

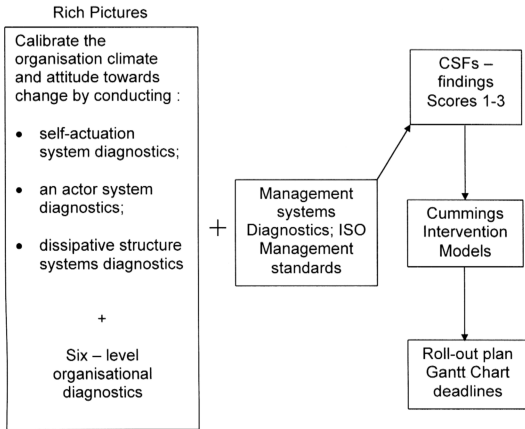
## CHAPTER 3

### RESEARCH METHODOLOGY

The research employed the Soft System Methodology in a case study. This methodology contains two kinds of activities, namely real world activities necessarily involving people in the problem situation and system thinking activities which may or may not involve those in the problem situation, depending upon the individual circumstances of the study. (Checkland, 1999).

The framework of this methodology is also being outline based on the following illustration from Yusof Omar's Adapted Soft System Methodology in Organisational Diagnostics. (Yusof, 2001)

Figure 1 : Yusof Omar's Adapted SSM in Organisational Diagnostics



Diagnosis in this study means the process of understanding how the organisation is currently functioning and provides information necessary to

design change intervention. In the real world activities, there are four types of diagnosis being carried out. The first diagnosis is using the seven characteristics of self-actuation to gauge the viable system closure. The second diagnosis is on the actor system adaptation for surviving the change. The system dissipativeness is the third diagnosis for evaluating the organisation structure for survival. In another context, the six-level organisational diagnosis is applied to measure the organisation performance.

Meanwhile, the system thinking activities are assessed by Environmental Management System MS ISO 14001:1997 and Quality Management System MS ISO 9001 : 2000 as CHS is certified for both systems. These two audits, according to MS ISO 14010:1997 and MS ISO 10011:1994 (Part 3), are meant to gauge the two systems performance in the organisation. Thereby, MS ISO 14011:1997 and MS ISO 10011:1994 (Part 1) are the two fundamentals guidelines used for environmental auditing and quality auditing. Prior to carrying the management system assessment, the assessor should be trained and certified as management system assessor so that appropriate facts can be unveiled. MS ISO 14012:1997 and MS ISO 10011:1994 (Part 2) provide qualification criteria for environmental auditors and quality auditors respectively.

During the diagnosis, auditing process and data collection activity, pertinent documents, archival records and physical artifacts are inspected as evidence to the conformity of the systems observation of real-life activities. Also, the assessor is intruding into the world of the subject being studied by being a participant-observation for collecting the necessary evidence.

The data collected from the above assessment are analysed to derive the critical success factors (1 point to 3 points). The four types of intervention strategies in organisation development and change, namely, human resources interventions, human process interventions, strategic orientation interventions and techno-structural interventions are then being outlined. At the end of the study, a roll out plan is developed to improve the current situation.

### 3.1 RESEARCH HYPOTHESES

There are a total of 6 hypotheses being formulated as follow :-

H1 : the means for organisation to maintain its stability through processes of self-actuation are equal to four and above. ( $H_0 : \mu = 4$  and above;  $H_A : \mu \neq 4$  and above);

H2 : the means for organisation to survive under change through actor system adaptation are equal to four and above. ( $H_0 : \mu = 4$  and above;  $H_A : \mu \neq 4$  and above);

H3 : the means for organisation structures to survive change through dissipative system are equal to four and above. ( $H_0 : \mu = 4$  and above;  $H_A : \mu \neq 4$  and above);

H4 : the means for six-level organisational diagnosis are equal to four and above. ( $H_0 : \mu = 4$  and above;  $H_A : \mu \neq 4$  and above);

H5 : the means for ISO 14001:1997 Internal Environmental Assessment are equal to four and above. ( $H_0 : \mu = 4$  and above;  $H_A : \mu \neq 4$  and above);

H6 : the means for ISO 9001:2000 Internal Quality Assessment are equal to four and above. ( $H_0 : \mu = 4$  and above;  $H_A : \mu \neq 4$  and above);

### 3.2 SELECTIONS OF MEASURES

Summated Rating Method : The Likert Scale is used to measure the attitudes ranging from very positive to very negative. (Likert, 1967) It is designed to allow the respondents to indicate how strongly they agree or disagree with carefully constructed statements relating to an attitudinal object.

### 3.3 SAMPLING DESIGN

For diagnosing the organisation and group level (departmental level), census was used for data collection. On the contrary, the sampling method was used for individual level diagnosis. The sample size was determined at 70 individuals from the population of 234 employees (as at June, 2001). This sample size which is equivalent to 30% of the total population, being selected according to the norm in any case study.

Prior to sampling for observation, the whole population of the employees was divided into 3 levels, namely managerial level (29 employees), supervisory level (41 employees) and operator level (164 employees). Stratified sampling was being adopted to pick the sample unit i.e. 9, 12 and 49 employees from each of the pre-defined level.

The formula for calculating the sampling error is as follow :-

$$S_x = S / \sqrt{n}$$

The sampling error for this sample size is determined at less than 0.5.

### 3.4 DATA COLLECTION PROCEDURE

The techniques for gathering diagnostics data in this case study is a simple design called fact finding. This fact finding entails evidence from pertinent documents, archival records, physical artifacts and also participant-observation. The selection of samples for observation and secondary data was based on census (for organisation level and group level) and probability sampling (for individual level).

In the assessment, the variables in self-actuation, actor system, structure dissipativeness, six-level organisational diagnosis, Environmental Management System (ISO 14001:1997 Standard) and Quality Management System (ISO 9001 : 2000 Standard) were being gauged with the ordinal scale. In this measurement, the raters were required to rate the variables on a Likert Scale ranging from 1 point to 5 points and they are excellent (5 points), good (4 points), satisfactory (3 points), fair (2 points) and poor (1 point).

### 3.5 DATA ANALYSIS TECHNIQUES

The Microsoft Office Excel 97 was used to summarise data obtained from the observation. Frequency distributions describe the characteristics of the organisation and respondents. Mean scores and standard deviations provided qualitative information about the respondents' perception on the various variables. In the group level analysis, the Z test is used to analyse the data. On the other hand, t-test is used to analyse the job level diagnosis as the standard deviation of the population is unknown. The critical value (CV) for Z test and t test are presented as :-

$$CV = \mu \pm Z_{c.l.} S_x$$

$$\mu = X \pm t_{c.l.} S_x$$

$\mu$  = population mean

$X$  = sample mean

$Z_{c.l}$  = critical value of Z at a specified confident level

$t_{c.l}$  = critical value of t at a specified confident level

$S_x$  = standard error of the mean

$S$  = sample standard deviation

$n$  = sample size

In the case where sample mean is contained in the region of rejection, the null hypotheses will be rejected. In turn, the alternative hypotheses will be accepted.