

CHAPTER 5

DISCUSSION AND CONCLUSIONS

5.1 Introduction

The overview process of study can be summarised as follows: Firstly, the traditional university selection decision process and the way of accepting new students of public university are studied. Next, a comprehensive list of criteria influencing university selection decisions is investigated and determined from various relevant sources. After that, the decision criteria which the potential students might consider in selecting university is synthesised, defined and rearranged into each cluster. The empirical study is then used to determine the proper criteria and sub-criteria and identify the preliminary membership of elements in the clusters and relationship among pairs of elements within clusters as well as between clusters. Questionnaires are then developed and distributed to the experts in order to ensure the membership and relationship. Analytical Network Process (ANP) approach is applied to university selection decision problem with the both types of admission systems and sensitivity analysis is also employed to test uncertainty existing in university selection decision environments. Lastly, model evaluation is performed to ensure the appropriateness of the model.

This chapter presents the main research findings and concluding remarks of this thesis. A brief summary of the research achievements is listed in the next section. Then, distinctive characteristics of the research and suggestion for improvement are summarised. Limitations of research are then discussed. Then, the research contributions built by this study are described. Finally, suggestions for further studies and future expansion are proposed.

5.2 Summary of Research Findings

The thesis has accomplished the objectives stated at the beginning of the research as follows:

1. Investigate desired characteristics of criteria influencing the university selection decisions so as to guide the appropriate criteria selection for a

current decision environment which interaction and dependencies between criteria are specifically allowed.

2. Investigate the stakeholders of a university so as to serve the different purposes for performance measurement, and lead to different criteria for decision making.
3. Understand the process of the university selection decision in practical perspective across/cover both types of admission system.
4. Investigate the common criteria influencing the university selection decision in engineering discipline so as to identify subsets of criteria appropriate for particular circumstances.
5. Show what criteria and sub-criteria influence the university selection decision and how for both types of admission system.
6. Develop a structured but flexible framework to make and evaluate university selection decisions that allows interaction and dependencies between criteria including incorporates both quantitative and qualitative criteria so that decision makers and practitioners can tackle such decisions more effectively.
7. Evaluate the model to confirm whether the developed model is appropriate for university selection decision of the potential students.

The research has made key findings in the light of the minor objectives of research. The arrangements/preparations of the research can be outlined as follows:

- The desirable characteristics of criteria for the university selection decision are investigated and summarised that all desirable characteristics of criteria reported in Chapter 2 are followed clearly except the one on absence of redundancy, which is deemed restrictive. This is because following this characteristic strictly would construct the decision environment considered in this research, since interaction and dependencies between criteria are specifically allowed in the current decision environment as studied in this research
- A comprehensive set of criteria and sub-criteria influencing the university selection decision of the potential students has been gathered and categorised into 13 major criteria and 68 sub-criteria. The set of criteria provides an initial basis for both researchers and practitioners when considering the university

selection decision- what criteria might be needed to be taken into consideration. The comprehensive set of criteria also provides a basis for the empirical study reported in Chapter 3.

- The research has adopted the integrated means of data collection, which comprise a brainstorming by focus group discussion and postal questionnaires in order to identify proper criteria and sub-criteria affecting the university selection decision in engineering discipline, as well as establishing and confirming the preliminary membership of elements in the cluster and relationships among pairs of elements within and without clusters.
- The findings indicate that decision criteria and their importance vary depending upon background of decision maker and type of admission system.
- The components of Common Criteria Model (Control Hierarchy, Control Criteria, Control Sub-Criteria, Clusters, Elements and their relationships) are discussed and agreed with the local expert counselling persons, academic staffs, so that it can represent the criteria involved from the viewpoint of the experts. Result of discussion and agreement are reported in Chapter 3.
- The focus group interview determine the proper criteria and sub-criteria for selecting university offering engineering discipline in the north-eastern region of Thailand and to identify the preliminary membership of elements in the clusters and relationship among pairs of elements within clusters as well as between clusters. The brainstorming of focus groups result showed that the main important criteria/components are: admission, financial requirement, faculty resources, academic resources, social experiences and outcomes.
- The postal questionnaires developed to ensure/reduce the membership and relationship and steps of data collection procedure by means of questionnaire are as follows: Step 1: brainstorming a focus group interview, Step 2: analysing data, developing the questionnaires from the results of steps 1 and piloting them. Step 3: distributing the postal questionnaires to 100 experts who have been selected from high schools and universities in the north-eastern region of Thailand, Step 4: collecting and analysing the questionnaires and Step 5: presenting the results not only the membership but also the most suitable relationships and interdependencies of each pair of the elements.
- The study has demonstrated how the ANP model can be applied in real practice. The potential application of the model is illustrated with key

decision-makers in two different types of admission systems—quota admission system, entrance admission system—in order to gain insights into the decision-making process on the university selection.

5.3 The Distinctive Characteristics of the Research and Suggestion for Improvement

5.3.1 The Distinctive Characteristics of the Research

The distinctive benefits of this research can be summarised as follows:

- The study helps to eliminate the limitation for pairwise comparison in Analytic Hierarchy Process since in reality, decision-making process is unable to be arranged in hierarchical structure/form.
- In order to compare the importance of decision criteria, the influence of criteria is taken into account, thus making the comparison of each alternative similar to that of the human decision making process.
- The finding of the decision criteria effecting university selection decision indicates that the experts who have experienced in engineering professionals including are the decision makers of the decision making structure; for instance, faculty, alumni, existing student from last year, and engineering academic staff and counselling staff both in high schools and universities.
- The finding is useful to the administrators who deal with marketing plan and quality development of the educational industry.
- A guideline for developing Analytic Network Process (ANP) and other decision support tool are created and applied to analyse the problems of potential students' decision making when selecting university offering engineering discipline in the north-eastern region of Thailand.

5.3.2 Suggestion for Research Improvement

Suggestion for research improvement can be summarised as follows:

- Both the questionnaires and interview are applied in order to compare the importance of various criteria and the influence on each criterion. The comparison may confuse the questionnaire respondents. Also, the responses may be different from what they think.

- The study monitors four alternatives in order to prevent the confusion in alternative comparison. However, there are more alternatives for the potential students/DMs or practitioners to select. As a result, this study is unable to cover all alternatives of the problems of decision-makers' in making a choice when university selection decisions.
- According to the weight of importance of various criteria or alternatives under a criterion, the respondents/applicants may not experience the features of the alternative selections by themselves. Therefore, the comparison of the alternative under some criteria is slightly different from the real situation.

5.4 Limitations of the Research

Although carefully designed and completed throughout the study, the research has certain limitations in some ways, in common with other research of this type. The main limitations are noted below.

5.4.1 Formulating ANP Model

The process of developing criteria in the university selection decisions for this research lacks the validity/confirmation from the experts in engineering field. As a result, the criteria used for this study are not complete since limited time and budgets. However, the criteria can use the guideline for demonstrating ANP model with the university selection decisions. Moreover, the process of making focus group brainstorming is also limited for the experts' co-operation and insufficient budgets. Therefore, the results of making focus group interview are not ideal since the participants are not representative of the experts coming from the north-eastern region of Thailand.

In the case of extension of ANP model for university selection to all regions of Thailand, it should verify/confirm the criteria that use for university selection decision by the engineering experts in aspects of validity, correspondence, and practicability. Moreover, the experts' invitation to participate the focus group brainstorming should be sufficient and cover all regions.

5.4.2 Applying and Evaluating the Developed Model

Since the model was developed from the empirical evidence, only relationship and dependencies between pairs of elements that were found to be significant from the data analysis were included into the network structure. Also, due to time and resources constraints, the process of applying the model was mainly conducted with six and twenty potential students who apply through quota and entrance admission system.

It should also be noted that the study only tested the ANP applicability with the process for decision making in the selection of university program. The findings indicate that that the model was found to be useful. However, it does not mean the decision obtained from the model are effective. Brief aspects of university selection criteria and linear studies may, therefore, need to be carried out to assess the impact of the model. It is also necessary to refine the model by testing it with a wide range of the target groups for evaluation which reported in Chapter 3 in order to make it more robust.

5.5 Contributions of the Research

In summary, this research has made contributions to the area of university performance measurement as follows:

1. The contribution of this study is in identifying proper criteria affecting university selection decision in engineering discipline from the potential student perspective and provides the relationships between Common Criteria Model and membership of elements in the cluster and relationships among pairs of elements within and without clusters. No reported research explicitly addresses the membership of elements in the cluster and relationships among pairs of elements within and without clusters. Also, no reported studies can found on the issue of investigating the definitions and relationship the Control Hierarchy, the Control Criteria, Control Sub-Criteria, Clusters, Elements and their relationships for the university selection decision. The value of the research also lies in methodologies utilised in the empirical investigation.
2. The second contribution of the research is developing an empirically based structured framework to tackle the university selection decision problem which is complicated and without decomposing them into a hierarchical form and want to deliver more accurate results. The essence on the decision maker

can be overcome by using Analytic Network Process (ANP) through its strength - the interactions and dependencies between the higher or lower level elements of the cluster relationships - all of which are unavailable in AHP (Hamalainen and Seppalainen (1986)). Therefore, ANP can be used to generate a better in-depth analysis and to deliver more accurate results than AHP. The evaluation framework is generic and flexible in nature and is applicable in helping the potential students or practitioners in dealing with the university selection decision more effectively.

It is hoped that both the framework and the findings will benefit counsellors in both high schools and universities, the potential students or applicants, and their parents wishing to choose a university, in helping the potential students in selecting a university in order to achieve their future life goals. The framework can guide practitioners and decision-makers in analysing and choosing the most appropriate university for their study.

5.6 Recommendations for Further Research

The worthwhile extensions of this work can be done for interested researchers as listed below.

1. It would be beneficial if further research on empirical study: Brainstorming by focus group and the people who is tested and evaluated of the developed model could be carried out with a larger sample size of experts or the potential students across whole region of Thailand in order to extend the generalisation.
2. In chapter three, the university performance measurement with the potential student perspective, there is a possibility to add more attributes to the control criteria and sub-criteria, and explore the consequent effects. Moreover, if we change the components in clusters, elements and relationships, the results could be different. With particular reference to the relationships between control criteria and sub-criteria, this research selected to define these relationships in a complicated way, based upon brainstorming with focus group discussions with various experts. Alternatively the relationships can be

defined by just simply connecting all clusters together and exploring the results.

3. In designing model, there should have ANP based models for the university selection decision more than three choices, then only one model is selected that is suitable for the university selection problem.
4. The group decision making should conduct in the university selection decision
5. It would be beneficial if further research to be extended to the whole region of Thailand, and not only engineering discipline but also another field of study.
6. The application ANP model for the university selection decision can expand to other level of education such as graduation level, high school, and vocation/diploma level including another field, for example machine selection decision problem, location selection decision, project selection decision and various performance measurement problem.
7. It would be of great interest to conduct sensitivity analysis on group decision making or the effect of changes in decision-makers' preferences.
8. It would be beneficial if further research to be developed to the decision support system in form of the Internet to help all decision-makers and to be easy for current information of various alternative universities.

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