for their activities.

*Standard high-rise apartment in the north of Vietnam. Standard household is around sixty square meters.*

1. Dang Thai Hoang, Housing Architecture, Construction Press, Hanoi 1996
1. The Vietnamese context

Before starting the first study, a preliminary observation of the existing condition of high-rise housing in Vietnam was performed. Also, precedents were catalogued as a reference tool to assist in the designing process. Analyzing the existing context showed that most high-rise buildings are covered by glass surfaces and clad with aluminium-framed fixed glass. These materials are expensive and not suitable for the climate: hot and humid.

Initially the research process was aimed toward exploring a possible high-rise model that well adapts to the climate, a kind of bio-climatical skyscraper: big and green, like Ken Yang’s work.

After that, deeper investigation into existing economical, social and culture factors was carried out. These factors included living habit, household structure, community structure, cultural activities on pavements.

Furthermore, aspects of the Vietnamese site were compared with a foreign context to identify the most specific urban characteristics. These are classified below.

1. Cultural activities on pavements
   a. Shopping street
   b. Shift shops, peddling
   c. Motorbike parking
   All of the activities create a high density environment with a high rate of communication.

2. Household structure
   a. Multi-generation family: three-generation family is a common type.
   b. Traditional row house structure.
      • Interfacing with the street.
      • Functional spaces are divided by elevation.

3. Close community structure
   This closer observation of the existing urban condition highlighted many problems with existing high-rise housing that need to be addressed. Most existing dwellings in block towers are small and not appropriate for a three-generation family. Apartment floor plans are designed according to conventional hotel structure, which result in a lack of common space and limited spatial communication. Furthermore, the base of existing towers, especially the ground floors is reserved for reception purposes. These spaces are huge and only serve the building so there is little opportunity for contact with the street and adjacent buildings.
2. Project methodology

This thesis was developed by the strategy of testing and augmenting three designs in three different sites. Although these designs differ from each other in terms of context and applied techniques they all have the same purpose: to address the question of the appropriateness of high-rise housing in Vietnam. The first two are framed as preliminary test cases, developing principles and identifying limitations which lead to the design project in South Saigon.

The first case study, Quang Trung square, identifies the key issues to be explored. It also sets up the methodology. By analytical observation of existing urban context, some issues of appropriate high-rise were raised. Furthermore, research on the precedents of sustainable high-rise around the world, especially Ken Yang’s work, was utilized as a tool for searching for solutions and expanding knowledge of research interests. Some design strategies and applicable techniques were identified. However, not all of the issues raised were addressed completely.

The second case study as a point of comparison was in Richmond, Australia. The key issues were examined in a foreign context with different cultural, social and climatic conditions. This is a mediating case study, in that it assisted in identifying characteristics particular to the Vietnamese context.

This is the hinge of the research process. The design strategies were tested and challenged in a different context suggesting some creative techniques which will be applied in the final project.

The final project is back to a Vietnamese context, in RMIT Saigon South campus. The purpose of the project is elaborating and addressing the issue of high-rise housing in Vietnam. In this stage, the understanding of Vietnamese urban characteristics and the design strategies developed during the first two test cases were used to address the question of appropriate high-rise housing in Vietnam.
I. CASE STUDY TESTS
A. QUANG TRUNG SQUARE CASE STUDY
1. SCENARIO

Tran Hung Dao Square is in the centre of Ho Chi Minh City. Ho Chi Minh City, or Saigon, is a 2100-square-kilometre city with a population of over six million (2004).
The specific cultural aspects and the high density population (2,894 people per square kilometre) both influence the living style. Ho Chi Minh City is characterized by:

- High rate of communication with shopping activities on streets. Shopping activities include anything from buying everyday goods to electronics or renting a DVD.

- The pavement is crowded with various activities such as: peddling, eating and drinking, drawing on the walkway, playing chess and the elderly doing exercises in the early morning.

1. Peddler on the pavement: selling tamarine
2. The elderly do the exercises on the street (at dawn)
3. Shift shop selling food, usually for breakfast and lunch
4. Playing chess on the pavement, under a tree

A hat shop along the pavement. It is hard to see where is the entrances. All of the showing materials create the shop frontage.

Consecutive small scale shops create a lively shopping street. From left to right: coffee shop, hardware store, jewelry and eyeglass shop.

This is not only a video rental spot but also a place for people to gather and chat. Just some plastic chairs are needed and the conversation starts.

A clear view shows the traditional occupation on the street side: on the left is the frontage shop fronts, in the middle is the walkway with peddling activity and on the right is motorbike parking area.
Furthermore, retail shops on the street are also places for everyday activities such as meeting, greeting, chatting etc. Furthermore, the retail shops on the street are also the places for such everyday activities as: meeting, greeting, chatting etc.

- Close community structure: This is a group of about 20-25 households (150 people) in close contact. This community is small enough for there to be an intimate connection between the households and most of the residents know one another. A number of everyday activities are communal such as morning physical exercise, hiring a DVD for relaxation. Also some everyday

1. Various activities on the pavement: eating, drinking, paddling, parking etc.
2. Shift shop on walkway: selling drinks, food, etc. just some plastic chairs

A RESIDENT QUATER CONSISTING OF TWO CLOSE COMMUNITIES

1.VARIOUS ACTIVITIES ON THE PAVEMENT: EATING, DRINKING, PADDLING, PARKING ETC.
2.SHIFT SHOP ON WALKWAY: SELLING DRINKS, FOOD, ETC. JUST SOME PLASTIC CHAIRS

View 1: from street looking into the entrance of a resident quarter
View 2: Here is a shared space. It is used as a place for breakfast or morning coffee, a kind of shift shop
View 3 (bottom-right): The view from the resident area toward the street
needs are serviced within the community such as, breakfast, coffee, fresh food, and everyday goods.

Ho Chi Minh City is in the south of Vietnam, near the equator. The weather is hot and humid all year round. The average temperature is 27°C and the average humidity is 80-87%. The main wind comes from the south east across the Pacific Ocean so it is cool and wet. The average wind speed is 2.7 m/s.
2. DEPARTURE

Urban population explosion has pushed the need for housing up. Many high-rise apartments have been built and sold quickly. People prefer flats in high-rise housing because land prices in the inner city are high. The trend toward apartment towers in Vietnam continues.

However, new built high-rise apartments are not appropriate in the Vietnamese context. There are many examples such as the Saigon Center (27 storey), Diamond Plaza (21 storey), Saigon Tower (17 storey), Renaissance River Side Hotel (20 storey), Saigon Trade Center (34 storey), Sun Wah Bank tower (22), Caravelle Hotel (24). Most of them were designed by foreign architects in an internationalist style. The buildings are covered by glass, use central air conditioning, have a hotel structure and do not consider environmental impacts. High-rises designed by local architects consider the need to

1. Hanoi complex, office for lease and apartments
2. Saigon Trade Center, Ho Chi Minh City, 34 storeys
3. High-rise apartments in Hanoi, Hotay lake side
4. Saigon Center, Ho Chi Minh City, 27 storeys
create living spaces large enough for the multi-generation family. But most of them still follow the hotel structure which does not cater for the traditional living habit. Households are linked by a communal corridor and there is no space for common activities. Neighbours cannot maintain the close relationships characteristic of the traditional community. People are isolated and hardly know each other. The fact that tenants do not have much opportunity for contact means the rate of communication is far less than it in a traditional townhouse.

Possible models for high-rise housing appropriate to Vietnam in terms of living habit, culture and climate were considered.
3. THE DESIGN APPROACH

3.1. Creating a close relationship community by packing dwellings in a “five storey community”

Proposed site

Horizontal circulation
The street
Common space

A STANDARD GROUP OF LIVING: A CLOSED COMMUNITY STRUCTURE

Resident group 01
Resident group 02
Common space
Paverment as a common space

ANALYZING THE STRUCTURE

Resident Group 01
Resident Group 02
COMMON SPACE

FIVE-STOREY COMMUNITY STRUCTURE

Resident Group 01a
Resident Group 01b
Resident Group 02a
Resident Group 02b
Communities are put together along the vertical street.

Using ramp to access from residential floors to the common floor.
3.2. Creating a “high rate communication environment” by *forcing circulation*

Households in a five storey community are forced to use the ramp to access to the common level before approaching the elevators which only stop at every five storeys.
3.3. Preserving cultural activities by using an **active frontages strategy**, creating a shopping street by including small-scale shops at the front.

The active frontages tactic involves dividing the lower levels of a tower into small-scale spaces especially the ground floor plan where the building is in direct connection with pavements. This creates a street shopping area and preserves cultural activities on pavements.

*Shopping street with small scale shops*

*Frontages and pavement are the two active factors which create a high density environment*

*No clear boundary between interior and exterior. Ground level of the dwelling acts as a transition space.*

*Standard section crossing the street showing the relationship of the household and the street*
3.4. The interfacing method is applied by creating a walkway with row shops crossing the base of the tower to maximize the possibility of connection between the building and its surroundings. The idea of a crossing strip of shops is derived from the traditional street structure. The section through the walkway reveals the relationship between vernacular shops and the design.
3.5 **Natural climate adaptation** scheme was applied and a linear plan chosen to encourage cross ventilation. The building is cooled by water evaporation. Yearly average temperature is 27°C. There are two main wind systems:

- Wind from Asian continent (west): arid. It is active in both seasons.
- Wind from Pacific Ocean (south east): cool and humid. It is active in both seasons.

Natural lighting and ventilation can be achieved by:

- Orientation of the building to get more direct sun and also cool wind from the ocean and river.
- Dividing the building into two separate towers so it has more faces that directly connect to the environment.
4. Case study DOCUMENT
PERSPECTIVE VIEW showing the proposed shopping street created in the ground floor. Culture activities are carefully preserved.
Glazing is not suitable and the building should be totally open to the environment. To deal with the heat each “five storey community” has its own natural cooling system, water evaporated. In each common level there is a pond on the west side and two ditch systems (water canal systems) along with the two corridors. In the afternoon, the sun radiates heat and makes water evaporate. Cool wind from the river helps the air circulate in the atrium and cool the whole five storeys. A strip of trees near the kindergarten at the east side of the common storey will trap the cool air. In the mornings the east wind will bring cool and humid air from the ocean. This will blow through the space between the two towers and chill the buildings.
Each “five storey community” should have “self-supplied” daily services for its residents. The common level has a large space available for a coffee shop serving breakfast, shops selling miscellaneous goods, a newsagent, video shop, grocery, kindergarten... The elderly can gather on the common level to do exercise in the early morning, play chess in the afternoon, meet and talk in the evening...

The ramp is used instead of stairs to access the common level and the other storeys. It is considered “more sidewalk-like” than a set of steps so it could be more suitable than other types of vertical transportation.
Rework on the square to create an open space serving as a part of the building.

Redesign the walkway to multi levels, more exciting spaces: attracting more people, creating a high density environment.

The pond in the open space: a place for relaxing and recreation.

Footpath in the open space: a place for relaxing and recreation.
5. SUMMARY

Through the observation of the existing context, it is obvious that there are many problems with high-rise housing in terms of appropriateness. This case study raised a number of issues that need to be addressed in order to create an appropriate model for high-rise apartment buildings in this site.

The Quang Trung square case study was an initial step to frame the research question and seek possible answers. Through an analytical interrogation of the existing urban context and the cataloguing of good precedents, this chapter produced some design strategies that were tested and applied in the case study.

However, these issues could not be completely addressed without a deeper understanding of the context in terms of culture, society, economics and climate. Therefore, it is necessary to test the research question in different conditions. This will allow comparison and assist in identifying the most important aspects of the Vietnamese context. This is necessary to clarify the factors that need to be considered when assessing what is and is not appropriate. The foreign site in Richmond, Australia was chosen for the next step of the research process.
1. SCENARIO
*Comparing the Melbourne context*

The Melbourne site for the high-rise housing case study is near the Richmond train station. The city is north west of the site through the MCG. The Yarra River is to the south, Olympic Park on the west side. Some existing high-rise apartments are located to the north. This area of the site is 6,500 square metres (wide:
75m, long: 90m & 120m) and it is adjacent with the Richmond Station. Some urban aspects that affect the design:

- First of all, the west facing row houses area: most of the houses have tall brick fences and big trees in front to protect the façade from low angle sun.

- Secondly, row shops along the Swan Street: most of the shops are small-scale selling a variety of goods from domestic supplies to musical instruments and sporting goods. The space in front of the shop that is covered by the canopy is called the “shopping pavement”. It is a semi-open space and adopted in my case study as a cultural component.

**Standard floor plans and facades of townhouses facing west**

- The retail shops selling food, everyday goods next to station entrance.

- The space in front of the shop which is covered by the canopy is called “shopping pavement”.

- Townhouses facing west with high brick fences and tall trees.

- This is the retail shop, selling many music products even musical instruments.
• Thirdly, the walls of the station are dominated by graffiti. It is a typical aspect of such locations.
2. DEPARTURE

Housing, the context in Melbourne

“The housing affordability crisis has deepened, with Melbourne rents rising at the fastest pace for almost a decade...
A State Government report reveals growing numbers of renters are being pushed out of inner-city areas by soaring housing costs...
The report, by the Victorian Office of Housing, said that only 28 percent of new rental agreements were affordable for lower income households, the worst figure on record.
It is not only renters who are struggling. Other figures have shown it is now more difficult to buy a home than at any time since 1983, after booming prices and four interest rate increases since the previous election.”
The Age

2.1. The proposal is aimed at a particular group of the population: average income bracket and rental purpose.
This apartment is aimed to average income class and for renting purposes. This is a particular group of the population who desire flexibility and variety in terms of models of ownership and use.
Uncommon family types include: blended family (divorced parents and their own children), extended family (migrants), new family types (multi generation family, joint family: a family structure in which grandparents, uncles, aunts and cousins are considered as a single unit living in one house)
Uncommon household types: student rental (shared), corporation housing (multi owners), co-housing (owners + tenants).

2.2. Creating a place that preserves living habits and cultural activities: shopping street
2.3. Encouraging communication and creating a public space for the area. The population density in Richmond is low and there is currently a lack of services close to this site. An increase in services in this area would be beneficial.
2.4. Preserving urban characteristics.
2.5. Adapting the building for the specific climatic conditions. Melbourne has a cold winter so there needs to be a natural solution for keeping heat inside the building. In summer, the building should be opened to create cross ventilation and natural cooling.
Richmond was an appropriate site for the test case for the following reasons:

• The site is a suburb of Melbourne so it is not too expensive
• It is close to the city
• Near public transport (train, tram, bus)
• Near a shopping area
• Next to a huge open space (Olympic Park)
• The apartments will have a view over the city through the park
3. THE DESIGN APPROACH

3.1. Make the apartments affordable: packing the households by creating an efficient structure

3.1.1. Section is a variation of Unite d’Habitation

Because this apartment is aimed at average income class and for rental purposes it is very important to make it affordable. In order to meet this constraint, the floor plans are dense and efficient. As you can see, the section of a standard five storey unit includes two three storey households with shared corridor.

3.1.2. Lift stops at every five storeys: minimize number of elevators

This also means there are only four lift stops for the whole building. As a result one elevator and one staircase is enough for vertical transportation. Household uses its own internal stairs.

Plan of a lift stop at every five storeys with a common space for encouraging communication

Vertical circulation core with only one lift and one staircase

Standard 5-storey unit includes two of 3-storey households with shared corridor.

Lift stops at every five storeys and there are 4 stops for the whole twenty-storey-apartment section.
3.2. Make the building adapt to the social requirements of the particular market by creating flexible plans

This housing test case is intended to cater for various models of ownership and use. In order to meet the requirements of the market the household and the rooms should be flexible and standard.

There are some different options for the standard room:
- Two singles
- One young couple with working space
- One couple with one child
- Elderly couple with their own living room

An example of an apartment for a multi generation family:
- Kitchen and living room on the first floor: shared space
- Second floor has two rooms, one for grandparents’ room and one for a young couple without children (first and second generation)
- Third floor has two rooms, one for a couple and one for two to three children (second and third generation)

These are some arrangements available for other family types:
- One couple with two children
- One couple with three children
- Two couples
- Four singles
- One couple and two singles

The maximum capacity is the household with six bedrooms. This plan is suitable for rental housing or co-housing (owners at second floor, tenants at third floor) and can house up to eight residents.
POSSIBLE ARRANGEMENTS OF THE DWELLING ACCORDING TO THE USING PURPOSES

Parents with two children
Parents with three children
two couples
four adults-renting

STANDARD HOUSEHOLD (COMMON LEVEL)

3rd Floor Plan
2nd Floor Plan
1st Floor Plan

An appropriate high-rise in Vietnam
Household area: 200m²
Average area per tenant: 22m²/capita
Maximum capacity dwelling: six bedrooms for eight people

POSSIBLE ARRANGEMENTS OF A ROOM
- two adults
- couple with working space
- parents with a child
- couples with living room

MAXIMUM CAPACITY HOUSEHOLD

An appropriate high-rise in Vietnam
3.3. Encourage communication by

3.3.1. Creating common space and shared space systems in the building: lift stops and shared areas.

Different family types have their own particular requirements. Multi-generation families include elderly people. Their children go to work and their grandchildren go to school so they feel isolated. They need a place to do some activities such as chatting, playing chess, reading newspaper, having a cup of tea with one another.

As a result, on common levels (7th, 12th, 17th and 22nd), there are two places provided for these activities:

- The lift stop: it is a common space where all the people of a five storey unit can meet, sit back and relax. This space gathers people before they leaving their apartments and encourages them to communicate and get to know each other: aspects often lacking in modern life.

- Shared space: this is more private than common space. It is shared by two of the households and can be directly accessed from either house. This space is used by people who are neighbours and know each other quite well.

3.3.2. Creating a high density environment by including some public services.

These are not only for the residents but also for people living and working nearby: supermarket, restaurants, coffee shops, clubs, gymnasium, a bridge connecting the building with the station etc.

The second and the third floor consist of some supermarkets to serve the approximately 250 tenants of these apartments as well as other people living in the area (there is currently no supermarket close by).

Furthermore at the top of third floor, there is a bridge directly connecting to the station. This helps people access the train station and allows people from the station to use the supermarkets and shopping space before travelling. This makes business more effective.
• The lift stop: it is a common space where all the people of a five storey unit can meet, sit back and relax. This space gathers people before they leaving their apartments and encourages them to communicate and get to know each other, aspects often lacking in modern life.

• Shared space: this is more private than common space. It is shared by two of the households and can be directly accessed from either house. This space is used by people who are neighbours and know each other quite well.

Because elevator stops at every five storey, the density at lift-stop are high. That encourages communication and reduces the number of lift needed.
3.4. Preserving culture activities

3.4.1. "Shopping walkway" along the pavement by creating retail shop area on the ground floor.

Shops in this area are small scale with in-house fittings and signage. They offer a variety of goods and services. The space in front of the shops is covered by a canopy to create a “shopping walkway”. The first floor plan is flexibly separated into small scale spaces that can be merged to create bigger space depending on owner demand. The “shopping pavement” is preserved as an appropriate urban style of this area.

The shop owners will complete this space by adding their own decoration, logos, panels etc. as has been the natural process with the shops already existing there.
The 1st floor plan is formed by shop-strip which is flexibly separated into small scale but can be added to bigger space due to the owners.
3.4.2. Create walking street at the station wall side.

The high walls of the station are a particular characteristic of this area. The street is shaped between a row of two to three storey houses and a wall over 10 metres high. This wall is part of the station and is dominated by graffiti. This “street-like” space also provides essential distance to reduce the noise from the station.

The walls surrounding the station are too high so they need to be decorated. Graffiti is painted on the walls of the station and the facades of many houses in this area.

Graffiti is a visual component of this area. The propose will provide some appropriate spaces for reserving this aspect as a cultural activity.
Feature wall with graffiti

Required distance to reduce the noise

Feature wall with graffiti

Feature wall with graffiti

Walking street

Ground level

Walking street

Walking street

Station
3.5. Make the building adapt to the climate:
Natural climate adaptation strategy

3.5.1. Cool the building in summer
a. Plan to be linear to allow ease of natural ventilation.
   
   b. Using shading devices on the north façade and limiting the openings on the west façade.
   
   c. Domestic photovoltaic system supplies energy for the hot water system. This is set inside the concrete slabs in the south face and will heat the rooms in winter.
   
   d. Building orientation: north-south facing apartment so it gets more sun in winter. Stairs are set into the west side so they block the low angle sun. Each household has a small garden in the west or in the east to serve as a buffer zone, improve the microclimate and bring greenery into the environment.

3.5.2. Maintaining the building’s heat in winter by passive solar system
a. Using concrete slab as a thermal mass. Low angle sun can penetrate into the building in winter so all concrete slabs serving as thermal masses absorb the heat during the daytime and release at night to warm the building.
   
   b. Double glazed windows and well insulated doors and walls in the south facade: keep the heat inside the building.
DOUBLE-LAYER WINDOW CROSS VENTILATION

PHOTOVOLTAIC MODULES

PERFORMANCE IN SUMMER

PERFORMANCE IN WINTER

An appropriate high-rise in Vietnam
4. CASE STUDY DOCUMENT

This is a 6,500 square metre site with a lot of noise from heavy traffic at the front and from the station behind. There are many advantages to a high-rise apartment building in this context.

- There is direct access to the train station
- The higher apartment the less the noise effect
- The shopping area is very close and convenient
- High apartments will have fantastic views over the park and toward the city

This test case aspires to cater to parts of the population with particular housing needs, as stated above. As a result, the household size should be larger than usual to meet these requirements.

This case study suggests a household style with three storeys, 200 square metres and a capacity of up to six bedrooms (or nine tenants). This is a very efficient index (22 square metres per capita). Site area: 6,500m2, Ground floor area: 2,500m2, Standard floor plan: 520m2. Construction ratio is 38%

This 24 storey apartment building has the structure shown on the diagram:

- The bottom three storeys: include retail shops on the ground level. The second and third floor has some small supermarkets (serving tenants and residents nearby).
- The building includes four five-storey-units. The standard unit consisting of five storeys as revealed in the diagram.
- A childcare center is located at the top of the building.
Walking street

RICHMOND STATION

Station wall painted with Graffities

Gymnasium for the community

Semi-open space

Pavement - shopping walkway

Small scale shops

GROUND FLOOR PLAN
An appropriate high-rise in Vietnam

BUILDING STRUCTURE

STANDARD UNIT - 5 STOREY

STANDARD 5 STOREY UNIT

10TH FLOOR PLAN

11TH FLOOR PLAN

13TH FLOOR PLAN

14TH FLOOR PLAN

COMMON LEVEL - 00F PLAN

3RD FLOOR PLAN

2ND FLOOR PLAN

STANDARD HOUSEHOLD - 1ST FLOOR PLAN
This case study suggests a household style with three storeys, 200 square metres and a capacity of up to six bedrooms (or nine tenants). This is a very efficient index (22 square metres per capita). Site area: 6,500m², Ground floor area: 2,500m², Standard floor plan: 520m². Construction ratio is 38%.

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- A childcare center is located at the top of the building.
5. SUMMARY

This case study is the hinge of the research process. All issues of appropriate high-rise housing were viewed from outside the Vietnamese context. Through proposing a housing test case in this site, similarities and differences in social, cultural, economic and climatic conditions between the two contexts, Saigon and Richmond, were highlighted.

The design strategies used in the first test case were alternatively utilized with appropriate techniques. This design process leads to some new schemes and programs that could be applied to later case studies.

As a result, it is proved that the design strategies are generally applicable, although each case study is site specific. They can be used in different contexts by applying suitable techniques. However their potential is maximized when they are applied to a specific site with some particular techniques.

This chapter is an intermediate step to approach the final project which returns to the Vietnamese context. The comparative tool allows for a deeper understanding of the contextual environment.

This case study identifies some research interests of an economic, cultural and social nature that centre around the question of appropriate high-rise in Vietnam. In the first case study the issue of and impact of climatic was stated, however this has now been broadened to incorporate other factors of importance that have emerged through the research and design process.
II. DESIGN PROJECT
SAIGON SOUTH STUDENT HOUSING
1. REFLECTION ON CASE STUDIES:

In the first case study, Quang Trung square, the appropriation of the Vietnamese urban structure occurred by creating a five level ‘community’ sections within the tower. The climatic design (solar and ventilation initiatives) are more appropriate than typical examples. However, some limitations need to be further investigated.

First, the architectural expression of the podium and tower does not address the question of ‘an appropriate high-rise in Vietnam’. Suitable sun-shading devices, building-section profile, material usage needed to be studied and applied in the final project with the aim of finding an appropriate form to multi-storey housing in Vietnam.

Second, in this case study, the investigation is mainly focused on community structures which maintain urban living patterns. The planning of the apartment developed beyond the idea of big household for multi-generation families. This issue should have some additional work and deeper investigation in the next studies. What is the appropriate size for the household? Is there any variation in household size? What will be suitable a way to put the apartments together which conserves the traditional way of living?

Furthermore, the affordability issue turned out to be critical. Generous common space and big areas could turn the tower into a luxurious apartment building, which is not appropriate in addressing affordability in Vietnamese economic conditions.

Finally, the use of local materials such as bamboo, brick etc. also need to be considered, helping to define the building identity and also reducing the construction cost.

In the second case study, Richmond, both apartments and community living structure are investigated. The household type and Corbusier ‘Unite’ style section configurations are somewhat address the question of social, cultural and economic appropriateness. The climatic conditions are carefully analyzed and studied.

Because the purpose of this study is comparative with Vietnam, there still are several limitations should be addressed in the final project.

First, one apartment type is present in the scheme and although flexible, this flexibility may be limited by the lack of further types on the mix.

Second, the affordability of the apartment is still in question: they are large and there is a large amount of common space. This should be scrutinized.

The appropriateness and the direct engagement with the Richmond context, of street and skyline level remains in question.

The final design project, Saigon South student housing, should address the limitations of the two case studies and refine the research question through comparison with the two test cases.
2. SCENARIO

Return to the Vietnamese context

Ho Chi Minh City is characterised by a high rate of social communication. The streets are full of people all day long. The pavements are crowded with variety of social activities: peddling, retailing, shopping street, eating and drinking, playing chess etc.

Most of the housing along the streets is in the form of row houses and they have similar structures. This is a specific and traditional structure for a house in this area and it is therefore appropriate to the context. This form could maximize the connection between the residence and the walkway.

The ground floor is left for common spaces including: commercial activity (shop), living room, dining room and kitchen. The plan could be long enough to be divided into two types of functional spaces: common and private. But people prefer to do that by elevation: ground floor for common activities, upper floors for private activities (bedrooms, worship space).

The open space in the ground floor is the transition space between interior and exterior, common and private, noisy and quiet. This structure could maximize the communication of the house with the street, make the relationship between interior and exterior closer and blur the boundary between in and out.

1. Small street with such an intensive activities. People hang cloths on the frontages. Food is sold at the corner of the street
2. Shift shop selling drinks
3. Playing chess under the shadow of a tree
The trend of living in a community with a high rate of communication and a townhouse structure suited to the context are the cultural aspects that should be preserved.

Vietnamese students who were born and have grown up in that context are used to living in a community with high rate of communication. They prefer to live with one another in a small group rather than individually as western students tend to and they need a space for common activities.

2. A better example with a common space for group leaning, but still small
3. Students hang their cloths and park their motorbikes at the same place
4. Computer is in bed, no place for it.

1. Students study on their beds because of the lack of space for studying.
5. Everything in a three square meter spot: fan, computer, table and bed.
6. Corner turns used as a kitchen, because there is no place for cooking.
However, the current quality of student housing is a problem. The living space is too small for all of the occupants’ activities. The crowded conditions have a detrimental effect on students’ studies and general wellbeing.

Also, there is no space in the room for such activities as: cooking, washing, drying clothes, relaxing and watching television. In order to meet their own requirements, students self-create correlative spaces within the room. As a result, the room becomes cramped, messy and noisy.

Furthermore, the bathroom area are too small to meet current requirements for contemporary hygiene.

The progress of housing for students could be divided into three periods:
- 1954-1975: war
- 1975-1985: post war
- 1985-now: innovation and development

The following table shows the improvement of living areas for students through time.

It is obvious that the average living area for students has been rising, especially between 1985 and now. In this period, the national economy is dramatically improving so the government can put more money into student housing projects and higher rentals can be accepted. Students today have higher requirements for their living spaces than they had previously. Besides the basic needs like studying and sleeping, they require more spaces in their houses for other activities such as relaxing, and having meals which helps them to live and study well.

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<th>MULTI-TECHNIC UNIVERSITY</th>
<th>NATION UNIVERSITY, SCHOOL OF EDUCATION</th>
<th>ACCOUNTING UNIVERSITY</th>
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<tr>
<td>Number of students</td>
<td>10</td>
<td>10</td>
<td>8</td>
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<tr>
<td>(per room)</td>
<td></td>
<td>Group: 3 rooms with 30 students</td>
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<tr>
<td>Average living area</td>
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<td>2.67</td>
<td>4</td>
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<tr>
<td>(include toilet) m²/ student</td>
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STUDENT HOUSING CONDITION AND THE IMPROVEMENT OF LIVING AREAS THROUGH THE TIME
Saigon South Improvement - RMIT Int. Vietnam Location
Existing Sport courses - badminton

Second stage

Existing Lecture Hall

Proposed site for student housing
3. DEPARTURE

*Student housing in Vietnam*

The rapid increase in the number of students and the fast growth of the nation’s economy, means that a number of high-rise buildings have been built for student accommodation. Consequently the average living area per student has increased.

Nevertheless, most of them were designed with a hotel structure. The standard floor plan is divided into many small rooms connected by a communal corridor. As a result, the whole space is segregated and the common space is not generous. Furthermore, the fact that the sleeping space and the common space are in the same room and the sleeping area is adjacent to the communal corridor means that inhabitants’ privacy is limited.

Students would prefer to live in a place like their home: with a high rate of communication but also privacy, rather than in a hotel-like building. Besides the preference for this style of living, students need living spaces larger than those provided by existing housing. From the year 2000, there have been many reports written and research conducted about the average area for student housing.

Some housing for students has high area per capita. For example, Hanoi Agriculture University has 10.8 square metres per student.

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**HANOI UNIVERSITY OF AGRICULTURE**


STANDARD GROUP OF HOUSEHOLDS: two rooms for 4 students, 10.8 square meters per capita
SUGGESTION FOR AVERAGE AREA PER CAPITA IN STUDENT HOUSING AND GROUP OF HOUSEHOLDS

1 Nguyen Thi Hai Yen, Student housing, Construction University, Hanoi 2000.
Basically, after increasing the area to 7.2 square metres per student as suggested or up to 10 square metres as some new built student house, living area has been added to allow spaces for studying, washing, drying clothes.

However, there are still a number of problems that need to be addressed: the sleeping and common spaces are in the same room and the bunk beds are adjacent to the communal corridor so students’ are disturbed by activities in the shared space and circulation on the walkway. The common space is divided into one room for every for four to eight students and each of these spaces is not sufficiently large. Students still do not have space for cooking, having meals, watching television.

Based on the real condition of four square metres per student (3 m² without toilet area), the suggestion (7.43-8.64 square metres) and new built (over 10 square metres) could make rental prices too high while still not meeting student requirements. In comparison with student housing in many countries, this index is quite small but this number should be viewed in terms of the Vietnamese context where a smaller area per capita is common. However, the overall common space provided needs to be larger than what is currently the norm in order to meet students’ needs and improve tenants’ privacy.

RMIT Vietnam campus was found to be the most suitable site for the project. The land cost is not too high in this area and students here are generally well off (average school fee in RMIT Vietnam is 5000AUD per year in comparison with an average annual school fee of around 300AUD) so they could afford higher rent.

As well as social conditions, climate is one of the most important factors affecting student accommodation. Because the weather is hot all year round the building needs to be ventilated, cooled and shaded from heat and direct sun.

However, the existing and the new built high buildings for student housing are not appropriately considered in regard to climate.

Apartments have no balcony and receive direct sunlight without any shading devices. All windows facing south are glass so they block natural ventilation. This trend is not suitable for the Vietnamese climate. The building should have many open spaces encouraging cross ventilation and taking advantage of cool winds across the building. On the other hand, the façade facing direct sun should have solutions for shading and cooling.

Student housing block, Nation University, School of Multi Techiques, Ho Chi Minh City campus. The design does not consider climate. Glass windows block the natural ventilation.
4. THE DESIGN APPROACH

1. Creating bigger households for bigger common space

To supply common space for everyday activities such as studying, cooking, eating, washing, drying clothes, relaxing and watching television, while still maintaining a minimum area for the building, this proposal, informed by the Richmond project, suggests a larger apartment size for students. The project in Richmond proposes a three storey apartment for three families. This project proposes a two storey apartment for 16 students.

This proposal is suitable for the living habits of Vietnamese students: they prefer living in a small group rather than living separately (as students from Western countries). Furthermore “according to the psychological pedagogy experience in student living, a group less than sixteen students has good effect on individual. It creates an environment part family part community. It is small enough for good hygiene and has enough people to manifest the role of majority with minority”. ¹

The proposal suggests a double storey apartment for 16 students. The lower floor is the place for the living room, studying room and a small kitchen. The area is 55 square metres. The upper floor is occupied by eight bunk beds (for 16 students). There are many other ways to arrange the bedroom for eight beds: 2-6, 2-2-4, 2-2-2-2 and 4-4 by flexible partitions (bamboo screens). The area of the upper floor is 55 square metres.

In conclusion, the dwelling area is 110 m² for 16 students with 55 square metres for common spaces. Average area per student is 6.875 m². The outcomes are quite impressive when the proposed average area per capita is smaller than the suggested number in the report to the government (the report to the government suggested the index from 6.93 to 7.92 square metre per capita) but the common area is larger. Furthermore, the special grouping structure increases both the privacy and the rate of communication in appropriate spaces compared to a conventional scheme.

Also, the common spaces such as living rooms or group studying and the space for sleeping are not in the same place so that improves the privacy while still providing a larger area for common activities.
Communal corridor + households with external stairs creating street-like structure

Studying room for sixteen students with double bamboo blind system to control the light and crossing wind. It also keep student in the studying room from being distracted by activities in the common corridor.

The gap between the dwelling and the common corridor encourage natural ventilation and reduce the noise for the studying room.

Cross section A-A through the living room showing the relationship between the household and the communal corridor. There is no boundary between interior and exterior. Bamboo blind system performs as a tool for dividing the functional spaces.
2. Creating high level of communication by forcing circulation

Based on the particular cultural aspect of high rates of communication and experiences from the first two projects, this proposal suggests a model of double storey apartments (using external stair) connecting with a communal corridor at the lower floor.

Because of the apartment structure, people from the upper floor must use the private stair down to the lower floor before accessing the communal corridor. This solution doubles the density circulating on the communal walkway. Furthermore, the lift is located between the two wings of the building and stops at every two storeys so the lift stop point is where students gather before going out of the building.
1. QUANG TRUNG SQUARE PROJECT

BUILDING STRUCTURE WITH 5-STOREY COMMUNITY

CIRCULATION DIAGRAM IN A 5-STOREY COMMUNITY

RESIDENTIAL 1st floor
COMMON LEVEL 1st floor
RESIDENTIAL 2nd floor

2. RICHMOND PROJECT

BUILDING STRUCTURE WITH 5-STOREY UNITS

THE VARIATION OF UNITE D’HABITATION

COMMUNAL CORRIDOR

RESIDENTIAL
COMMON LEVEL
RESIDENTIAL

3. SAIGON SOUTH PROJECT

CIRCULATION DIAGRAM OF THE WHOLE BUILDING

APARTMENTS

SERVICES

UPPER LEVEL

COMMUNAL CORRIDOR

EXTERNAL STAIR

LOWER LEVEL

FORCING CIRCULATION STRATEGY IS ALTERNATIVELY APPLIED IN THE THREE PROJECTS
3. **Stacking dwellings** by street-like structure: preserving living habits and improving privacy.

Based on living habits and the structure of the traditional townhouse this project proposes the model of double storey apartments put next to each other like row houses along a street. This structure could preserve living habits.
The lower floor is used for common activities. It is totally open and the boundary between interior and exterior, common and individual are blurred. It maximizes the contact between the apartment and the communal circulation. The upper floor accessed by the private stair is the bedroom which needs more privacy and silence.

Standard section crossing the street showing the relationship between interior and exterior.
The solution of dividing spaces (common and individual, noisy and silent) by elevation (vertical direction) is derived from the traditional townhouse structure and was used in the first two projects. This proposal uses it in an alternative way.

Section B-B showing the relationship between functional spaces. The bamboo blind system performs as a key factor to dividing the interior and exterior spaces. When it opens: no boundary between in and out.

Picture in the right: Perspective view showing the street-like occupation from the studying room.
4. Active frontages and interfacing:

Active frontages and interfacing are confirmed as good strategies to recreate an environment with rich culture activity. Ground floor are occupied by small scale retail shops which could be accessed from front and back sides. Some spots near the motorbike parking area are reserved for shift shops and paddling activity.
5. Natural climate adaptation:

5.1. Solutions for natural ventilation and lighting

5.1.1. North-South orientation and wind direction

North-south orientation to maximize natural lighting and minimize the west and east sides of the building which are over heated by low angle sun.

5.1.2. Natural ventilation: enhance cross ventilation by using single load building, maximizing natural wind across the building and creating many open spaces.

This wing orientation meets the main wind direction coming from Pacific Ocean, which is cool and humid.

1. Rainy Tropical Architecture, Dr Hoang Huy Thang, 2002
2. Bioclimatic Architecture, Pham Duc Nguyen, 2002
5.1.3. Stack effect

The stack effect will encourage the natural ventilation. The well created behind the staircase facilitates airflow in a vertical direction.

5.2. Solutions for cooling the building

5.2.1. Water evaporation

Water evaporates and cools the building from outer faces, especially from below. Furthermore wind brings the cool and humid air into the building.

Diagram below showing how evaporated water cools the building.
5.2.2 Bamboo blind: works as a separation tool. When it opens no boundary between interior and exterior; when it closes, a temporary separation is created to keep the privacy for the interior space. It also works as a device for adjusting the sunlight and wind flow. The most interesting aspect of the bamboo blind is it allows sunlight to go through even when it is closed. Bamboo is an extremely cheap material in Vietnam and has been used a lot in construction.
PROJECT

Walking trail
West wing building for boys
Outdoor coffee area
Ong Nghe canal
Reserved area for the second stage
Proposed bridge
Common dining hall

Green area

To the lecture hall
Proposed bridge
Reserved area for the second stage

Main Entrance from Saigon South Parkway

Lift core - Vertical circulation
Motorbike parking
East wing building for girls
Retail shops, shift shops, fresh food area
Motorbike parking area
Green Space

To the proposed area

MASTER PLAN
VIEW1 - RETAIL SHOPS AND FRESH FOOD SELLING AREA
VIEW2 - RETAIL SHOPS, SHIFT SHOPS, FRESH FOOD AND MOTORBIKE PARKING AREA
6. FURTHER REFLECTION: 
REVISITING OF QUANGTRUNG SQUARE CASE

Exterior of a standard 5-storey 'community'. Balconies are used as shading devices. This specific composition of balconies help casting shadows and reducing floor areas.

The podium in the ground floor is a place for culture activities. It conserves the traditional street performance.

View from Thi Sach street. The composition of balconies as shading devices creates a brand-new look for the multi-storey building in comparison with a standard examples.
7. SUMMARY

The final project is back within the Vietnamese context at Saigon South. Based on experience and knowledge gained from the first two case studies, this chapter reframes the research question. The issues were restated in a wider context but they are more specific and clear. The design strategies, which were applied and improved in the other two test cases, are utilized in a creative and suitable way in order to cope with the issues of high apartment buildings and create an appropriate model of high-rise in this site.

This project was carried out as a final step in the research process. It clarifies the issues that need to be considered to create appropriate high-rise in the Vietnamese context and confirms the design strategies with some certain techniques.
Conclusion

High-rise housing has been built in Vietnam and continues to be constructed as a trend in the housing market. Existing apartment blocks have many disadvantages. Departing from here, possible models for high-rise apartments have been investigated by project-based techniques. Through the research process various problems associated with high-rise apartments have been identified and considered.

The question was, how can high-rise housing preserve traditional living habits and cultural activities but still ensure affordable materials appropriate to the climate?

Working through the three designs in three different contexts, many issues have been addressed and some strategies have emerged in order to assist the design process.

In the first case study, Quang Trung square, the stacking strategy proposes a five storey community corresponding to the traditional close community. This residential area is big enough to allow a diverse inhabitant structure and to ensure sufficient space for everyday activities but is small enough to encourage community. The active frontages tactic involves dividing the lower levels of a tower into small scale, especially the ground floor plan where the building has a direct connection with pavements, to create a shopping street area and preserve cultural activities on pavements. The interfacing method is grouping applied by creating a walkway with row shops crossing the base of the tower, maximizing the possibility of communication between the building and the context. In order to create a high rate of communication, the scheme forcing circulation is applied. Households in a five storey community are forced to use the ramp to access to the common level before approaching the elevators which stop at every five storeys. The Natural climate adaptation scheme was applied with a linear floor plan being chosen to encourage cross ventilation. The building is cooled by water evaporation.

The site of the second case study is in Richmond, Australia. The purpose of this case study is to explore some similarities and contrasts in society, culture, economics, climate and environment between the two different countries. This test case focuses on a particular market: average income bracket and rental market, a group of the population requiring particular and varied models of ownership and use. The active frontages tactics is alternatively reapplied. The
lower floor plans were separated into small partitions as the existing shopping street structure on Swan Street. The interfacing strategy is enhanced by the arrangement of row shops on the ground floor which could be accessed from two directions: the pavement (front side) and the corridor at patio (back side). This solution doubles the potential connection of the building with its surroundings. A stacking scheme was utilized by creating a five storey unit consisting of two households. The section form is a variation of Unite’d Habitation. This three storey dwelling is a confirmation of the solution bigger household for bigger common space. Forcing circulation has become an effective design tool to create an active, high density environment. In this case, dwellers in a three storey household are advised to use their internal stairs to access the common level before getting to the lifts which stop at every five storeys. The natural climate adaptation involves use of a linear floor plan to encouraging breezes across the building. Shading devices on the north face cool the tower in summer, a double-layer facade solution keeps the heat in winter. A passive heating system was created by using a concrete slab structure to absorb heat in the daytime and warm the building at night. The extreme climatic conditions suggest a totally open building in the final project: multistory housing for students at RMIT Vietnam campus, Saigon South.

The last project has a single-loaded floor plan which maximizes cross ventilation. The building is facing south to get natural light and catch breezes from the main wind direction. Interior spaces are formed by active layers such as bamboo blinds and screens which are operable to adjust sunlight and wind flow. This is an extremely cheap but quality material and considered as an appropriate solution. A stacking households strategy is creatively applied to create a street-like structure. A number of double storey households next to each other, linked by a large communal corridor at lower floors, represents a traditional row house system in which dwellings are linked by a pavement rich with cultural activities. Bigger household solutions means the dwelling can accommodate up to 16 students. The outcomes are quite impressive when the proposed average area per capita is smaller than the suggested number in the report to the government but the common area is bigger. Furthermore, the special grouping structure achieves a higher level of privacy and rate of communication in appropriate spaces than a conventional scheme. Forcing circulation is a key factor in creating a high density environment. Tenants have to use their external stairs to access the communal walkway. The lift stops every two storeys at the common level. Finally, active frontage and interfacing are confirmed as good strategies to recreate an environment with rich cultural activity. The ground floor is occupied by small-scale retail shops, which could be accessed from front and back. Some spots near the motorbike parking area are reserved for shift-shops and peddling activities.

In reflecting on the projects it becomes clear that established strategies of stacking, bigger household, active frontages, interfacing, forcing circulation and natural climate adaptation could all be utilized. These tactics have been shown to be useful in each site although the proposal includes many factors that are very site specific. These strategies can work in different contexts, however their potential is maximized when they are applied to a specific project with some particular techniques.

The observation of appropriate models of high-rise in Vietnam has many possible outcomes. The continuation of investigation should improve these strategies and techniques in practical design.
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