

Chapter 3

Research Methodology

3.0 Introduction

In consideration of the methodology best suited to carry out research on current factors influencing operational efficiency and job satisfaction a range of approaches were examined. This chapter provides an in-depth analysis as to the methodological approach, research approach and research strategy employed by the researcher.

3.1 Methodological Approach for Operational Efficiency using DEA

The first step in conducting a DEA-based efficiency study is to determine the most appropriate scope which entails determining the best inputs and outputs. "Sometimes the study's most important contribution is providing managers with the discipline of having to specify their outputs and inputs and how they can best be measured" (Provision, 1997).

3.1.1 Determining Appropriate Inputs and Outputs

The importance of obtaining the best possible inputs and outputs is to negate one of the major limitations of DEA as mentioned above; "The measures of outputs and inputs should be as comprehensive as possible: not including some output dimensions will disadvantage those organizations which are relatively efficient at producing those outputs...As a result, the ideal selection includes the smallest number of output and input measures that adequately captures all essential aspects of the organization's operations" (Provision, 1997).

Once inputs and outputs have been determined, it is necessary to collect the data from the sample based on the chosen inputs and outputs. For the purposes of this study, the researcher decided that an input-orientated DEA approach would be best suited as it would allow NGOs to get a clear picture of how they can improve their operations

based on their inputs. The data for this study was obtained through the use of questionnaires, interviews and also some secondary data such as annual reports.

Table 3.1 explains the inputs and outputs that the researcher decided that best “capture all essential aspects” of each NGO it would be best to use two input one output approach. The inputs that the researcher feels were most suitable to take into consideration are: 1) number of workers; regardless of whether they are volunteers or paid staff, and 2) total amount of expenses used to achieve their output. The output to be used for this study is defined as *the total number of lives impacted* by each organization.

Table 3.1 Explanation of DEA Inputs and Outputs

Input	Description
Number of workers	Paid staff, volunteer staff, part-time or full-time
Total expenses	The total amount of finances used during each period to achieve output for that period
Output	
Total number of lives impacted	The total number of individual lives that are directly impacted by the organizations projects (Recipients of aid)

3.2 Population and Sample Selection

Based on the limited data available regarding the number of NGOs in Chiang Mai the researcher was able to find a total of 44 organizations that operate in Chiang Mai. These 44 organizations can be classified into seven different types in terms of their specialized areas of work. The seven types are: Youth, Women and Orphans,

Environmental, Disabilities, Human Rights, Health-care and Education and Relief & Community Development (Athakravi, 2005).

The researcher has experience of working in relief & community development organizations and therefore chose to focus the study on this particular sector. In this sector the researcher was able to identify 12 international NGOs of which seven were willing to take part in the study. The pie-chart below provides an overall view of the types of NGOs operating out of Chiang Mai as well as their percentage.



Figure 3.1 Pie-chart of Types of NGOs in Chiang Mai

The seven NGOs which participated in the study had a population of 160. These NGOs were willing to provide information for measuring efficiency as well as job satisfaction. For this, the researcher required the organizations to provide the latest annual reports and allow the researcher to conduct a survey with the staff in order to assess the satisfaction levels. Of the seven, three were organizations that had mixed staff and the remaining four organizations had only paid staff.

It is important to note here that in order for DEA to work well the organizations have to be similar and despite the fact that there are many International NGOs in Chiang Mai not all of them are working in similar fields. The researcher was not able to

include organizations without their consent and this therefore decreased the number of participating organizations.

3.3 DEA Concept and its Formula

For the purpose of identifying efficiency levels of NGOs in Chiang Mai the researcher seeks to explain how DEA can be calculated keeping in mind the objectives of the study.

The researcher decided it would be most useful for NGOs to understand what inputs could be minimized while keeping the NGOs output constant. In DEA terms, this is known as “an input-orientated version of DEA” (Provision, 1997). By understanding what inputs can be reduced while maintaining a constant level of output managers will be better able to utilize their resources to improve the efficiency of the NGO.

The linear programming formula for an input-orientated version of DEA is provided below:

Minimize E_n with respect to w_1, \dots, w_N, E_n

Subject to:

$$\begin{aligned} \sum_{j=1}^N w_j Y_{ij} - E_n Y_{in} &\geq 0 & i = 1, \dots, I \\ \sum_{j=1}^N w_j X_{kj} - E_n X_{kn} &\geq 0 & k = 1, \dots, K \\ w_j &\geq 0 & j = 1, \dots, N \end{aligned}$$

Y_i ; Number of Human Lives Impacted and inputs (X); Total number of staff and total expenses

Where there are N organizations in the sample producing I different outputs (Y_{in} denotes the observed amount of output i for organization n) and using K different inputs (X_{kn} denotes the observed amount of input k for organization n). The w_j are weights applied across the N organizations. When the n th linear program is solved, these weights allow the most efficient method of producing organization n 's outputs to be determined. The efficiency score for the n th organization, E_n , is the smallest number E_n which satisfies the three sets of constraints listed above. For a full set of efficiency scores, this problem has to be solved N times – once for each organization in the sample (Provision, 1997).

The formula displayed above is implying that the efficiency score for the n th organization should be minimized subject to three sets of constraints. The factors that can be varied to do this are the weights w_j and the score E_n itself. The weights are used to form the hypothetical organization lying on the frontier. The constraints are, that the weighted average of the other organizations must produce at least as much of each output, as does organization n (the first set of constraints above), while not using any more of any input than does organization n (the second set of constraints above). The third set of constraints simply limits the weights to being either zero or positive (Provision, 1997).

Table 3.2 explains how the above mentioned formula can be implemented:

Table 3.2 Hypothetical Data Set for NGOs (One Output – Two Inputs)

Organization	Number of Human Lives Impacted	No. of Staff	Budget
1	450	20	400
2	370	25	350
3	280	22	422
4	500	30	289
5	690	32	375

The DEA formula for the first organization in the one output, two inputs example would be:

Minimize E_1 with respect to w_1, w_2, w_3, w_4, w_5 and E_1

Subject to:

$$450w_1 + 370w_2 + 280w_3 + 500w_4 + 690w_5 - 450 \geq 0$$

$$20w_1 + 25w_2 + 22w_3 + 30w_4 + 32w_5 - 20E_1 \leq 0$$

$$400w_1 + 350w_2 + 422w_3 + 289w_4 + 375w_5 - 400E_1 \leq 0$$

$$w_1 \geq 0, w_2 \geq 0, w_3 \geq 0, w_4 \geq 0, w_5 \geq 0$$

The first constraint requires that the weighted average of the output of *human lives impacted*, less organization 1's output of 450, be greater than or equal to zero. This means that the hypothetical frontier organization for organization 1 has to have an output of at least 450. In the same way, the second and third constraints require the hypothetical organization to not use any more than organization 1's 20 (labor) and 400 (capital) respectively (Provision, 1997). The above example is only for the first organization and the same will need to be calculated for the remaining four organizations. As the data set increases, "this system of equations is not trivial and requires a computer program" (Provision, 1997).

The results obtained from solving this DEA problem will provide the researcher with the Technical Efficiency (TE) of each organization. Any organization that has a TE score of 1 is considered to be 100% efficient, the rest of the organizations will obtain a score between one and zero. "The efficiency scores estimate the extent to which both inputs would need to be reduced in equal proportions to reach the production frontier.

3.4 Statistical Test of Difference between Means of Technical Efficiency and Job Satisfaction

In order for this research to be useful it is important that the information obtained from the DEA analysis is linked with the Job Satisfaction analysis. In order to achieve this, the researcher decided to use the statistical approach "Test Difference between Means". This will allow the researcher to answer the objectives outlined in Chapter One and will enable the research to be a useful tool for managers in these International NGOs.

Following is the statistical formula of T- Test which was used to link and compare the data from both DEA (management efficiency scores) and the JSS analysis (job satisfaction levels). There are two types of T-tests which were used in this study. The first is the case where there is an unequal sample size and equal variance between the two samples and the second is the case where there is; unequal sample size and unequal variance between the two samples.

$$t = \frac{\bar{x}_1 - \bar{x}_2}{S_{x_1 - x_2}}$$

Where

$$S_{x_1 - x_2} = \sqrt{\frac{S_2^2}{n_2} + \frac{S_1^2}{n_1}}$$

Where the degree of freedom (d.f.) for the case where there is an unequal sample size and unequal variance between the two samples can be calculated as follow:

$$d.f. = \frac{\left(s_1^2 / n_1 + s_2^2 / n_2\right)^2}{\left(s_1^2 / n_1\right)^2 / (n_1 - 1) + \left(s_2^2 / n_2\right)^2 / (n_2 - 1)}$$

3.5 Methodological Approach for Job Satisfaction

Saunders presents two research philosophies: positivism and phenomenology to developing and judging knowledge. Taking a third-person view, the positivist believes that any test can be redone to draw the same conclusions as before. The phenomenologist, on the other hand, becomes a part of the research in the belief that only thorough examination of the social setting and the distinct interpretations and views of the individuals involved can the social reality be determined (Saunders, 2003).

Given the particular nature of this research topic it seemed logical to employ the philosophy of phenomenology. As a phenomenologist the researcher took into account individual interpretations, views and values of the NGOs in the sample to better understand their organizational social reality.

3.6 Research Approach

The research approach better informs the research design. Saunders et al (2003) present the deductive and inductive approaches but according to Bryman and Bell a third approach, commonly known as the abductive approach, also exists (Bryman, 2003).

Whilst the deductive approach systematically tests an existing theory by using controls to see whether the hypothesis stands, the inductive approach builds a theory and then proceeds to test it through qualitative measures such as interviews, observations and focus groups. This method considers both the context and the individual, or group interpretations, to better understand how they construct meaning from their reality. The abductive approach employs the use of a theoretical framework for analysis while being open to the emergence and development of other theoretical frameworks as the research goes on.

As the researcher sought to examine current levels of job satisfaction of staff in NGOs, the abductive approach was the most appropriate. This study used motivational theories discussed in the literature review as a theoretical framework to further explore the factors influencing job satisfaction in NGOs and determine their applicability.

3.7 Research Strategy

Research strategy stems from a clear research purpose and list of objectives and seeks to justify how these objectives will be fulfilled. Given the nature of the research purpose (examining current levels of job satisfaction in NGOs in Chiang Mai) the relevant research strategies will be: surveys, exploratory, descriptive and explanatory.

The researcher used the survey strategy through a questionnaire designed to develop the research study and further its findings. The exploratory strategy enabled the researcher to inform the research question through the use of the literature review and be an informal participant in an observer role. The descriptive strategy will facilitate analysis of inputs, output and staff in NGOs and will help contextualize job satisfaction in the HR personnel. And finally, through the explanatory strategy the researcher can draw conclusions and explain casual relationships between variables, such as, for example, motivation leads to job satisfaction, which in turn, leads to improved work performance.

3.8 Methods used for Inquiry

Following is a look at how the researcher plans to obtain relevant data as it pertains to job satisfaction.

3.9 Structured interviews

The researcher made use of structured interviews with the managers of the seven organizations to obtain information regarding the perceived satisfaction levels of their employees. This allowed the researcher to better understand the organization and its goals and objectives. In addition to using structured interviews the researcher also made use of a questionnaire which is explained in the next section.

3.10 Questionnaire

In order to examine the current levels of job satisfaction of staff in NGOs the Job Satisfaction Survey (JSS) was chosen as a relevant research strategy. The JSS was used primarily because it was designed to be applicable specifically to human service, public and non-profit organizations. The JSS was developed by Paul E. Spector as a more in-depth measure of job satisfaction. Spector (1985) states that though it is widely understood job satisfaction is not consistent with performance “there is

evidence that satisfaction is associated with employee performance and client outcomes”.

Table 3.3: Job Satisfaction Survey Subscales

Subscale	Description
Pay	Pay and remuneration
Promotion	Promotion opportunities
Supervision	Immediate supervisor
Fringe Benefits	Monetary and non-monetary fringe benefits
Contingent Rewards	Appreciation, recognition and rewards for good work
Operating Procedures	Operating policies and procedures
Co-workers	People you work with
Nature of Work	Job tasks themselves
Communication	Communication within the department

Source: Spector, 1985.

Whilst there are other scales that exist to measure job satisfaction, e.g. Job Descriptive Index (JDI) and the Minnesota Satisfaction Questionnaire (MSQ), they do not adequately reflect human service organizations (Spector, 1985). “The JSS measures nine aspects of job satisfaction, [that] were chosen from a review of the literature on job satisfaction dimensions” (Spector, 1985) and is considerably shorter in length.

The 36 questions which make up the JSS are based on a nine-factor scale. Together these factors aid in the individual assessment of “evaluative feelings about the job” (Spector, 1985). Four questions are allocated to the assessment of each of the nine

factors on the scale. Spector uses a “summated rating scale format with six choices per question ranging from ‘strongly disagree’ to ‘strongly agree’” (Spector, 2001). The nine subscales and their descriptions are outlined in Table 3.3

3.11 Data Collection

The JSS was hand delivered to all employees in the data set (organizations) and was also translated into Thai as a large portion of the respondents were local staff. In efforts to generate a high response rate the researcher wrote a personalized letter to explain the purpose of the questionnaire. The letter outlined instructions for completing the questionnaire, the approximate length of time it would take, and offered the option to participate whilst stressing the importance of participation and finally concluded with the researcher’s contact details in the case of queries or concerns. (*See Appendix A for sample questionnaire*).

The staff was asked to complete the JSS in 2 weeks, in which time no reminders were given. The researcher respected the participant’s privacy, consent and confidentiality by being conscious not to demand a response but to build their confidence and allow them to choose whether or not to participate.

The researcher did not modify the original six agree-disagree responses of the JSS. It’s reliability and validity was retained by following Spector’s process for scoring (Spector, 1999).

3.12 Data Analysis

Once the responses were received, each of the items were numbered from 1 representing strongest disagreement to 6 representing strongest agreement with each. Negatively worded items will be reversed according to Spector’s (1999) outline:

$$1 = 6$$

$$3 = 4$$

$$5 = 2$$

$$2 = 5$$

$$4 = 3$$

$$6 = 1$$

The negatively worded items on the JSS are 2, 4, 6, 8, 10, 12, 14, 16, 18, 19, 21, 23, 24, 26, 29, 31, 32, 34, and 36.

Next; the sum of the four items for each of the nine subscales were plotted as shown in Table 3.2. Where data was missing the scores were adjusted by calculating the mean score per item for the individual then substituting that mean for the missing items. (Table 3.4)

Table 3.4: Relationship between Subscales and Item Numbers

Subscale	Item numbers
Pay	1, 10, 19, 28
Promotion	2, 11, 20, 33
Supervision	3, 12, 21, 30
Fringe Benefits	4, 13, 22, 29
Contingent rewards	5, 14, 23, 32
Operating procedures	6, 15, 24, 31
Co-workers	7, 16, 25, 34
Nature of work	8, 17, 27, 35
Communication	9, 18, 26, 36
Total satisfaction	1-36

Source: Spector, 1999

High scores are representative of high job satisfaction. As previously insinuated, JSS questions were written in both positive and negative directions. Each question was given a score between 1 and 6. Scores on the negatively worded items will be reversed before being added to the positively worded questions for the final score. Therefore, when scoring each question from 1 to 6 careful attention was given to the positively and negatively worded questions: a score of 6, in a negatively worded question, represented strong agreement was the same as a score of 1 which, in a positively worded question, represented strong disagreement.

Given the JSS uses 6-point agree-disagree response choices, it can be assumed that agreement with positively-worded items and disagreement with negatively-worded items would represent satisfaction, whereas disagreement with positive-worded items and agreement with negative-worded items represents dissatisfaction.

For the 4-item subscales, as well as the 36-item total score, this means that scores with a mean item response (after reverse scoring the negatively-worded items) of 4 or more represents satisfaction, whereas mean responses of 3 or less represents dissatisfaction. Mean scores between 3 and 4 are ambivalence. Translated into the summed scores, for the 4-item subscales with a range from 4 to 24, scores of 4 to 12 are dissatisfied, 16 to 24 are satisfied, and between 12 and 16 are ambivalent. For the 36-item total where possible scores range from 36 to 216, the ranges are 36 to 108 for dissatisfaction, 144 to 216 for satisfaction, and between 108 and 144 for ambivalent (Spector, 2001).

3.13 Method for obtaining Descriptive Statistics

Descriptive statistics (mean, standard deviation, the coefficient of variation) were produced and the following formula was used:

$$95\%CI = \bar{x} \pm \frac{1.96 \times SD}{\sqrt{n}}$$

Here, CI = confidence interval, \bar{x} = mean, SD = standard deviation of the mean, n = number of participants.

3.14 Statistical Package Used

The statistical package used in this study was SPSS. This was chosen because the researcher was most familiar with and had used this software in the past.