

CHAPTER 3 METHODOLOGY

Methodology is required as a framework that assists this study. Through methodology, overall research processes can be view. The construction of research methodology also enables researcher to execute research as it was already planned. Information on research design, site and process are given in the first three subsections, followed by data gathering techniques, and sample and population. Types of measurements variable and numbers of analysis that are used during the study are given in the last two subsections.

3.1 RESEARCH DESIGN

This research aims at quantifying relationship between KM system performance and its impact on organisational process. This study uses Bank X's KM system called Learning Management System (e-Learning) as research subject or study case. By means this research only reports data on one subject (Cooper & Schindler, 2008).

A hypothesis has been set up to formalise this research. Variables that are used to modelled the hypothesis are taken from the literatures review. Those are KM system performance, which consists of relevancy, quality and availability, and organisational process performance, which concludes of innovativeness, effectiveness, and efficiency of process. The hypothesis can be drawn as it is shown on Figure 3.1. Through these model, above hypothesis can be verified.

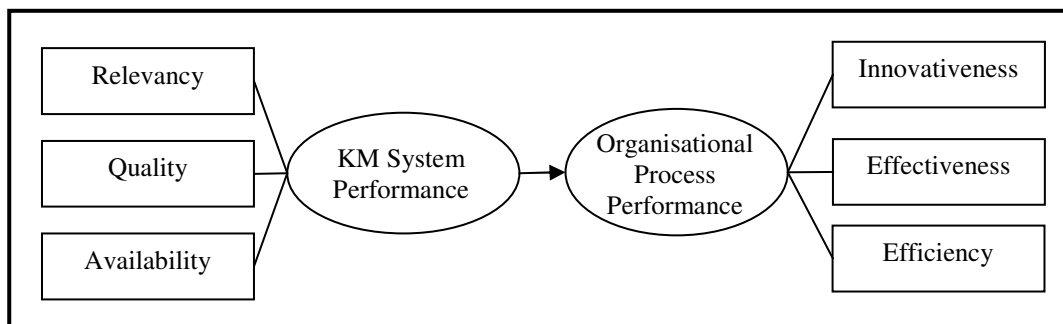


Figure 3.1 Research Hypothesis Model

3.2 RESEARCH SITE

Bank X's KM system: Learning Management System (E-Learning) is selected as research subject. The reason is because this particular system is one instance of KM system which has functionalities that enables organisation to conduct knowledge preservation, knowledge distribution and knowledge creation. Therefore, two-ways interaction between system and user can be identified through the use of the system. Moreover, Bank X is one instance of organisation in Indonesia that has real contribution on the growth of knowledge management in Indonesia. For instance, Bank X had contributed a great deal to the creation of Knowledge Management Indonesia in November 2005. In addition Bank X also has established a Learning Center Group (LCG) as a part of its goal on the way to become successful learning organisation.

As for impact of KM system in organisational process, the study focuses only to one particular organisational process; learning process that is conducted in Bank X Learning Center Group. This approach is used in order to centralise the area of study as well as to get in depth of knowledge on that particular process.

3.3 RESEARCH PROCESS

This research is initiated by the researcher based on concern on the implementation of KM initiative and KM system in the organisation as well as its impact on organisational process. Soon after the research topic cleared, literature review is conducted. Methodology is set up to be used as a framework in conducting the rest of the research which is data gathering, summarising finding, reporting research result. The entire process of the research can be explained using activity diagram below.

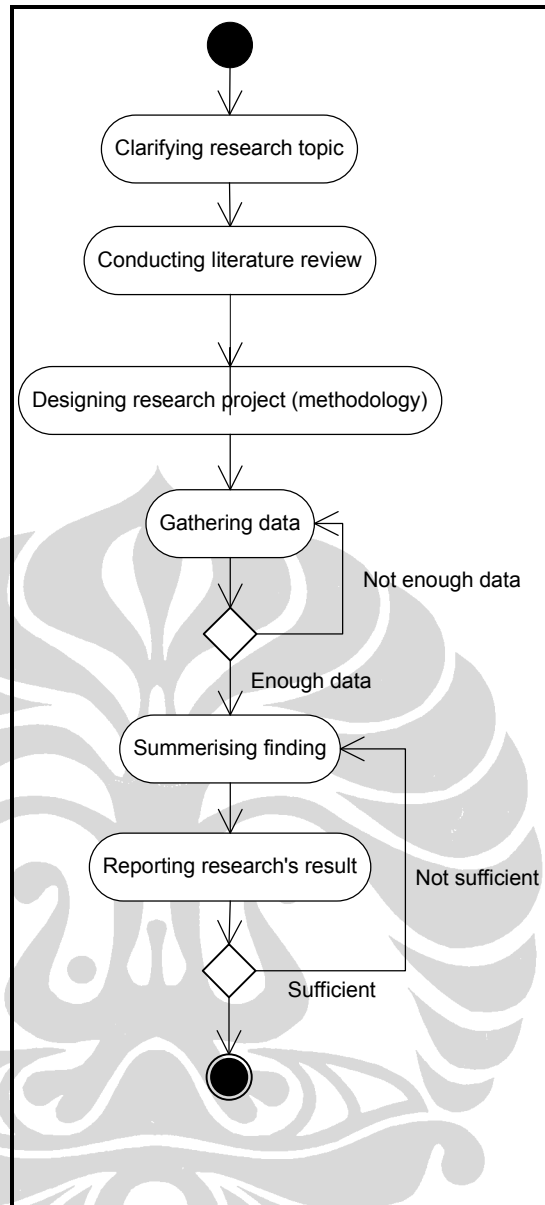


Figure 3.2 Research activity diagram

3.4 DATA GATHERING TECHNIQUE

Data for this research is gathered through several data gathering techniques. More than one data gathering techniques are needed in order to construct comprehend and complete research findings. Those techniques are questionnaire, interview, and documentation study.

3.4.1 Questionnaire

Questionnaire, as main data gathering technique, is conducted to collect data for testing the research hypothesis. Among all, this technique is the main research instrument. The objectives of conducting questionnaire as part of data gathering are: (1) to know KM system performance level, (2) to know the influences of KM system on organisation process performance.

The questionnaire contains items measuring KM system performance and KM system impact in organisational process. Each statement in questionnaire is constructed from intensive literature study. It uses five point Likert scale, anchored from 1 which means strongly disagree to 5 which means strongly agree, as a way to respond to each statement (Cooper & Schindler, 2008). The final design of questionnaire that is used in this study can be seen in Appendix 1.

3.4.2 Interview

Interview is conducted to build background on Bank X's KM system and to explore different and special issues regarding the KM initiative and the use of KM system in the organisation. The interview is conducted in semi structures interview style. This model enables interviewer to stress on certain topic as well as gives the interviewee overall looks of the interview.

Interview is addressed the KM system implementation subject in general including the subdivision in organisation that is responsible for the execution. Each question is constructed based on literature review and uniquely designed so that responses given by the interviewee are able to cover all aspects that are needed for the evaluation. Detail of the interview questions can be read in Appendix 1.

3.4.3 Documentation Study

Documentation study is conducted to learn about past or current KM system and organisation's performance. The aim of this gathering technique is to spot on

some trends that apply in the organisation regarding KM system performance and impact as supporting material for this paper.

3.5 POPULATION AND SAMPLE

Each data gathering techniques require different sample type and size. Thus, this section is divided in to three parts; (1) questionnaire, (2) interview, (3) documentation study. Within each section, detail of population and sample is explained.

3.5.1 Questionnaire

Questionnaire is distributed to members of a selected department in Bank X. At least 30 participants are expected to involve in this research. This number is extracted structural equation modelling (SEM) requirement that is employed as analysis method in this research. To participate in this study, participants have to be aware of KM system as tools to identify, capture, share, and store knowledge.

3.5.2 Interview

This technique is intended to gather information from Chief of Knowledge Officer (CKO), KM system administrator and selected section head. The CKO is chosen to participate in this study because his knowledge of KM in the organisation. While the administrator is chosen as informant in this study because of his or her expertise with the system and section head is chosen because of his or her insight about strategic management issues in relation to KM initiative.

3.5.3 Documentation Study

Few examples of documentation that need to be studied:

- KM system usage report
This document needs to be studied to find out number of user, number of contributor, number of seeks of KM system.
- Projects report

This report needs to be studied to find out information about projects or tasks performance.

3.6 MEASUREMENT

This research is designed to measure the influence of KM system performance on organisational proses performance. Therefore, two types of measurement variables that are used in this research are KM system performance as independent variables (X) and organisational process performance as dependent variables (Y).

3.6.1 Independent Variables

Used as independent variable (X) or exogenic variable in this research is KM System performance. KM system performance is a latent variable that can be measured using three variables. Those variables are relevancy, quality and reliability. Detail definition of each indicator is stated in table below:

Table 3.1 Definition of KM System Performance Indicators

Sub variable	Definition	Reference
Relevancy	User responses to discrepancy between user's perception and expectation and the actual system itself.	Folkens & Spiliopoulou (2004) and Tsai & Chen (2007)
Quality	User responses to the desired characteristics of the system to meet the requirement. Such as accuracy, completeness, understandability, and personalisation.	Folkens & Spiliopoulou (2004) and Tsai & Chen (2007)
Availability	User responses to system accessibility to anyone who requires its service.	Folkens & Spiliopoulou (2004)

3.6.2 Dependent Variables

Used as dependent variable (Y) or endogenic variable is KM system impact on organisational process performance. Organisational process performance consists of efficiency, effectiveness and innovativeness. Efficiency, effectiveness and innovativeness are used as indicators to measure KM system impact on organisational process performance since it cannot be measured directly. Detail definition of each indicator is stated in table below:

Table 3.2 Definition of KM System impact on Organisational Process Indicators

Sub variable	Definition	Reference
Efficiency	User responses to the use of knowledge in the system, measure in term of process cycle time and cost.	Becerra-Fernandez, et al., (2004) and Tsai & Chen (2007)
Effectiveness	User responses to the use of knowledge in the system, measure in term of methods.	Becerra-Fernandez, et al. (2004)
Innovativeness	User responses to the use of knowledge in the system, measure in term of idea and creativity.	Becerra-Fernandez, et al. (2004)

3.7 ANALYSIS

Numbers of analysis are necessary to confirm results of this study. There are two types of analysis that is going to be explained. Those are descriptive and inferential analysis. The explanation of each analysis is stated below.

3.7.1 Descriptive Analysis

Descriptive data analysis consists of analysis on research participants, data gathering result and Bank X's KM and KM system. Analysis on research participants is explained through frequency table that is generated via SPSS 15.0. The method is used to find out the trend that is applied among research participant. The data gathering result is clarified using statistical analysis (e.g.

central tendency and dispersion) that is calculated using SPSS 15.0 statistic computer software.

3.7.2 Inferential Analysis

Structural Equation Modelling (SEM) is used during the inferential analysis to test the research hypothesis. SEM is a complex multivariate statistic method (Santoso, 2007). It comprises of path analysis, regression techniques, and other statistical function (Streiner, 2006). The use of SEM allows researcher to validate relationship between latent variable and its indicators and relationship between latent variables that exist in the research hypothesis model (Santoso, 2007). Furthermore, SEM is able to give information whether a model that is used in the research is accepted or not. A tool that is used to process data for the inferential analysis is AMOS 16.

To be able to adopt SEM concept in research, there are several steps that need to be conducted. According to Santoso (2007), those steps are stated as follow:

- (1) Model Specification
- (2) Model Identification
- (3) Model Testing and Estimation

3.7.2.1 Model specification

A model needs to be constructed to adopt the SEM concept in the research. Latent variable is an unobserved variable that are not measured directly. It rather to be measured using observe variable named indicator or manifest variable (Santoso, 2007). For example, figure below shows latent variable KM system performance is measured through three observer variables: relevancy, availability, and quality.

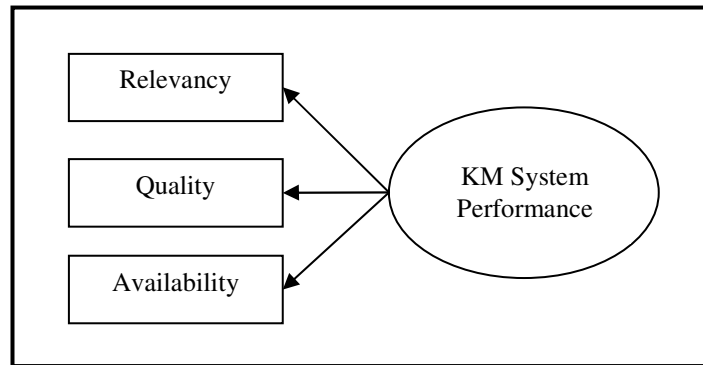


Figure 3.3 Relationships between Latent Variable and Its Indicators

Relation between latent variable is also possible in SEM concept. It refers to two concepts: exogenous latent variable and endogenous latent variable (Santoso, 2007). Exogenous latent variable is also known as independent variable, while endogenous latent variable is similar to dependent variable. Figure below realises the relation between KM system performance as exogenous or independent variable and organisational process performance as endogenous or dependent variable.

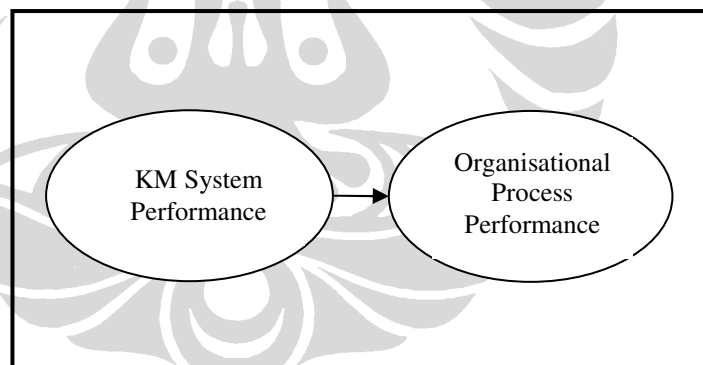


Figure 3.4 Relationships between Latent Variables

By connecting two relations above, a complete SEM model can be drawn as below. In the given model, KM system performance, which consists of three indicators, influences organisational process performance. The model is named after its endogen variable, which is organisational process performance.

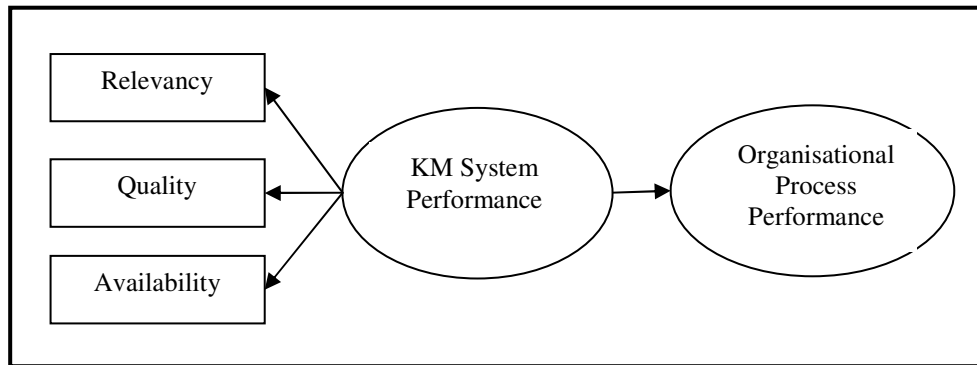


Figure 3.5 SEM Model

3.7.2.2 Model identification

Model identification is conducted in order to assure that the model is able to be used in the SEM analysis. The decision is made based on several tests. Those tests are:

- (1) Degree of freedom (df) value. Positive df value, where $df > 0$, or overestimate model is expected, so that the model can be used for further SEM analysis (Santoso, 2007).
- (2) Sample size test. It is expected that the sample size is sufficient enough for the SEM analysis. According to Santoso (2007), to compute minimum sample size for SEM analysis, comparison rate of 1: 5 between indicator and sample is can be used. Although, several resources argue that the minimum sample size that is required or SEM analysis is about 200 samples (Barrett, 2007; Streiner, 2006).
- (3) Outlier observation. Referring to Santoso (2007) any outlier data must be taken out from the sample. Data that has p_1 and p_2 values less than 0.05 (according to t table) is considered as outlier.
- (4) Assessment of Normality. Data that is used for SEM should be normally dispersed. According to Santoso (2007) data is normally distribute if both skew c.r and kurtosis c.r value is smaller or equal to ± 2.58 (according to z table).

3.7.2.3 Model testing and estimation

Model testing and measurement consist of two sub models. Those models are (1) measurement model and (2) structural model.

3.7.2.3.1 Measurement model

This model is also called as fit model analysis. If the measurement model is correct or fit, then it means that the indicator variables are able to explain its corresponding latent variable. A correct model then can be used in the structural model testing to test the hypothesis.

The analysis consists of several tests, such as hi-Square (X^2), and Probability test that are very sensitive to sample size. Other tests such as Goodness of Fit Index (GFI), Normed Fit Index (NFI), Comparative Fit Index (CFI), Parsimony Fit Indices (PRatio), Aikake Information Criterion (AIC), and Expected Cross-Validation Index (ECVI) are less sensitive to the sample size. Table 3.3 below lists cut-off Number of samples and the complexity of the model also influence goodness of fit of a SEM model (Santoso, 2007; Barrett, 2007).

Table 3.3 Goodness of Fit Model

Goodness of Fit Index	Cut-off Value	References
Chi-Square (X^2)	< X^2 table	Santoso, 2007; Barrett, 2007
Probability	> 0.05	Santoso, 2007; Barrett, 2007
GFI	> 0.9	Santoso, 2007
RMR	Close to zero / as small as possible	Santoso, 2007
NFI	> 0.9	Santoso, 2007
CFI	> 0.9	Santoso, 2007
PRatio	$0 < \text{PRatio} < 1$	Santoso, 2007
AIC	< AIC independent model	Santoso, 2007
ECVI	< ECVI independent model	Santoso, 2007

3.7.2.3.2 Structural model

Structural model, as part of model testing and estimation analysis, consists of three kinds of testing. Those are (1) validity, (2) reliability, (3) parameters and hypothesis testing. Each test has their purpose. Detail of each test is explained as below.

3.7.2.3.2.1 Validity testing

Validation testing is done to assure that the data gathering instrument is able to measure what is purpose to be measured. As result, the instrument is able to solve the research problem. Probability (P) value is used as measured parameter. P value below 0.05 for each parameter is expected in order to pass the validity testing (Santoso, 2007).

3.7.2.3.2.2 Reliability testing

Reliability is conducted to assure that the instrument is able to supply consistent results. The testing is executed by calculating variance extracted (VE) for each construct based on standardised regression weight. VE value above 0.50 is expected for each construct to pass this test (Santoso, 2007).

3.7.2.3.2.3 Parameters and hypothesis testing

This test is used to measure relationship between variables in the research hypothesis. This research studies relationship between two latent variables, which are KM system performance and organisational process performance. It stated in hypothesis, that KM system positively influences the organisational performance.

Among those two variables, there also exist three observe variables or indicators in the model. Indicators relevancy, quality and availability are fitted to KM system performance, while efficiency, effectiveness, and innovativeness refer to organisational process performance. Relation among the indicators and its corresponding latent variable is also measured in structural model analysis.

The estimate value, also known as factor loadings, in the rate of more than 0.5 is expected in order to show relationship between indicators and its corresponding latent variable and between latent variables (Santoso, 2007).

The hypothesis statement states that: It is likely that KM system performance positively influences organisational process performance. Therefore the hypothesis testing can be constructed as follow:

H₀: KM system performance does not relate to organisational process performance.

H₁: KM system performance positively influences organisational process performance.

According to Santoso (2007), if estimate value between organisational process performance and KM system performance is smaller than 0.5 then H₀ is accepted. Conversely, if estimate value between organisational process performance and KM system performance is greater than 0.5 then H₀ is rejected. In this case, the research intends to reject H₀ and to receive H₁, where KM system performance positively influences organisational process performance.