

INTRODUCTION

CRITERIA SYSTEM OF SUSTAINABLE ARCHITECTURE FOR DESIGNING HIGH-RISE HOUSING IN HO CHI MINH CITY

STATEMENT

Many research studies have identified the very cause of climate change, which has made a great impact on the world. Ever since, proper and adequate attention and evaluation has been given to the environment through numerous summits on environment, development and global warming.

It is absolutely urgent to study and work out sustainable architectural criteria for high-rise buildings, which will help materialize the theory on sustainable development in architectural design. The criteria will act as an orientational tool for designers, managers, investors as well as users who can make their own evaluation of sustainability-based high-rise housing design.

PURPOSE

Aim: To propose “Criteria system of sustainable architecture for designing high-rise housing in Ho Chi Minh City”

Objectives:

- To identify the major aspects that form the distinctive features of sustainable development.
- To clarify the relationship between sustainable development and high-rise housing design
- To embody sustainable development in the field of high-rise housing design
- To establish groups of criteria and their weight in correspondence to the basic system of sustainable development applied to high-rise housing design.
- To determine the quantitative and qualitative methods applied for the criteria as well as evaluation methods for high-rise housings in Ho Chi Minh City according to the architectural sustainability criteria.
- To investigate international issues in green buildings and sustainable development.
- To investigate the existing practical problems concerning high-rise housing designs in Ho Chi Minh City.
- To investigate the relationship between ecological, socio-cultural, economic – technological issues and sustainability-based tall building design.
- To examine the relationship of three systems that lead to sustainable development and their weight in the overall system which help achieve sustainable development goals.
- To work out the sustainable architectural criteria for high-rise design in Ho Chi Minh City that meets the demand of sustainable development.

SCOPE OF THE STUDY

- Type of building: high-rise buildings
- A study on high-rise building architecture with regards to ecological environment, society and culture, and economics and technology with the ultimate goal of sustainable development.
- The city of investigation is Ho Chi Minh City
- The sustainable architectural criteria are set up to serve all the related fields and to serve building architects with their own ability and capacity in their design.

CONTRIBUTIONS OF THE DISSERTATION

- Finding the process of investigating scientific basics concerning sustainable development which are employed in architectural design.

- Proposing “The Criteria system of sustainable architecture for design high-rise housing in Ho Chi Minh City”.
- Theoretical findings have helped to concretize sustainable development in architectural design.
- The sustainable architectural criteria can act as a tool for designing and evaluating sustainability-based high-rise housing design.
- The study can be developed to build up “The Criteria system of sustainable architecture for high-rise housing in Ho Chi Minh City”.

CHAPTER 1

OVERVIEW OF THEORY AND PRACTICE ON ARCHITECTURAL DESIGN “TOWARDS SUSTAINABLE BUILDING ENVIRONMENT”

1.1 Theory and practice on environment-related design movements worldwide

- **History of green movement in the world**

The twentieth century has seen the start of action of governments in order to preserve the natural ecological environments, which are distinctive and diversified in different parts of the world. Philosopher Aldo Leopold (1877-1948) had many innovative ideas that influentially helped form Green North America Movement and other movements for ecological environmental protection.

- **History of concept “sustainable development”**

In 1987, president of World Committee of environment and development, Norwegian Prime Minister Gro Harlem Brundtland was the first to define the term sustainable development “*“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”* [53,p.9]. The concept of S.D (sustainable development) was specified in 1995 through the model proposed by International Institute of Environment and Development (IIED) that S.D is the harmony of the three core areas: ecological environment, society and culture, economy and technology. [1, p.45].

- **Architectural design trends related to ecological environment, energy and sustainable development.**

There have existed Green Building Councils with green building evaluation standards. From the concept of Green Building comes the concept of Green Architecture. However, there is a significant difference between Green Architecture and Sustainable Development. According to The American Environmental Protection, sustainable design has a higher standard with a strong implication of “future”.

1.2 SOME GREEN BUILDING EVALUATION SYSTEMS

- **Some GB Evaluation systems**

The first GB Evaluation System introduced first in 1990 in the world is BREEAM by Great Britain Construction Research Agency [58]. To date, there have been nearly 200 G.B Evaluation Systems in the world, of which the most prominent are LEED from The USA, and CASBEE from Japan.

- **Comparison and discussion of different GB Evaluation Systems**

As a whole, all the systems focus on such major issues as quality of buildings, materials, water, waste, management, pollution, traffic and transportation, community, creativity, responsiveness, and natural catastrophic mineralization.

All the evaluation systems have almost similar evaluation methods except CASBEE by Japan Green Building Council.

1.3 Theory and Practice of environment –based design in Vietnam.

In August 2010, Vietnam Green Building Council (VGBC) introduced LOTUS, which is the first GB Evaluation System in the country.

Vietnam Construction Environment Council has proposed Criteria for GB Evaluation and Certification. This study established the Evaluation Standards for “Commercial and Residential Buildings which are newly constructed or largely repaired.” (Version 1) in august 2013.

1.4 CONCLUSION

- A. Establishing GB criteria has been the norm in many countries with the aim of protecting human environment for the present and the future.
- B. Green architecture and green building design have set their goal to solve ecological environmental problems, which, however, has yet to meet the requirement specified in the definition of sustainable development by The World Committee of Environment and Development.
- C. Green Building Criteria by each country have their specific major goal in each particular stage.
- D. The approach to establishing Green Building Criteria in the world is much similar to that of LEED by America Green Building Council except that of CASBEE by Japan Breen Building, which is quite different from others.
- E. High-rise housing design has not been based on sustainable design.
- F. The study of criteria for sustainable architectural design for high-rise housing in Ho Chi Minh City must correspond to the definition of sustainable development. Therefore, the findings of the study are expected to make a theoretical contribution which helps translate sustainable development into architectural design in general, and high-rise building design in particular.
- G. It is essential to study the criteria for sustainable architecture for high-rise housing in HCM City. From the framework, architects can have an instrumental method to design sustainability-based high-rise buildings.
- H. The Criteria for high-rise housing design in HCM City have showed their similarities with those typical in the world to ensure the inheritance, transfer and development.
- I.

CHAPTER 2

SCIENTIFIC GROUNDING FOR ESTABLISHING CRITERIA SYSTEM OF SUSTAINABLE ARCHITECTURE FOR DESIGNING HIGH-RISE HOUSING IN HO CHI MINH CITY

2.1 Investigation into high-rise residential building design in the light of sustainable architectural design

The dissertation has employed investigative methods to survey and evaluate high-rise projects realized in HCM City. All the buildings were constructed in districts 1, 2, 4, 5, 6, 7, Binh Thanh and Thu Duc designed by both local and foreign companies with varying scales. Questions were focused on: types of occupants, comprehensive planning, apartment and house design, etc. the findings were presented in table 2.1

2.2 ecological environmental factors that affect sustainability-based high-rise housing design

▪ **Relationship between architectural space environment and ecological environment**

Architectural space environment is taken as an open and dynamic system.

▪ **Physical ecological environment in connection with high-rise housings in HCM City**

There is interaction between the ecological environment with high-rise residential buildings. The integration may be one-way or two-way depending on a specific point of time. In addition, there is also impact from socio-cultural, economic – technological factors, namely

- Construction site and soil environment
- Natural water source in the region and clean water public source
- Flora, and living creatures and bio-diversity in the construction site.
- Natural resources in connection to building material
- Energy source in connection to the source provided for the building
- The region's air environment that affects the building
- Waste from the building to the environment (solid, liquid, gas, heat, ...)
- Physical climatic condition in HCM City

2.3 Socio-cultural factors concerning residential high-rise architecture in HCM City

There is interaction between socio-cultural factors and high-rise residential buildings, which may be one-way or two-way depending on each particular aspect. Moreover, those factors are under the impact of physical ecological environment and economic-technological factors, namely

- in human response to physical ecological environment
- in human response among each other in communities
- in family members' response
- in health care and education

2.4 Economic-technological factors that affect sustainability-based high-rise housing design

Economic-technological factors must be taken into consideration throughout lifetime of architectural space environment consisting of four stages: sources preparation, construction process, operation process, and treatment process of lifetime use.

2.5 Sustainable development and sustainable design in the world

In order to identify all the aspects about sustainable development and sustainable design in the world, the study made use of five material sources, from which 18 major points have been highlighted

- definition of sustainable development
- five characteristics that determine sustainability

- definition of housing sustainability
- four social goals to achieve sustainable development
- platform of twenty first century architecture

2.6 Evaluation methods in the light of the interrelated three core areas of sustainable development

- The relationship between three areas in sustainable development
- The weight between three areas in sustainable development applied for sustainable design criteria
- Qualitative and quantitative aspects in relation to criteria requirements in sustainable architectural criteria.

2.7 Conclusion

A. High-rise residential building architecture is in the increase in demand and has become the main housing trend in the future. However, the existing buildings have not yet met the requirement of sustainable development.

B. The architectural space environment is considered as a open dynamic system, which is identified with four stages of a building's lifetime. Each stage has a certain amount of impact of the building on the physical environment in general and the eco-system in particular. The environment of architectural space must be systematically studied in relation to the eco-system in the whole bio-sphere.

C. There is a mutual interaction between the physical ecological environment and high-rise residential buildings, which may be one-way or two-way depending on individual aspects, which in turn interacts with socio-cultural and economic-technological factors. Ho Chi Minh City, where there are not diversified resources, has to rely on resources (building construction, energy and water, ...) from other regions. On the other hand, proper treatment of urban planning, architecture and infrastructure has caused serious pollution. Many high-rise buildings are built in a small scale, scattered in the existing low-rise residential areas, therefore fail to create a sustainable environment and have a negative impact on three areas of sustainable development: ecological environment, socio-cultural, and economic- technology

D. The socio-cultural factor is one of the most significant in the study because it reflects a society in terms of its extent of awareness of ecological issues and treatment of the past and the present as well as human interaction in a large community and within a small family. These aspects are closely related to many fields in which architectural design has made enormous contribution through design, space layout, residential space components from the whole plan of the residential neighborhood to the plan of apartments. From the investigation of socio-cultural factors manifested in the cultural tradition, Vietnamese typical socio – cultural characteristics must be identified and translated into high-rise residential building design with all the traditional values refined and transferred and new values added. Socio-cultural features in high-rise residential design have been given humble attention from the full-scale space to apartment space, from the response to the physical environment to the response to the people in the region. Unsatisfactory settlements of these issues may lead to unstable socio-cultural foundations.

E. Economic factors are important factors. However, more proper treatments should be given to long-term and large-scale economic values as well as impact on other fields and industries. Technological progress has affected design, construction, operation, dismantling, material research and development. Construction techniques cause little damage to the environment and result in energy efficiency. Therefore, sustainability can be achieved throughout the building's life-time.

F. The evaluation method of the criteria for high-rise residential building design in HCM City considers the three areas: ecological environment, socio-cultural and economic-technological as three fundamental foundations of the sustainable development. The three foundations must be balanced to ensure stability and the three form a harmonious relationship, demonstrating itself at their overlapping at the center. Due to their relationship with three areas, some criteria in the sustainable architecture criteria can be determined by efficiency factors (quantitative methods) and some criteria by rule factors (qualitative methods) or in some cases, criteria must be determined by both methods.

CHAPTER 3

PROPOSING THE CRITERIA SYSTEM OF SUSTAINABLE ARCHITECTURE FOR DESIGNING HIGH-RISE HOUSING IN HO CHI MINH CITY

3.1 IDENTIFYING GROUPS OF CRITERIA FOR SUSTAINABLE ARCHITECTURE APPLIED TO HIGH-RISE RESIDENTIAL ARCHITECTURE

Making an exhaustive survey of all the criteria concerning sustainable development and sustainable architecture that the world is concerned with, the author proposes the sustainable architecture criteria for high-rise housing consisting of 14 groups of main criteria (see table 3.1).

3.2 RELATIONSHIP BETWEEN THE GROUP OF SUSTAINABLE ARCHITECTURE CRITERIA AND THE CONTENT OF THE CONCEPT ‘SUSTAINABLE DEVELOPMENT’

Analysis and demonstration of the criteria in the criteria group concerning three areas of sustainable development is presented in the table “Relationship between the criteria system of sustainable architecture for designing high-rise housing in the light of three core areas of sustainable development” (see table 3.2).

3.3 THE CRITERIA SYSTEM OF SUSTAINABLE ARCHITECTURE FOR DESIGNING HIGH-RISE HOUSING IN HO CHI MINH CITY

Based on the factors that affects the eco-system, sustainable architecture criteria for high-rise housing are identified. The criteria are classified into 14 groups, each consisting of sub-criteria. Each sub-criteria with their own characteristics may affect ecological environmental, socio-cultural and economic-technological aspects with varying degrees. (See tables from 3.3 to 3.17)

Tables 3.17 Point proportion of the the criteria system

CRITERIA SYSTEM OF SUSTAINABLE ARCHITECTURE FOR DESIGNING HIGH-RISE HOUSING IN HO CHI MINH CITY					
		CRITERIA	Points		
			MTST (EE)	VHXH (C-S)	KTKT (ET)
01	MTST&KĐ	Ecological Environment And Contrucstruction Land	16 (16%)	15 (15%)	7 (7%)

02	TKTT	Unit And Overall Design	14	15	8
			(14%)	(15%)	(8%)
03	TKCH	Apartment Space Design	10	10	15
			(10%)	(10%)	(15%)
04	TN&VL	Natural Resources And Building Materials	12	3,5	12
			(12%)	(3,5%)	(12%)
05	N	Water	8	3	8,5
			(8%)	(3%)	(8,5%)
06	NL	Energy	10	3,5	10
			(10%)	(3,5%)	(10%)
07	CT&PTON	Waste And Pollution Emission	5	4,5	4
			(5%)	(4,5%)	(4%)
08	KTGTTT	Inheritance Of Traditional Values	8	8	5
			(3%)	(8%)	(1%)
09	ĐKTNVL	Physical Facilities	7	12,5	12
			(7%)	(12,5%)	(12%)
10	TKAT	Safe Design	0,5	9	6
			(0,5%)	(9%)	(6%)
11	KNTU'	Adaptability	4	4,5	4
			(4%)	(4,5%)	(4%)
12	GDMT	Education-Environment	3,5	9,5	6,5
			(3,5%)	(9,5%)	(6,5%)
13	ST	Creative	2	2	2
			(2%)	(2%)	(2%)
14	QL	Construction And Operation Management	0	0	0
			(0%)	(0%)	(0%)
Total			100	100	100
			(100%)	(100%)	(100%)

3.4 THE EVALUATION METHOD FOR CRITERIA SYSTEM OF SUSTAINABLE ARCHITECTURE FOR DESIGNING HIGH-RISE HOUSING IN HO CHI MINH CITY

- **Scoring of criteria groups**

Based on the criteria of the proposed sustainable architecture evaluation, high-rise housing are evaluated in terms of each area of the sustainable development: ecological environment, socio-cultural, economic-technological (see Table 3.17 and Figure 3.1).

Each aspect is evaluated on the 100 scale. After each aspect has assigned a score, sustainable diagram will be used to examine the extent of achievement of high-rise housings in the region of interest.

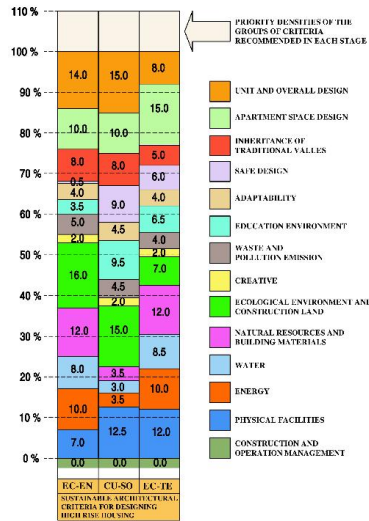


Figure 3.1
Point proportion of the criteria groups in the criteria system

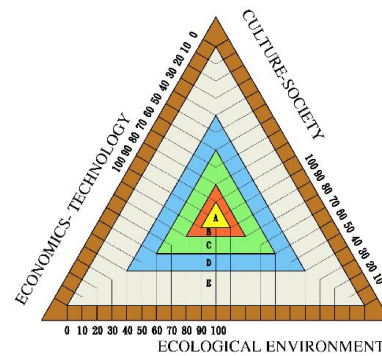


Figure 3.2
Sustainable Chart

▪ **Sustainable Chart**

“Sustainable Chart” is presented in the form of a triangle, each side of the triangle representing one of the three areas of the sustainable development model. Each side of the triangle shows the range of score from 0 to 100. The level of sustainability is presented in the model in the area of A, B, C, D, E (see Figure 3.2)

▪ **Evaluation Range**

In the “Sustainability Chart”, each level is showed in the area of A, B, C, D, E. The condition that must be met to achieve a level of sustainability is the actual score of the three areas must be overlapped in the space of the sustainability diagram. In the diagram there are 5 bands (A,B,C,D,E) with the following level of score (see Figure 3.3, 3.4)

- E: unqualified, achieving scores from 0 to <40 points
- D: two WHITE LOTUSES FROM > 40 TO <60 points
- C: three WHITE LOTUSES FROM > 60 TO <80 points

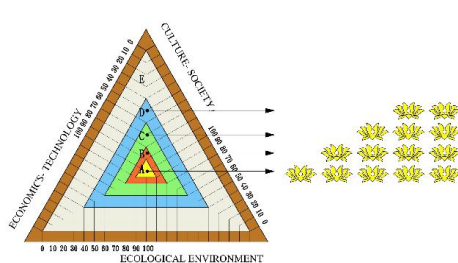


Figure 3.3
Sustainable Chart and levels

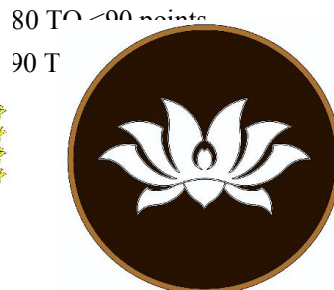


Figure 3.4
“White lotus” icon

- **Flexibility of the criteria system of sustainable architecture for designing high-rise housing in Ho Chi Minh City in practice**

In the score structure of the criteria, apart from the total score of each core area being 100 points, there is one more designed band, namely “prioritized weight for the criteria groups promoted in each stage”. This band in each core area has 10 points as a maximum additional score (10 %) (see Figure 3.1).

3.5 DESIGN SOLUTION ORIENTATION

Design solution orientation was worked out with the following aims in mind:

- Concretize requirements of sub-criteria in each criteria group of the criteria system.
- Clarify the method to achieve the purpose of each sub-criterion of the sustainable architecture criteria
- Clarify one way to achieve sub-criteria in each criteria group of the criteria system.

3.6 CONCLUSION

- A. In establishing the criteria for sustainability-based high-rise housing design, it's of crucial important to consider a building as a system, the Ph.D. candidate has proposed the sustainability architecture criteria with 14 groups of criteria, which cover the areas corresponding to a high-rise housing's whole life-time. These areas are within the working field of those who are involved in design, construction, management and operation. (That is, buildings are studied from the systematic viewpoint). Those concerning architects' design are taken as core criteria. These are criteria for evaluating architectural design that meets the sustainability demand. At the same time, the study has also made initial steps to propose “important” criteria, which are concerned with other fields closely related to design, construction, operation and operation. Admittedly, the “important” criteria are clarified in terms of ways to identify criteria and purpose, but not ways to meet requirements. The “important” criteria suggests new lines of study to strongly establish “sustainable architecture criteria for high-rise housing design in Ho Chi Minh City.
- B. There are sub-criteria in each group of criteria, the content of which are related to the three areas which form the concept of sustainable development: ecological environmental, social – cultural, economic – technological. Each criteria is assigned a certain weight of score. The proportion of score in the total is examined according to the role of each criterion in the sustainable architecture criteria system. The total score of each area (ecological environmental, social – cultural, economic – technological) is 100. (see Figure 3.17)
- C. In the scoring scheme of the criteria system, there is one area, namely “Prioritized weight of incentive criteria in each stage”.
- D. The Ph.D. candidate proposes “Sustainability Chart” which is a triangular model in which each side represents one of the three areas that form the concept of sustainable development, each side assigned the score from 1 to 100. In the “Sustainability Chart”, each level is demonstrated in a corresponding E, D, C, B, or A, which is interpreted as the grade of the building.
- E. The extent of a building that achieves the goal of sustainable architecture will be determined through the comparison of the score gained from the actual evaluation based on the “sustainable architecture criteria” and the “Sustainability Chart”.
- F. The Ph.D. candidate studies the orientation of architectural design solution that satisfies the demand of the sustainable architecture criteria for high-rise housing design in HCM City in order to further clarify the requirement of each sub-criterion, identifying some methods and ways to implement in design.

CHAPTER 4
COMPARISON AND CONTRAST, FINDINGS, AND DISCUSSION BETWEEN THE CRITERIA
SYSTEM OF SUSTAINABLE ARCHITECTURE FOR DESIGNING HIGH-RISE HOUSING IN HO
CHI MINH CITY AND THE GREEN BUILDING CRITERIA

▪ **Similarities between the two systems of criteria**

There are some similarities between some groups of criteria due to the same problems to solve. However, in each particular detail, there are always differences.

▪ **Difference and new features in the sustainable architecture criteria**

There exist differences in goals, content of each group of criteria and most importantly, the difference in the evaluation method.

4.1 FINDINGS

- A. The criteria system of sustainable architecture for designing high-rise housing in Ho Chi Minh City are meant to correspond to the definition of the concept sustainable development.
- B. The proposed sustainable architecture criteria system consist of 14 groups, 9 of which have the similar names to the green building criteria and 5 of which are newly invented.
- C. Regarding the content of sub-criteria, sub-criteria of The criteria system of sustainable architecture for designing high-rise housing in Ho Chi Minh City are worked out in order to evaluate simultaneous impact of the three core areas of sustainable development.
- D. The Ph.D. candidate proposes the “sustainability diagram” which is expected to show the grade that a high-rise housing achieves in HCM City according to the standards of sustainable development.

4.2 DISCUSSION

Similarities in some criteria primarily come from the fact that the sustainable architecture criteria aim at protecting ecological environment and saving energy just as the green building criteria (such as LEED and CASBEE) do.

Differences between the proposed sustainable architecture criteria system and LEED and CASBEE are demonstrated in the content itself as the former aims to deal with three core areas that constitute the concept of sustainable development. Another significant difference is the content of the criteria and their evaluation method which are substantially different from those of the green building criteria adopted by any countries in the world.

FINDINGS AND SUGGESTIONS

1.1 FINDINGS

1. Sustainable development is a demand of the present and the future in many fields including architectural design, which has got growing attention worldwide and which has initial research in the Vietnamese context.
2. The architectural space environment is taken as a open dynamic system, which is identified with a four-stage lifetime of a building. The architectural space environment must be studied systematically in relation to the ecological environment in the bio-sphere.
3. There is the interation between the ecological environment and high-rise residential buildings, which may be one – way or two –way by nature, and they themselves also interact with other social-cultural and economic-technological factors. Ho Chi Minh City, where there are not diversified resources, has to rely on resources from other regions. On the other hand, proper treatment of urban planning, architecture and infrastructure has caused serious pollution. Many high-rise buildings are built in a small scale, scattered in the existing low-rise

residential areas, therefore fail to create a sustainable environment and have a negative impact on three areas of sustainable development: ecological environment, socio-cultural, and economic- technology

4. The socio-cultural factor is one of the most significant in the study because it reflects a society in terms of its extent of awareness of ecological issues and treatment of the past and the present as well as human interaction in a large community and within a small family. From the investigation of socio-cultural factors manifested in the cultural tradition, Vietnamese typical socio – cultural characteristics must be identified and translated into high-rise housing design with all the traditional values refined and transferred and new values added.
5. Economic factors are important factors. However, more proper treatments should be given to long-term and large-scale economic values as well as impact on other fields and industries. Technological progress has affected design, construction, operation, dismantling, material research and development. Construction techniques cause little damage to the environment and result in energy efficiency. Therefore, sustainability can be achieved throughout the building’s life-time.
6. The evaluation method of the criteria for high-rise housing design in HCM City considers the three areas: ecological environment, socio-cultural and economic-technological as three fundamental foundations of the sustainable development. The three foundations must be balanced to ensure stability and the three form a harmonious relationship, demonstrating itself at their overlapping at the center. Due to their relationship with three areas, some criteria in the sustainable architecture criteria can be determined by efficiency factors (quantitative methods) and some criteria by rule factors (qualitative methods) or in some cases, criteria must be determined by both methods.
7. The Ph.D. candidate has proposed the sustainability architecture criteria with 14 groups of criteria, which cover the areas corresponding to a high-rise housing’s whole life-time. candidate proposes the “Sustainability Chart” Such triangle area that contains simultaneously the above three points represents the levels of certification of the architectural design achieved. The certification ranges from two to five white lotus icons (see Figure 3.4).
8. The findings have proposed a new model that concretizes the arguments of sustainable development in terms of architectural design in general as well as high-rise housing design in Ho Chi Minh City in particular.
9. The criteria system is used as a tool for architectural designers, managers, investors and users to assess design quality in accordance with the requirements of the sustainable architecture.
10. The study has also made initial steps to propose “important” criteria, which are concerned with other fields closely related to design, construction, operation and operation. Admittedly, the “important” criteria are clarified in terms of ways to identify criteria and purpose, but not ways to meet requirements. The “important” criteria suggests new lines of study to strongly establish “The criteria system of sustainable architecture for high-rise housing in Ho Chi Minh City”
11. The Ph.D. candidate studies the orientation of architectural design solution that satisfies the demand of the sustainable architecture criteria for high-rise residential building design in HCM City in order to further clarify the requirement of each sub-criterion, identifying some methods and ways to implement in design.

1.2 SUGGESTIONS

1. The contributions to the a building's lifetime from many experts from all related fields will help improve The criteria system of sustainable architecture for designing high-rise housing in Ho Chi Minh City
2. Further research is needed to find out the correlevance between The criteria system of sustainable architecture for designing high-rise housing in Ho Chi Minh City and Green building criteria such as LEED and CASBEE. From the result of such research, equivalence between sustainable architecture standards and green building standards can be established.
3. There should be further research into scientific grounding, requirements of “important criteria” in the criteria system proposed by the Ph.D. candidate so that “The criteria system of sustainable architecture for designing high-rise housing in Ho Chi Minh City” may turn into “The Criteria system of sustainable architecture for high-rise housing in Ho Chi Minh City”. That is, there is a set of sustainable architecture criteria which function as a basis for evaluating the whole lifetime cycle of high-rise housing in Ho Chi Minh City.