

# A STUDY ON COMMUNITY PERCEPTION TO IMPROVE THE URBAN GREEN SPACE DENSITY: A Case Study of Can Tho City, Vietnam

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**Abstract:** The study aims to examine the green density in Can Tho City, Vietnam, where urbanization has been rapidly growing and urban green space has gradually disappeared, because built-up land has been increasing rapidly over the last 20 years. First, this study conducted a survey and interviewed the local people to discover residents' perceptions about the current quality of urban green space and explore the existing problems. The survey focused on green space density, current housing types, and the quality of housing to suggest a vertical resettlement concept for improvement of green space. The results of the survey questionnaire demonstrate a lack of green space in the center of the city, and local people entirely concur with the need for relocation into high rise buildings, in order to cede land to green spaces. Thus, the study chooses to research an area, where the survey results reveal that the current housing conditions and quality of life of the inhabitants is low and chaotic, and therefore, the solution of the vertical resettlement is considered a suitable solution in this case. The solution can thus enhance the living conditions of the inhabitants, allowing them to optimize land use planning in this study area.

**Keywords:** Urban green space, questionnaire survey, residents' perception, improving green space, vertical resettlement concept

## INTRODUCTION

Can Tho is known as the largest city in Vietnam's Mekong Delta. According to the government's development plan, Can Tho is expected to become one of the regional hubs, connecting critical economic centers of the South East Asian region (Ho Chi Minh, Phnom Penh, and Bangkok) in the future. This is the reason why strong urbanization in Can Tho city has been occurring for the past twenty years. Rapid population growth in the center of Can Tho has caused problems not only from a social, but also from an environmental point of view, such as environmental pollution, lack of public space, lack of housing, urban heat islands, and flooding. Ninh Kieu is one of the core districts in Can Tho, placed at the intersection of the Hau and Can Tho rivers that bring advantages in both agriculture productions and urban development, but also challenges, for example the risk of flood and a lack of housing in Nink Kieu. According to the World Bank (ISET), increasing green surface in urban areas is one of the more important objectives, in order to reduce the flood risk and develop the urban landscape.

Urban green space is planned following governmental standards and its quality is measured by expert assessment, but there are always gaps between urban planning projects and the reality as it unfolds in Vietnam. So, the current green areas are insufficient to meet the demand of citizens in the main cities of Vietnam. One of the drawbacks of governmental standards for determining green space quality is the fact that the satisfaction and attitude of the local

population is not taken into account. Hence, a survey of the citizen perceptions is an important tool for providing the information to set the future direction of urban green spaces. Local communities clearly understand the existing issues in their living areas through the activity of daily life. In fact, other studies have shown that local people's perception is shaped by knowledge about the goals and characteristics for protected areas as they relate to socioeconomic factors. In this study, the perception of the current issues of green space and the local population's attitudes toward urban green space are examined in 110 households in the central Ninh Kieu district.

Approximately 90% of respondents perceive a lack of green space in their living area and approximately 80% of respondents hold positive attitudes toward the replacement of slum area in urban and vertical resettlement development. In fact, the success of the vertical resettlement to improve the slum area in Mumbai City-India is a real case study that the other cities of Asia may refer to. This model resolves the twin challenges of lack of housing and the need for land use in an urban setting. However, each country has different social, economic, and cultural factors, so the application of the vertical resettlement in Mumbai city to Vietnam should be carefully considered, with the goal of community satisfaction.

The study is designed to determine the existing green space by the collection of local people's perception. For this purpose, a survey questionnaire

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Figure 1: (a) Theory of Le Corbusier for Contemporary city. Source; (b) The Architectural model of the 50-storeys public housing development at Duxton Plain; (c) Two areas in Mumbai are a mixture of urban sprawls and vertical urban.

and face to face interview were conducted for 111 households in Ninh Kieu district, Can Tho City, Vietnam. It is expected that the results will provide the data to determine planning parameters for urban planners and architects, particularly focused on increasing green space in urban areas. In the same way, the study shows that the suggestion of applying the vertical resettlement model in slum areas will be supported by up to 80% the local community.

### 1. LITERATURE REVIEW

#### 1.1. REVIEW OF VERTICAL RESETTLEMENT CASES

The first vertical development concept was designed in 1922 by Le Corbusier. He proposed a plan where three million inhabitants would be housed in a specially designed "contemporary city". The concept was understood as moving the living space to a vertical direction thus avoiding residential sprawl in urban areas that is equivalent to the unplanned urban growth these days. According to Le Corbusier, overpopulation is one of the serious problems of modern cities, so he proposed housing blocks- and skyscrapers- encircled by gardens, in order to accommodate high density in the city center, which corresponded to the redevelopment of a large area of Paris. These skyscrapers proposed the high density, in order to leave at least 85% of the ground free for green space (figure 1a).

The adaptability of the concept of a vertical city was also studied as a solution for land scarcity in Singapore where the area is approximately 660km<sup>2</sup>, the population is 5.5 million and Singapore needs to cater to about 80,000 housing units. So, the Singapore government provided accommodation for citizens by creating a fifty-storey public housing development at Duxton Plain in 2002. This project is complemented with numerous other types of land use within the same structure, especially focused on providing quality housing with good natural lighting, ventilation, orientation, and views. With the vertical city concept,

this building type received 50.8% of the respondents in favor of the fifty-story public housing development at Duxton Plain. This means that the perception of inhabitants favored this concept (figure 1b).

According to the study by Grace Wong, this shows that, although some vertical city proposals come across some opposition, they have become a common trend in Asian countries. Vertical development is also examined as a potential application to solve the issue of slums in chaotic cities. For example, Mumbai (Bombay) is India's main industrial and commercial center with a total area of 5027sq km and a population of 27.5 million at the last formal census in 1991. In Mumbai, the huge population pressures on the limited land area led to the lack of housing units in the city. Therefore, many apartment blocks were built to supply housing for citizens; inhabitants of the slum areas were convinced to move into high rise buildings constructed on the original area, in order to leave land for open space. This model was considered an important solution to replicate in cities with similar situations (figure 1c).

#### 1.2. VERTICAL RESETTLEMENT ADAPTS TO THE VIETNAMESE URBAN CONTEXT

##### 1.2.1. THE SUCCESS OF THE HIGH-RISE BUILDING PROJECT

Urbanization in Vietnam has advanced faster than in other regional countries. A number of areas are recognized as urban areas of accelerated development. In Vietnam, the percentage of population living in urban regions rose from 19% to 26% in the period 2000-2010. Thus, the large cities in Vietnam such as Ho Chi Minh, Ha Noi, Da Nang, and Can Tho are facing a lack of housing, built land, and environmental pollution. In Ho Chi Minh City, urban upgrading projects were supported by many developed countries to solve the environmental, housing, and social challenges. One of them is the THLG project supported by Belgium, which was considered a success when completed in 2006.



Figure 2: (a) Tan Hoa Lo Gom canal in Ho Chi Minh City (before the project started); (b) The Architectural model of the three-story apartment buildings (after the project finished)

To provide residence for poor migrants along canals, the situated apartment comprised three-story blocks designed in consultation with the future users, so as to leave open public land for playgrounds, green areas, and motorcycle parking. In particular, residents could live close to the street level, which is quite handy for their economic activities (figure 2). This project was considered a success in providing the accommodation and, public space for 42% of the households with the lowest social status, while simultaneously addressing the canal's heavily polluted water.

In the context of Vietnam, large cities such as Ho Chi Minh, Ha Noi, Da Nang, Can Tho have been pressured by the huge migration in recent years. Lack of housing for the households with the lowest status, especially the residents along canals in city is a complex problem for the government. The success of the Tan Hoa Lo Gom project in Ho Chi Minh city, it shows that the vertical city concept can be applied to the current issues in Vietnam, and to Can Tho City in particular. Although many Vietnamese urban planners and architects advocate for the vertical city concept as a solution to the expansion of the cities in Vietnam, their studies do not note the needs, perceptions, and reactions of the residents thus leading to conflict between government and residents. Herein, a study has been executed to access the resident's acceptance of living in a high-rise apartment building. This is the first step for obtaining the residents' perception in Nink Kieu district, on whether or not they are willing to live in high-rise housing.

### 1.2.2. CHANGE IN HOUSING TYPOLOGY IN VIETNAM

There is a difference in living style between the rural regions and urban areas in Vietnam. In the rural region, people live in rural homes - this housing type has the only one level, but it has a large area and is in harmony with the surrounding environment. In contrast, because of the rapid urbanization and population growth in the city, housing construction is chaotic and has led to diverse housing styles. There are five housing typologies in large cities: the rental house, slum house, old apartment, modern apartment, and tube house. (table 1). High rise buildings especially have gradually evolved day by day to adapt to the Vietnamese living styles. First, these types' floor area is usually small, around thirty square meters, with a sleeping area, restroom, and kitchen. It is tiny and not enough space for the multi-generation family in Vietnam. So, recent construction has changed in the spatial configuration and the floor area is now large (over fifty square meters), with two-bedrooms and many other functions. As a result, Vietnamese people have gradually moved to high-rise buildings in large cities.

In addition, a survey of the existing high-rise apartments in Can Tho City was performed, and residents stated that most built apartments lack common space, such as parks, motorbike parking, etc. Another finding was that the lack of space for small businesses on the street level, because of the narrow pavement. This should be considered an important request of high-rise dwellers-these buildings should add

|   |   |   |   |  |   |
|---|---|---|---|--|---|
|  |  |  |  |  |  |
| Rural Region  | City Fringe   |   |   | Central City   |   |

Table 1: The difference in housing typology between rural regions and cities.

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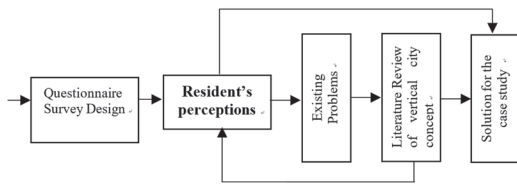


Figure 3: Summary of the procedure of research. (Author 2019)

common space and have more green spaces, like a rural setting, or spaces for businesses. This will reduce the drastic change in the style of living of the Vietnamese. With this solution in mind, the apartment typology will attract the attention of the Vietnamese.

## 2. METHOD

### 2.1. STUDY DESIGN

The study data used was derived from the case study in Ninh Kieu district. This study follows a stepwise procedure to select the solution for improvement of urban green space density that had been evaluated by the residents' survey. First, the study designed the questionnaires based on the research purpose and with reference to the related documents. Second, the study conducted a survey questionnaire and interview in February 2018 to collect information on two elements: existing green space and vertical development concepts (figure 3).

### 2.2. STUDY AREA

The study selected an area of 5x5 square kilometers at the center of Ninh Kieu district, Can Tho City. One of the notable things in this area is the permanent complexity of the residential area, commercial area, and tourist area. The residential area is characterized by tube houses and two-story block houses in the French style, while the other areas possess structures such as banks, hotels, restaurants, civic and religious buildings. Toward

the middle of each plot, some of the existing housing in the case study, revealed slum-like, poor conditions.

In order to propose a specific solution, block one and two in the study area are considered as sample research for green space improvement (see figure 4c). The study expects that the results will be a clear concept to be applied not only to the Ninh Kieu district, but also to the other cities in the Mekong Delta.

### 2.3. DATA COLLECTION TECHNIQUES

To explore the local perceptions of the twin issue of the current green space and the relocation to a high rise, the study collected the data in February 2018 by using survey, in-depth interview, and field observation. These methods play an important role in directly collecting and synthesizing local perceptions from different households.

#### Questionnaires

The survey was divided into two sections. Section 1 comprised evaluating the quality of life and confirming the existing problems in the study area. The measurement of urban green space density was determined through a series of focus questions with inhabitants living in the study area. Section 2 comprised a group of questions that relate to the solution for improving the urban green space.

Data were collected by means of paper-mailed questionnaires that were randomly distributed to the inhabitants in 2018. Five questions evaluate the perceived quality of life with suggested multiple-choice answers and room for respondents to express their own opinions. While from question number six to ten comprises qualitative questions which the respondent must choose according to their perception (table 2).

The diverse information obtained from the local people will help urban planners embrace all sides of the issues currently at play in the study area, in order to find the most suitable solution to improve the green space density and the most appropriate use of urban land, all with the goal of achieving a higher quality of life.

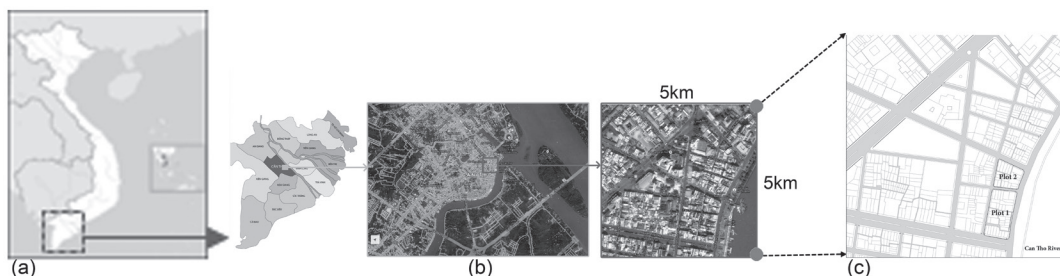


Figure 4: Study area location: (a) Mekong Delta Location; (b) Can Tho City Location; (c) The case study with two plots as example for vertical city concept. (Author 2019)

| #   | Question  | Related result  |
|---|---|---|
| <b>Evaluation Question about the existing problems in the study area</b>                    |   |   |
| Q1  | To evaluate your satisfaction with the quality of life in the study area by green space.  | Level of satisfaction (There is a relationship between the qualitative feature of green space and residents' self-reporting)  |
| Q2  | To increase the quality of life in the area, which of the following space is most necessary?  | Perception of green space   |
| Q3  | According to your opinion what disadvantages are occurring in the area where you are living in?   | Perceived the negative aspects of life that is the cause of disappeared green space   |
| Q4  | How many green spaces are there within a 20 minutes walk from your house?   | The standard distance to the nearest green space. With 20 minutes' walk, the distance proposed 700 meter from house to green space (according to an accessible green space standard of Bristol City Council in 2008). |
| Q5  | If your answer in number four question is having green space.<br>May you describe the green space?  | Observation   |
| <b>Evaluation Question about the vertical city concept to improve the urban green space</b> |   |   |
| Q6  | According to the below describe: What kind of urban green space do you want?<br>1. Public space is like square<br>2. Public space has many functions such as green space, playground, motorcycle parking. | Perceived the kind of green space   |
| Q7  | To increase the quality of life in the area, the government should be renovated in the area. What solution would you like to agree with?  | Perceived living habit  |
| Q8  | Give your opinion about this solution. Resettlement solution with residential space is organized follow on the vertical like the apartment to create the green space on ground floor.                     | Perceived the level education and nature  |
| Q9  | Give your opinion about Apartment buildings from 2 to 5 floor have green space and public space   | Perceived living habit  |

Table 2: Question used for the survey

### In depth-interview

In total, 111 out of 200 distributed questionnaires were returned. All 111 samples contained complete data available for analysis. All participants in the survey were long-term residents of the study area, and most of them had been in this area for over eight years.

Out of the respondents, the largest participation age cohort in the survey were between 45 to 60 (53.3%) and smallest was aged 18 to 24 (6%). The remaining balance of the participants were aged 28 to 36 (40.7%). The highest proportion operated a small business (occupying 34.1%). Second, the degree of education achieved by respondents (college graduate or more) was 20%; this is followed by students, and workers. Most of the respondents have a stable monthly income to support their family.

The mentioned survey samples are confirmed to be selections that are random, and that are universally representative of the study area, thus exposing the various dimensions of the experience of the local populace.

### 2.4. DATA ANALYSIS

The collected data was simply analyzed by statistical analyses which was performed by using SPSS software version 23. All inhabitants' opinions in the study area are described by using descriptive statistics. The descriptive statistics provides simple summaries about local perceptions via table 2. The study investigates a number of cases that fall into various categories, so the frequency option is carried out to obtain the number of people within each category in the dataset.

The study not only observes and analyzes the green space, buildings and local people, but it also listens to what participants have to say and records the length of time the participant has lived in the research area. The data was gathered in the form of handwritten notetaking on the map and photography; these revealed multiple problems in the slum area. In fact, the local populace is living in conditions of environmental pollution, flooding, lack of open space, and poor housing quality. These problems were assessed through observation.



### 3. RESULT

#### 3.1. RESULT OF THE QUESTIONNAIRE SURVEY

During the interview, local people have shown honest, sincere appreciation and deep understanding of their living area. The results show that they are facing serious challenges of lacking green space and housing degradation. Also, they seem worried about the flooding that happens often. In tables 3, 4, the analysis shows the percentage of the most selected answers for each question. Then, the most selected answer will be considered as the remarkable survey result to evaluate the green space status in the study area.

The study demonstrates local perceptions about moving to high-rise housing, in order to leave urban land for green space, by questionnaire survey. The results are summarized in table 4. In this section, the study notes

| Evaluation Question about the existing problems (green space and the quality of living) in the study area      | % per total participants |
|--|--------------------------|
| Non- satisfaction with the current green space   | 76.6                     |
| Agree with improvement the urban green space   | 53.2                     |
| Densely populated informal settlements in the study area have caused environmental pollution, and chaotic area | 49.5                     |

Table 3: Level satisfaction of local people about urban green space.

| Resident's opinion about vertical city concept   | % per total participants |
|--|--------------------------|
| Agreement living in high-rise housing.   | 19.7                     |
| Agreement living in high-rise housing with the stabilization policy.   | 73.1                     |
| High rise apartment building is complemented with numerous functions, such as green space, playground, and motorcycle parking. | 92.8                     |

Table 4: Resident's opinion about vertical city concept

| Job Variable               | Agreement                        |  | Disagreement | Other |
|----------------------------|----------------------------------|--|--------------|-------|
|                            | Agreement & Stabilization Policy | Agreement without Stabilization Policy |              |       |
| Officer, Doctor, Law, etc. | 20                               |  |              |       |
| Workers, staff             | 19                               | 19.7                                   |              | 1.8   |
| Businessmen                | 34.1                             |  | 5.4          |       |
| Total                      | 92.8                             | 5.4                                    | 1.8          |       |

Table 5: Job Factors affecting residents' perception about the vertical city concept

the level of education of respondents, where 20% of participants graduated from college and higher. Most agree with this solution. Also, 38.7% of the workers, office workers and students approve of the proposal. Businessmen concur with this solution, but they require that the government have the policy in place to ensure the work, and 5.4% completely disagree with this concept (table 5).

There are a number of issues surrounding the opinions of local people regarding vertical residential developments, especially small businessmen who have used the ground floor for supporting their living. The businessmen worry that moving into high rise housing they lose their business space. Therefore, the need for implementation of vertical development in parallel with an effective social policy, which ensures all people in the area may support their living.

#### 3.2. RESULT OF THE HOUSE'S QUALITY SURVEY

Housing typology in Ninh Kieu district is various. The tube houses typology with modern architecture along the main street have been not only functional living spaces, but also lucrative for businesses, which occupy the largest percentage, as opposed to the middle of the block, where the slum-like makeshift houses are of poor quality (table 6: houses are marked in yellow, and figure 5). A large population living in slums creates multiple problems for the city, such as environmental pollution, lack of public space, lack of housing, etc.

#### 3.3. SUGGESTED SOLUTION

From the results of observation, the study carefully surveyed two residential areas as mentioned above to illustrate the vertical concept. The purpose was to show that numerous functions such as green space, playgrounds, and motorcycle parking could coexist in the area, as compared to the current flat city, in which inhabitants do not enjoy communal green spaces. In the selected two plots, there are residential areas, ground-floor commercial spaces, offices, and institutional land use. Each of these uses have a different character and streetscape requirement. All of the households should be resettled into high rise housing, in order to leave the central zone for green space. Providing green space will transform the concrete surface and increase the capacity for flood resistance in the future (figure 6).

#### CONCLUSION

This study outlines an approach by the questionnaire survey to measure inhabitant's opinion of urban green space. Two main findings were presented in this research. First, a set of nine questions used to survey the inhabitant's opinion. The results show that the

Housing Location is classified by colour









|   |   |  |   |
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|  |  |  |  |
|  |  |  |  |
| 2-storey block houses in French style   | 2-3 storey block houses   | Tube Houses  | Makeshift houses  |

Table 6: The quality of current Housing in the study area. (Author 2019)



Figure 5: Survey of existing housing in the study area in 2018. (Author 2019)

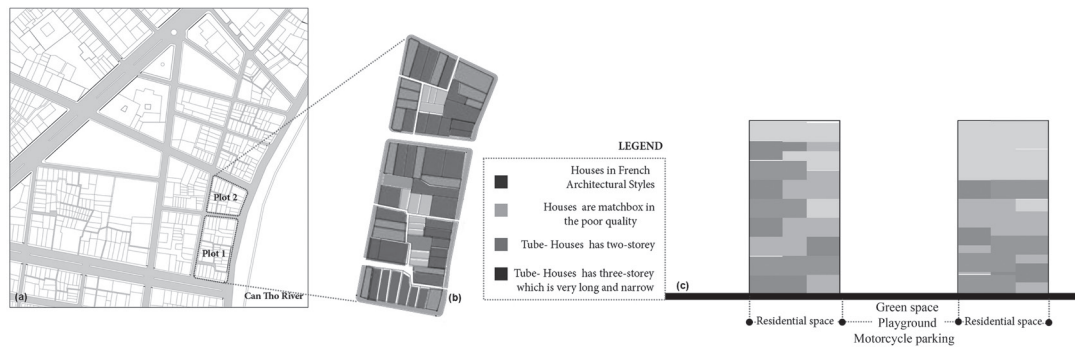


Figure 6: (a) Location of selected two plots; (b) Flat city; (c) Vertical city concept. (Author 2019)

attitude toward the urban existing issues is rightly evaluated, and the inhabitant's level of acceptability of high-rise housing is also high in spite of it is a new solution to the population in Can Tho city. It is unbelievable that over 70% of answers agree with vertical city development and the government must attach the policy to stabilize their life. Therefore, that is notable for urban planners and government when they plan to redevelop the slum in urban, the satisfaction of social issues is conducted as well as. Second, moving into the high-rise apartment to leave the urban land for green space is not only enhancing the quality of inhabitant's life, but also solve the flooding in urban due to climate change and sea-level rise.

The above analysis explores that the citizens always have a concerned attitude toward the existing issues in their area and the respondents' level of acceptability is highly dependent on whether the government has the policy to support their life. The research suggests that the local perception should be considered as a precept in the plan development of the city.

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