

## Chapter 3

### Methodology

As discussed in the introduction, in the redevelopment projects of subsidized apartments, the Vietnamese Government is lacking a legal tool for users' evaluation on the functional aspects of the building, which could complete information for the establishment of redevelopment projects. To contribute for the project implement of the 35<sup>th</sup> Resolution, this research selected the Dong Da apartment for a case study of Post-occupancy Evaluation (POE). The following methods are derived from literature review:

From reviewed methods of building evaluation, POE, an evaluation tool in the phase of the building redevelopment, is selected as the research method for the case Dong Da.

From reviewed Indicative POEs, ten steps of POE procedure of Wener, (1994) is a suitable procedure for a clarified research methodology.

From reviewed components of POE, this POE research adopts:

- + Questionnaire is the main instrument for data collection
- + User's satisfaction is the measurement of POE.
- + 27 sub-aspects of building function of Voordt (2004) for the users' evaluation

The three objectives of statistical techniques are applied in the POE, which are Descriptive Statistic, ANOVA and Mean Comparing, and Multiple Regression.

Finally, the suggestions of POE could be separated into three terms of the project implementation, which are short-term, medium-term and long term.

This chapter is organized into two main sections. First section describes research objectives. Second section contains the details of research design, which are based on the 10 steps of the POE procedure. However, for the clarification of a research thesis, step 9 (Result presentation and Discussion) has become Chapter 4 and step 10 of the suggestion became Chapter 5 of this thesis book.

### 3.1 Research Objectives

Nowadays, on the way to a free market, the Vietnam government has lacked an evaluation tool for redeveloping buildings that aim to get information from users/clients. Consequently, many projects of developing old apartments, which were mass products in the subsidized period, are delayed by the absence of users' evaluation in the project establishments. As well known by international method,

Post-occupancy Evaluation (POE) is an evaluation tool that addresses the problems of the building from the users' evaluation and provides information for a future design database. To demonstrate a applicable POE to the redevelopment projects of

subsidized apartment in Vietnam by a case study, this research select the Dong Da apartment complex that is lacking information of user' evaluation on the aspects of the building function. Then, this POE research establishes two main objectives:

1. To evaluate aspects of building function of the Dong Da apartments complex with the users' evaluations by the POE method
2. To propose suggestions from POE results to the project planner to enable the planning of an efficient project strategy for the Dong Da redevelopment project

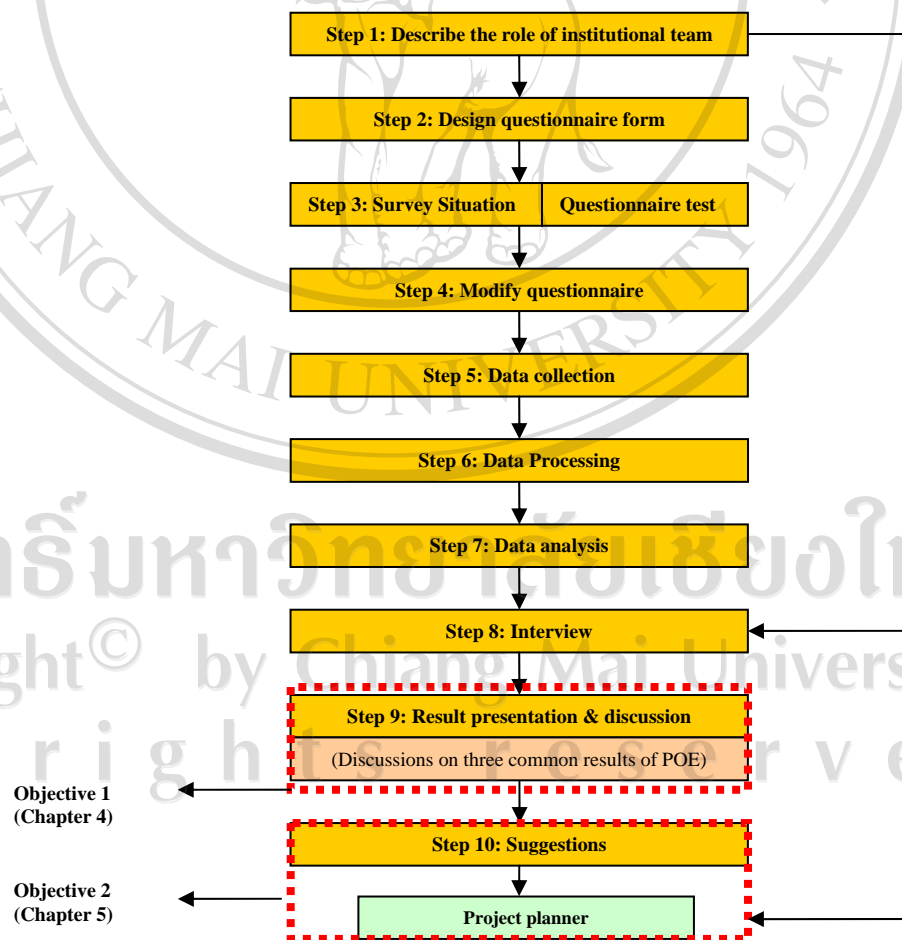
When accomplished, the fulfillment of research objectives could help the building manager or project planner to improve the disadvantages and develop the advantages of the building (Nasar, 2000). The architects, who may design the same type as the evaluated building, should avoid repeating the mistakes/disadvantages and develop the strong point/advantages of aspects of the building (Leifer, 1998).

As high application in project planning and policymaking, the differences in opinions/satisfaction of users will help the planner and the policy maker avoiding conflicts between the differed groups and designing a suitable plan or policy to different groups of users. (Sugur, 1998)

Project planners or investors could have an effective investment when they only focus on the positive correlation between the aspects of building and user's satisfaction. This application of the planner is to aim to get the highest possible satisfaction of the user, which could relate to the acceptance of users in their next decision for option choices. Liu, (1999); Joseph, (2000)

### 3.2 Research Design

Since this research adopted the ten step of the POE procedure as research methodology, the research design is presented in the order of a POE method. Aim of this organization of research design is to be more convenient for the next researcher who could develop a formal POE in Vietnam. In general, the ten steps of the procedure work in a following order. However, the purpose of some steps of the procedure not only conducts the next step but also links to the previous and some following steps. For illustration, below figure 3-1 is the diagram of the research design of the Dong Da POE.



**Figure 3-1:** Diagram of Research Design

For explanation of the diagram, the next section describes details of the procedure in each step. Firstly, the purpose of the step is introduced briefly, and then it will be described in successive procedures that are implemented in the POE Dong Da. In addition, the detail contents of step 9 (Results) and step 10 (Suggestions) will be separated into chapter 4 and chapter 5 because of the organization format of a thesis book. Below are more details of step 1 to the 8 step of the Dong Da POE procedure.

### **3.2.1 Step1- Describing of the Role of Institutional Team**

After contacting the administrator, Hue Construction Office - Housing management Department confirmed that Dong Da apartment is in planning to be a redevelopment project. However, the project has been delayed since 2004. In present, Dong Da project are three main components:

- Occupants or users of Dong Da apartment, who have right of estate, are participants of the POE. Specially, the building leader is also a user who has much experience about the disadvantages of Dong Da complex because he always listens to complains of users about this apartment complex. Therefore, he could give more details about the disadvantages of the Dong Da complex from the management's side.
- Hue Construction Office (HCO) deputized the People committee of Hue city, which has the last decision for the project implementation and control information of the housing project in Hue. Therefore, the information of the Dong Da should refer from HCO before a situation surveying.

- The Hue Construction Company (HCC) is making reports and is proposing the project, which will submit a proposal for HCO. However, the Planner said that this project could not get more information from the users because the user/ occupants ostracized the project establishment after the unsuccessful first meeting. However, HCO still appoints the HCC to realize this project. In the other words, the project planner of HCC is the first jurisdiction in Dong Da implementation and is also the first receiver of information of POE for the working of the Dong Da project.

Among three components of the Dong Da project, the Project planner is as the deputized for the local government, therefore, the research has to contact two main participants, which are the users and the project planner. In addition, the building leader who is living in the Dong Da complex is the manager rather than a user. In short, this step provides information for the next steps:

- In step 8: the building leader will be interviewed for disadvantages of the building management; the planner will discuss and select the applicable results to use in the Dong Da project
- In step 10: the projects planner who is the receiver of the POE Dong Da report

### 3.2.2 Step 2- Questionnaire Form Designing

According to the guidelines of POE and relevant POE researches, the form of the questionnaire has two main parts, which are parameters of user and parameters of



building aspects. In addition, the criterion of measurement of POE, which is user's satisfaction, was also mentioned in this part.

#### **a. Parameters of Users**

As the frequent parameter of user, five parameters were as criteria to classify the groups of users are the type of building, gender, floor height, time of occupancy and the size of the apartment. Below parts mentions the reasons that why this POE selects the five reviewed parameters for the POE in Dong Da complex.

Type of building: Altas, & Ozsoy, (1998) classified the groups of users on the 4 types of the building, then by mean comparing of users' satisfaction between 4 groups of users, Altas, & Ozsoy, (1998) found the best type of building with highest mean of users' satisfaction of groups of users in that building. Aim to find which building in the Dong Da complex has which better or worse aspects of building functions, the POE Dong Da will compare mean of user satisfaction between groups of users of different building types.

The floor height: Erkip, (2001) used criteria of Floor height to classify the different groups of users, then Erkip, (2001) found the users' satisfaction on the privacy of their living decreasing when the floor height of their living is increased. In the real situation of the development project in Hanoi, the users of the first floor always require a compensation of their living that is higher than the other floor heights. Therefore, the POE Dong Da might find out the reason of the differences of their satisfaction with the other floor heights. The project planners should know this

information when planning a suitable compensation for the users in a redevelopment project.

Gender: Erkip, (2001) also found that the male is less satisfied by the impact of climates. Because the POE Dong Da is an Indicative POE which is the general objective, therefore it also should study difference of gender as an empirical research.

Period of Occupancy: 1999 is the year of the privatization of property in Dong Da apartment. This time is a landmark of classification of the period of occupancy, because many new users moved in since this time. Besides, the users, who lived in the apartment in Subsidized Period (before 1999) at the Dong Da, are taken care of by the government because of reasons of a sensitivity policy. Therefore, the differences between the two group users will help the project planner/policy makers to a better understanding about them before making a policy to support the users of over 9 year occupancy.

The standard living: The area of the living relates to the density or crowding of people in an apartment. Sungur, (2001) and Erkip, (2001) found that the crowding has an impact on the decrease of the users' satisfaction. Beside, the Vietnamese government is planning a new standard of living area per person which is higher than 12sq per person. Therefore, the investigation of differences between the two groups of above and under the standard is as the proving for the judicious decision of the government when increasing the standard living area in building design.

In short, five main user's parameters/criteria to classify the groups of users are derived: Types of building (building A, B and C), Floor height (1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup>



floor), Gender (Male and Female) , Period of occupancy(over and under 9 years) and Standard of living area per person (higher and lower 12s.q per person).

### b. Parameters of Building Aspects

As mentioned in literature review, the 27 sub-aspects in the 9 main aspects by Voordt, (2004), which cover the criteria for aspects of building function, are derived:

**Table 3-1:** The 27 sub-aspects of building function (Voordt, 2004)

No	Sub-aspects of building functional quality
1	Reachability
2	Parking Facilities
3	The Physical accessibility
4	The Psychology accessibility
5	Location
6	Adequate access arrangements
7	Efficient layout
8	Sufficient floor area
9	Sufficient vertical dimensions
10	Functional use of colors and materials
11	Adequate equipment and arrangement
12	Flexibility
13	Adaptable
14	User ergonomics safety
15	Public safety
16	Fire safety
17	Constructional safety
18	Traffic safety
19	Chemical safety
20	Identity, Sign
21	Harmony of façade
22	Privacy
23	Social contact
24	Noise
25	Light
26	Interior climate
27	Sustainability

Among them, the ‘Sustainability’ aspect became the overall user satisfaction of the Dong Da apartment buildings because it is the general factor/aspects (Voordt, 2004).

### **c. User’s Satisfaction as Measurement of POE**

As a component of POE, the user satisfaction becomes the criterion of measurement for users’ evaluation, Schorr, (1966). In the second part of the questionnaire, each aspect of the building function has a rank of satisfaction level from a 1 to 7 grade scale, which makes 1= very dissatisfied; 2= dissatisfied; 3= a little dissatisfied; 4= neutral; 5= a little satisfied; 6= satisfied; and 7= very satisfied. In addition, the user could write more comments about their building in the last part of the questionnaire.

In summary, based on the format of the reviewed questionnaire of the relevant POE researches, 5 main user’s parameters or criteria to classify the groups of users, which are: Types of building, Floor height, Gender, Period of occupancy and Standard of living area per person. The 27 aspects of building function of Voordt (2004) are selected for the evaluated variables. Beside, the questionnaire was translated from English to Vietnamese before step 3, the questionnaire test.

### **3.2.3 Step 3- Situation Survey and Questionnaire Test**

Aim of this step is to check the difference between the database and the real situation; therefore, research should consider these aspects in the results discussion. Beside, the questionnaire test aims to find out mistakes or unsuitable questions for the next step of the questionnaire’s modification.

In situation survey, the researcher found that the long corridor of B building was separated. Therefore, this change should be considered in the results discussion. After the questionnaire is translated to Vietnamese, ten Vietnamese people, who are the users and a Vietnamese language professor, tested the questionnaire before a formal delivery to the occupants. In addition, the building/community leader agreed and offered suggestions for the questionnaire.

In summary, the design of the B floor was changed in the corridor, therefore, the researcher had to consider these aspects of the building in the results discussion (step 9). Besides, the result of this test was that most testers understood the questionnaire, however, some special words needed a more specific Vietnamese description and the format had to put in an introduction of the Faculty of Architecture, Hue College of Sciences. These adjustments aimed to get acceptance from users, who were prejudiced toward getting information of HCC.

#### **3.2.4 Step 4- Questionnaire Form Modifying**

Base on the previous step 3, this step deletes irrelevant questions, describing more the questions, change to suitable local language, and adjust the questionnaire form. Aim of this step is the revision of the questionnaire before a formal delivery to users.

In this step, the draft questionnaire was modified in the using of words for local usage and described more special words in Vietnamese, which are: User ergonomics safety, The Physical accessibility, and the psychology accessibility. Beside, the Vietnamese questionnaire format was changed to reduce the length of

page, which is more convenient to read. (Appendix 13). In short, the final questionnaire form was completed based on comments of the testers.

### **3.2.5 Step 5- Data Collection**

The aim of this step is to get sufficient data on the questionnaire form for the data analysis step. This step had two main processes, which are sample identifying (sampling method) and questionnaire delivering

#### **a. Sampling method**

Dong Da Apartment Complex (includes building A, B, and C) has 154 households. Avoid repeating sample in each household by probability sampling that could lead to deviation in describing the population of the Dong Da complex, the non-probability sampling was considered for the sampling. In other words, each questionnaire was delivered to each household. However, based on five criteria to classify the sub-groups of users, that are gender, time of occupancy, floor height, standard of living area and type of building, the quota sampling was used for the data collection.

#### **b. Questionnaire delivering process**

In the cooperation and introduced by the leaders of the apartment building and the Faculty of Architecture, the Hue college of Sciences, researcher met each household directly to deliver the questionnaire and make an appointment with them to collect it again. After delivery 154 questionnaire to 154 household, 25 households did not want to participate and 16 households did not return the questionnaire. Finally, researcher collected 113 questionnaires.

In short, 113 samples of different households per 154 households make the scope of inference from data analysis for the population of the Dong Da complex. Beside, the samples are distributed in balance of samples between sub-groups in the comparison test. Below table shows in more detail the sufficient sample in sub-group by quota sampling.

**Table 3-2:** Distribution of Sample in Groups of User in Dong Da Apartment Complex

	Criteria of the classification	Name of user group	Number of participated user	Percentage of participants per 113 house hold
1	Types of building	A	59	52.2%
		B	31	27.4%
		C	23	20.4%
2	High floor	1 <sup>st</sup> Floor	33	29.2%
		2 <sup>nd</sup> Floor	30	26.5%
		3 <sup>rd</sup> Floor	29	25.7%
		4 <sup>th</sup> Floor	12	10.6%
		5 <sup>th</sup> Floor	9	8.0%
3	Gender	Male	62	54.9%
		Female	51	45.1%
4	Period of occupancy	Above 9 years	21	18.6%
		Under 9 years	92	81.4%
5	Standard size of living area (12 sq.m per person)	Higher standard of living area	55	48.7%
		Lower standard of living area	58	51.3%

### 3.2.6 Step 6- Data Processing

For the data of the noted comments, researcher classified these notes into three types of comment that was also coded to find the most frequent comments of users:

- The comments from the users: are separated to 27 groups that relate to 27 sub-aspects of the building function. This classified information is for researcher's reference when the advantages/disadvantages of the aspects of building function are found by statistical test.
- The comments from the building leader: based on recording and notes of interview with the building leader, this information was grouped under the disadvantage aspects of the Dong Da complex, which are showed by the leader.
- The comments from the project planner: Based on discussions with project planner, this step notes the results of the Dong Da POE, which are selected by the project planner. Then, these notes are used for the medium-term suggestion, which relate to the next phase of the building.

The Statistical plug-in 3.0 and XLSTAT plug-in for Excel was installed for the data analysis. All data of the questionnaires was put into Microsoft Excel software. In particular, all parameters of users was coded following the name of user group, such as, male is M and female is F. Besides, the parameters/aspects of building function

were inputted based on the level of user satisfaction, which is from 1 to 7. In short, all data was put into two types, which are interval data of user satisfaction level and

nominal data of users' information. Both types of data help the statistical technique to be more flexible.



### 3.2.7 Step 7- Data Analysis

This step of POE aim to get the output information of the data analysis that will be interpreted and discussed in step 9. However, applying the statistical analysis depends on the objective of the research. Below table 8 is the introduction of the statistical techniques that could fulfill the research objectives:

**Table 3-3:** The statistical techniques conduct to three types of POE objective

<b>Statistical Objectives (Common results of POE)</b>			
	<b>Describe a single population</b> <i>(Advantages/ Disadvantage of building quality/user group)</i>	<b>Compare Populations</b> <i>(Differences between user groups/building quality aspects)</i>	<b>Analyze Relationship between variables</b> <i>(Relationship between the aspects of buildings and the overall satisfaction)</i>
<b>Statistical techniques</b>	Descriptive Statistics: Mean, Rank, bar chart, Frequency	Compare mean, ANOVA test	Multiple regression

As mentioned that the three common result of POE could fulfill the research objective, below are three processes of statistical techniques that conduct to the three common results of POE.

#### a. The Disadvantage and Advantage Aspects of Building Function in the Dong Da Apartment Complex

According to Nasar, (2000) Sugur, (1998) the advantages and disadvantages of the building aspects could be found by the following steps:

Firstly, average the level of the users' satisfaction of each Apartment

Building on each aspect of the functional quality to find means of the

users' satisfaction of the groups of user.

Secondly, when the mean of the user satisfaction is higher than level 4.50 (higher satisfied level), it would be an advantage; and when lower than level 3 (lower dissatisfied level) it would be a disadvantage of the building function.

Thirdly, the frequent comments of users on aspects of the building function from the interview describe more advantage/disadvantage aspects of the building function. Aim of this part is to provide evidence and reasons of those advantage and disadvantage aspects.

#### **b. The differences of satisfactions levels between user groups on aspects of building function**

Firstly, identify groups of users, which are based on the criteria of user group classification (Types of building, high floor, gender, period of occupancy and standard of living area per person).

Second, the line chart provides a visual illustration of mean comparing to identify the group of user that had different mean of users' satisfaction.

Then, to find the lowest and the highest satisfaction, the research

compared means of users' satisfaction level on aspect of the building function in each user group. Beside, ANOVA- test identify the different significance of user satisfaction level between user groups on each aspect of the building function. If  $P$  value  $< 0.05$  we infer that there is significant differences between groups of users. However, the ANOVA test is only implemented in which aspects had the hypothesis.

### **c. The relationship between user satisfactions on aspects of building function and the overall satisfaction of users**

Based on result of Multiple Regression with stepwise model, the choice of predictive variables is carried out by an automatic procedure. This test provides the predictive model of the overall satisfaction of users by the independent variables of aspects of building function.

In short, this step of data analysis of the Dong Da POE sufficiently carried out output of data-analysis for interpretation of the results discussion in step 9. As the following, step 8 will describe more the re-data collection/interview that is to provide more evidence for the results of data analysis

#### **3.2.8 Step 8- Interview**

After data analysis, the results should be confirmed by re-data collection for strong evidence (Wener, 1994). Researcher interviewed three main groups of participants of Dong Da POE, which are the users, building leader, and project planner. In addition, the interview with the project planner was a part of the result discussion, which brings the Dong Da POE to a high application level.

##### **a. Interview the with Users**

This step will interview special people, who had the lowest or the highest satisfaction about their building. The information of this interview will be referred to for the advantages and disadvantages of each building.

The main questions of the interview are:

Did you feel low or high satisfaction in that aspect of the building?

Could you tell me why? or what reason made you think that?

All information of the interview was noted in the questionnaire for the interviewee. This information became the users' comments for the advantages and disadvantages of the building by the content analysis. Besides, photo capture is a detailed description for the advantages and disadvantages of each building; however, many users refused the photo capture because of their privacy.

#### **b. Interview the leaders of the building**

The building leaders, who are also the leaders of the community, usually listen to complains of the users. Therefore, they have a good understanding of the disadvantages of the building. The aim was to gather more information; the most common questions for the leaders were:

Do you think that these advantages and/ or disadvantages of this building are real?

Could you give me some information about the advantages and/or disadvantages of building management in the Dong Da complex?

As expected, the three leaders gave more disadvantages of the building, which were hidden in the sub-aspects of functional quality of the building but were not expressed as such on the questionnaire. As complement, this information was cited in the summary of disadvantages of each building in chapter 4.

#### **c. Interview the project planner**

For the application of research, the raw data analysis was presented to the project planner, who really wanted to know more about the users of the Dong Da apartment. During the presentation researcher asked the project planner the following:

- What do you think about applicable results of the Dong Da POE?
- What more information would you need to obtain for the project?

During the cooperation with the project planner, he claimed that he did not know about POE before. However, all this information from POE is very useful for re-establishing the Dong Da project. This information will support his reporting of the functional quality of Dong Da apartment complex to the government and the investor. In present, the information which is interesting for the project planner, is the real ability of users to pay for the new apartment and the building type with high acceptance of the Dong Da users.

In summary, as supporting evidences and exploring more information for the results discussion, this section has 3 main parts of information from the interviewees.

First, the users, who had low and high satisfaction, provided more reasons and implication of the advantage/disadvantages of building function. Secondly, the building leader provided more disadvantage aspects of the building function. Thirdly, the project planner of the Dong Da project discusses the results of the Dong Da POE.

### **3.2.9 Step 9- Result Presentation** (Described more in Chapter 4)

As the answer to the first research objective, purpose of the 9<sup>th</sup> step, is to present the results of research, which are the three results of POE.

### 3.2.10 Step 10- Suggestions (Described more in chapter 5)

According to the second research objective, this chapter is offering suggestions on three terms (short-term, medium-term and long-term) of building performance, which was mentioned by Presier & Nasar, (2008). Finally, to recognize the POE Dong Da, the general director of Hue Construction Company received the POE results in the proceeding of the Dong Da project. It is a prospect of this case study that this chapter might be of help in other redevelopment projects that are in the same situation as the Dong Da apartment complex in Hue City.

### 3.3 Summary of Methodology

This chapter provided a description of the research method and procedure. In particular, the 10 steps of POE are introduced in order. Inside each step of the procedure, the developed POE process by the researcher also was presented for other researchers to further develop POE. In summary, this chapter includes:

Basically, the researcher developed the ten step of POE of Wener, (1994)

The three common results of POE are a consequence of three main

objective guidelines of statistical techniques, which are described in a single population, compare populations and analyze relationships between variables. This is to ensure to fulfill the research objective.

The statistical techniques are applied in the Dong Da POE:

- + Descriptive Statistic finds the advantage/disadvantage aspects of the building functions in Dong Da complex



+ ANOVA test and Compare Mean find the difference between groups of users in Dong Da complex

+ Multiple Regression with stepwise model carried out the factor/aspects of building function that could influence the overall satisfaction of users in a predictive equation.

The notes of the interview provided evidences and exposed the reasons of the advantage/disadvantage aspects of building function.

Hence, for more detail of the results from all data analysis, chapter 4, which is also step 9 of the POE procedure, will describe in more detail the results and discussion of the Dong Da POE.