CHAPTER 3

RESEARCH METHODOLOGY

This research used Exploratory Mixed Method Research Design that consists of qualitative research and quantitative research. The conflict between qualitative research and quantitative research are reduced when used Exploratory Mixed Method Research Design is used by developing a learning model from qualitative Research and then confirming the model with Quantitative Research (Cresswell, 2005). This research method would derive the appropriate learning model for the SEP extension to farmers in Phitsanulok Province, Thailand. The research processes and steps taken were designed as follows:

3.1 The Qualitative Research Design was the study and development of SEP learning model by investigating learning theories and in-field studies in qualitative methods by using the in-depth interview techniques and focus group discussions.

3.2 The Quantitative Research Design included the validity of the developed SEP learning model by using confirmatory factor analysis.

3.1 Qualitative Research Design

The qualitative research design had the definite scope of area and content that covered both width and depth data by using a variety of data, sources' and methods. This research utilized the in – depth interview and focus group discussion as the methods in investigating component and factors of learning that affected to the SEP learning of farmers. This qualitative research design was the preliminary research that developing learning model for the hypothesis setting in quantitative research design of the next step. (Peotichita, 2007)

3.1.1 Population and Sampling

The population in this research consists of farmers who participated in the SEP project of Phitsanulok Provincial Office of Agricultural and the related institutes that support farmers in learning SEP in Phitsanulok Province that consists of the government agencies, Private Corporation and Academic Institutes in Phitsanulok Province. The sampling selecting method was as follows:

1) For in-depth interviews, the sampling was selected by using purposive sampling from farmers who participated in SEP project of Phitsanulok Provincial Office of Agricultural. The first person selected was one who could provide enough information in implementing SEP as a guideline in agricultural and was accepted by the Phitsanulok Provincial Office of Agricultural as a model farmer in carrying out the agricultural activity following the SEP. The selected person was considered well inform of SEP knowledge. And the remaining selection included interviewing farmers from nine districts that were 1) Muang, 2) Wungtong, 3) Phrompiram, 4) Bangrakum, 5) Bangkratum, 6) Nakhonthai, 7) Chartrakan,

8) Nuanmaprang and 9) Watboat. Two farmers were selected from each district and the total number selected farmers were 18 persons.

2) For focus group discussions, the sampling selecting method for participants was purposive sampling from two groups and each group met once from the institutes relating in extension and supporting farmer in learning SEP. The first group consisted of Phitsanulok Provincial Office of Agricultural a Co-operatives, Phitsanulok Provincial Agricultural Extension, Phitsanulok Provincial Community development, Land Development Regional Office 8, Phitsanulok Provincial Livestock Office, Phitsanulok Provincial Public Health Office and Bank of Agriculture and Agricultural Co-operatives. The second group consisted of Phitsanulok Provincial Office of the Basic Education Commission, Phitsanulok Provincial Office of the Non-formal and Informal Education, Naresuan university, Pibulsongkram Rajabhat University, Rajamangala University of Technology Lanna Phitsanulok campus, Radio Thailand Phitsanulok and Mass Media. Then, the 28 key informants were selected from 14 agencies by choosing two persons from each agency.

3.1.2 Research Instrument

The researcher was an important tool in this research. By using relationship development between the researcher, interviewee and participant with corporative, informal and naturally atmosphere, the creation of trust in each other led to accurate information obtained. The semi – structured questions in this research were derived from the issue in investigating the learning theory and learning components that would cover the content issues including 1) context and background of farmers 2) content of SEP 3) learning process 4) component supporting learning of

SEP and 5) learning outputs of farmers in an activity base model. The question for in-depth interviews and focus group discussions were on the same issue to verify the role of both the extension officer and the learner in order to understand the components and factors completely and correctly.

3.1.3 Collecting Data

The data collection of qualitative research employed the in-depth interviews and focus group discussions to acquire the needed data by the following process.

1) The in – depth Interview process was as follows:

1.1) The selection of farmers for the in-depth interview were sampling of farmers who applied SEP in agriculture and were on a farmers' list in the Phitsanulok Provincial office of Agriculture. The total numbers of interviewees were 18 and were selected from nine districts with two persons from each district.

1.2) The questionnaire was field tested to verify that the interviewees could understand their questions and their answers corresponded to and covered the objectives and purpose of research. Then, the research questions were corrected for appropriateness and to be more effective. Moreover, this investigation also developed a friendly atmosphere with the interviewed farmer in the research.

1.3) The questionnaire validity was accomplished by the advisory committee to ensure that the content of questions conformed to the research objectives.

1.4) The setup appointment with the district agriculture officer was developed to set the time for the in-depth interviews with farmers.

1.5) The data collection was carried out by the researcher. The researcher asked each farmer for permission to voice records, introduced himself, and stated the objectives of the research before starting any interview. For the in-depth interview, the needed acquired data must cover most of the research objectives.

2) The focus group discussion process was as follows:

2.1) The selections of focus group discussion participants were sampling from the institutes who were responsibly in SEP extension for farmers in Phitsanulok Province. The total number of 28 persons was selected from 14 institutes.

2.2) An official invitation letter was issued to invite the participants to meet at the conference hall, Rajamangala University of technology Lanna, Phitsanulok campus. In the invitation letter, detail about the specification of representative person, time, date and place of meeting, the coordinator was informed in order to make travel plans to Phitsanulok Province.

2.3) The research team meeting was to clarify the role and responsibility of each member. In each research team, the members consist of one moderator, one moderator assistance, four note takers, and two issue analyzers.

2.4) The focus group discussions were carried out asking for permission to voice records their comments and then by stating the objectives of the meeting. The group discussions were in the atmospheric of demonstrating opinions according to the developed questions in the same issues as the in-depth interviews with farmers. The focus group discussions consisted of two groups as follows:

2.4.1) The first group was the SEP extension agencies that were responsible for supporting farmers to implement SEP in the productions that

were Phitsanulok Provincial Agricultural Extension, Phitsanulok Provincial office of Agricultural an co-operatives, Phitsanulok Provincial Community development, Land Development Regional Office 8, Phitsanulok Provincial Livestock Office, Phitsanulok provincial public health office and Bank of agriculture and agricultural co-operatives. A total of 14 persons was selected and two persons from each agency.

2.4.2) The second group was the agency of academic and mass communication that driven the SEP policy in Phitsanulok area including Phitsanulok Provincial office of the basic education commission Phitsanulok Provincial office of the non-formal and informal education, Naresuan university, Pibulsongkram Rajabhat University, Rajamangala University of technology Lanna Phitsanulok campus, Radio Thailand Phitsanulok and The Mass Media Association Bank of agriculture. A total of 14 persons were selected and two persons from each agency.

2.5) The note taker recorded discussing data according to the location layout of each participant. Moreover, the issue analyzers summarized the discussion results in mind mapping on paper according to discussion issues that led the moderator. Voice and video recordings were made throughout all discussions.

3.1.4 Research Validity

The data validity of data were carryout parallel with all research activity including the in-depth interview, the focus group discussion of the SEP extension agencies for supporting farmers to implement SEP and the focus group discussion of the agencies from both on academic and mass communication in Phitsanulok Province in order to obtain the correct information and ensure that the

data was truth. Moreover, the data validity was done immediately in fieldwork or as soon as possible after left the fieldwork. The data validation was recorded in steps according to the data analysis phases and the data validity was the face validity that had evidence to confirm and traceability. Then, the data was stored for the reason of security and was conveniently for later analyzing. The data storage was kept in a document file separate from data of in-depth interviews and focus group discussions that were records in the computer including pictures audio and video. These data were backup on an external hard disk to prevent loss and for conveniently retrieving data validating later. Moreover, passwords were entered to access the computer data of the in-depth interviews and group discussions because all participants were informed that these data would be used only for this research and they would not be reveals to unauthorized persons.

3.1.5 *Data Analysis*

The analysis of data was done simultaneously with data collection through out the research period. Miles and Huberman (1994) Quoted that Podhisita (2005) stated the data analysis steps were as follows.

1) Data organizing was carryout by analyzing the voice recording from in-depth interviews and focus group discussion word by word in order to prevent misinterpreting data and meaning. Then data was grouped and coded by investigating the data from voice recording carefully. If there was a sentence correlated to the correct issue, the code would be marked to represent the meaning of the sentence that could be the theme of the issue. This theme was derived from the literature review of questionnaires used for in-depth interviews and the issue used in group discussions.

Kvale (1996) quote in Podhisita (2005) that the recommendation for the same meaning sentence is to use the same code with no matter of whether the sentences were short or long and no matter what words were used in the sentences. If there were the same meaning, the same code should be used for data classification.

2) Data was displayed by combining the coding data that was in sub-order so as to be understandable and classify according to factor and component of farmers learning. The data was presented in descriptive sentences and summarized as a diagram connecting the relationship between each component of farmer learning.

3) The research result was summarized, interpreted and validated by using the relationship diagram of each learning components of farmers and validated by examine that the collected data was corresponding to the research questions or objectives correctly and completely. The triangulation validation was used to examine the truth of the data and also to match the data with the research objectives correctly. Moreover, the data validations were carried out immediately upon entering and leaving the interview (Cresswell, 2005) by using 3 methods that consisted of the in-depth interview of model farmers, the focus group discussion of the extension officer for farmer in implemented SEP and the focus group of the institute on educations and mass communication in supporting SEP learning for farmers.

3.2 Quantitative Research Design

This quantitative research design used the pattern from the qualitative research design to validate the SEP learning model for farmer in Phitsanulok Province by using the confirmatory factors analysis model with LISREL Program.

3.2.1 Population and Sampling

The population in this research was 1,757 farmers who were participant in Phitsanulok SEP Project of Phitsanulok Provincial Office of Agricultural. The sampling steps and sampling method used were as follows:

1) The location was selected by using purposive random sampling methods from all districts. The selected locations were the nine SEP learning centers of the districts according to the list from the Phitsanulok Provincial Office of Agricultural.

2) The sampling process was multistage cluster sampling by dividing the population into levels in each district to classify the number of farmers who participated in SEP Project. Then, the sampling was done by using simple random sampling on the calculated sampling in each district from the list of SEP project of the Phitsanulok Provincial Office of Agricultural.

3) The sampling size was assigned to each district according to the list of SEP projects of Phitsanulok Provincial office of Agricultural. By using the formulation of Taro Yamanae (1970:725) quoted by Kaiyawan (2006), the sampling size was 326 persons. The calculating formula was as follows:

$$n = \frac{N}{1 + N(e)^2}$$

Note: n is sample size

N is number of populations

e is the sampling error and in this case is equal to +/- 0.05 within the

confidence level of 95 %

$$n = \frac{1,757}{1 + 1,757(0.05)^2}$$

n = 326 persons

As show in table 3.1

Table 3.1 Indicated the District, Population, and Sample Number in Each District of Phitsanulok Province

No.	District	Population (farmers)	Sample (farmers)
1	Muang	153	29
2	Wungthong	192	36
3	Watboot	240	44
4	Bangrakum	170	32
5	Bangkratum	156	29
6	Nuanmaprang	162	30
7	Nakhonthai	157	29
8	Chartrakan	240	44
9	Phrompiram	287	53
	Total	**1,757**	**326**

3.2.2 Research Instrument

The data collecting instruments was divided into two groups as follows.

1) The questionnaire to evaluate the suitability of SEP learning model for farmers was developed by researcher. The questionnaire was sent by mail and the researcher followed up to collect data by phone during March through May 2010. The questionnaire consisted of two parts.

Part 1 was the question on the suitability of SEP learning factors for farmers divided into five scale levels in the questionnaire. The factors were 1) context and background of farmers 2) content of SEP 3) learning process of farmers 4) component supporting learning of SEP 5) SEP learning outputs of farmers.

Part 2 was the additional recommendations about the components of SEP learning for farmers.

2) The questionnaire on the SEP learning model of farmers in Phitsanulok divided into six parts as follows;

Part 1 the context and background of farmers were the open - ended checklists with a five level Likert scale.

Part 2 the contents of SEP with a five level Likert scale.

Part 3 learning process was the principle and guideline for organizing SEP learning with a five level Likert scale.

Part 4 components supporting learning of SEP with a five level Likert scale.

Part 5 SEP learning outputs of farmer in aspect of application and attitude with a five level Likert scale.

Part 6 additional recommendations about the SEP learning model of farmers in Phitsanulok Province in Thailand were open - ended questions.

3.2.3 Collecting Data

The data was collected by using an interview question survey with each farmer in the sample list and the data collecting method were as follows.

1) The appointments with farmers were setup and the confirmation carried out before the visit.

2) At the beginning of each interview the farmer would be asked for permission to record the interview. Then the objectives of the research would be stated. Then the farmer would be informed that the collected data would be used only in this research and would be kept in secret.

3) The data collected from every question was examined for completeness.

3.2.4 Research Validity and Reliability

The validity and reliability of data completeness from the fieldwork were done to examine the completeness and correctness the data for each question. Then, the questionnaires and answers were coded for traceability.

The correctness of research instruments was examined by the experts to validate the content for correctness, on the issues and completeness. The experts

consisted of 1) one expert on adults learning psychology 2) one expert on SEP knowledge 3) three experts' from the head of SEP extension agencies.

The analysis score from the experts would be analyzed with SPSS version 14. The median and inter-quartile ranges were analyzed and translate according to the criteria of Wongwanich (2005) as follows.

1) Median < 1.5 means the sentence was least likely to be possible or the experts group did not agree with the meaning very much.

2) Median was between 1.51 - 2.50 means the sentence was less likely to be possible or the group of experts did not agree with the sentence.

3) Median was between 2.51 - 3.50 means the sentence was not likely to be possible or the group of experts did not sure with the sentence

4) Median was between 3.51 - 4.50 means the sentence was likely to be possible or the groups of experts agree with the sentence.

5) Median were more than 4.51 means the sentence was likely to be possible very much or the groups of experts agrees very much with the sentence.

The calculation of inter quartile range was the different value among the first quartile and the third quartile. If the calculated inter quartile range of the sentence is below 1.5, it was indicated that the opinions of the experts were agreed with the sentence. If the calculated inter quartile range of the sentence is above 1.5 (from 1.51 up), it indicated that the opinions of the experts were not agreed with the sentence. Then, collecting the sentences that the experts agreed with in both the median and inter quartile range was summarized as a comment of the experts. Moreover, the

framework of SEP learning model of farmers was developed which was divided into the components and factors for the learning model validation in the next step.

The questionnaire was examined for reliability using internal consistency by calculating the conbach's alpha of the questionnaire. The reliability tests used one set of the instruments, one time testing and did not divide the questionnaire. The assumption of the questions of the same set of instruments was measured in the same components as the content of each question in the same edition should be unique. Therefore, the reliability value with this method measured the internal consistency of instrument by testing the developed instrument with 20 farmers in Mae ta nua sub-district, Mae on district, Chiang Mai that was not the source data and the instrument was edited for appropriated application.

The consistency testing of the instrument used the alpha coefficient of Cronbach (Cronbach, 1951) quoted by Prasitratasin, (1997) to calculate the reliability coefficient of the questionnaire that the scoring system was not 0 and 1. This measurement was for the continuous data that must evaluate in scale and the questionnaire was rating scale.

The results of this testing found that the reliability of the questionnaire divided according to the components as follows.

1) The first component was the context and background of farmers and the attitude that effect the learning of SEP. The alpha coefficient was 0.8687 indicated the high level of reliability.

2) The second component was the content of SEP. The alpha coefficient was 0.8545 indicated the high level of reliability.

3) The third component was the learning process: principle and guideline in management of SEP using experience and supporting self learning. The alpha coefficient was 0.9460 indicated the high level of reliability.

4) The fourth component was component supporting learning of farmers. The alpha coefficient was 0.8285 indicated the high level of reliability.

5) The fifth component was the SEP learning outputs of farmers in aspect of practice and attitude. The alpha coefficient was 0.9311 indicated the high level of reliability.

Moreover, the overall alpha coefficient of the questionnaire was 0.9703 indicated that this questionnaire had the high reliability at the level of 97%. The questionnaire was also edited according to the comment of expert as to its appropriateness. (Appendix C)

3.2.5 *Data Analysis*

The data analysis was divided in two steps that were the descriptive data analysis and the data analysis for answers the research questions as follows.

1) The descriptive data analysis was done by using descriptive statistic including Percentage, Mean ($\overline{X}$), S.D., Median, Maximum and Minimum. This analysis was done by the SPSS version 14 program.

2) The stepwise multiple regression analysis was used to study the correlation between independent factors of the context and background of farmers that had effect to dependent factors of SEP learning outputs. This correlation value indicated the degree of factors that effected to the SEP learning outputs. This analysis

methods input the independent factor one by one as a forward and after the factor was in the equation, it would be testing backward multiple regression again.

3) The data analysis for construct validity by examining the conformatory in appropriateness and possibility in implementing according to the pattern and process of learning SEP with the empirical data. The LISREL model was used to analyze the confirmatory factor analysis in order to examine the validity of the goodness of fit by using the statistic as follows.

3.1 Chi – square value (χ^2). The very high χ^2 indicated that the confirmatory function was significant difference from zero in statistics meant LISREL model did not fit to empirical data. If χ^2 was very low and approach to zero indicated that the model fit to empirical data. Moreover, saris and stronkhorst (1984: 200) quoted by Kaewurai, Panichpalinchai, Klinjarern, & Thuntanakul, (2003) recommended that χ^2 should equal to an independent factor for the model to fit the empirical data. Some theories recommended that the value of χ^2 / df should lower than 5.00 (Bollen, 1989; Diamantopoulos and siguaw, 2000 quoted by Kaewurai, Panichpalinchai, Klinjarern, & Thuntanakul, 2003)

3.2) GFI (Goodness of Fit Index) was between 0 and 1. If GFI value approaches 1 indicates that the model fit to empirical data

3.3) AGFI (Adjusted Good of Fit Index) was between 0 and 1. If AGFI value approached 1 indicates that the model fit to empirical data

3.4) RMR (Root of Mean Square Residuals) If RMR value approached 0 indicates that the model fit to empirical data.

A summary of steps taken in the research process to investigate and develop the SEP learning model for farmers in Phitsanulok Province including the construction and validation of the model are shown in figure 3.1.
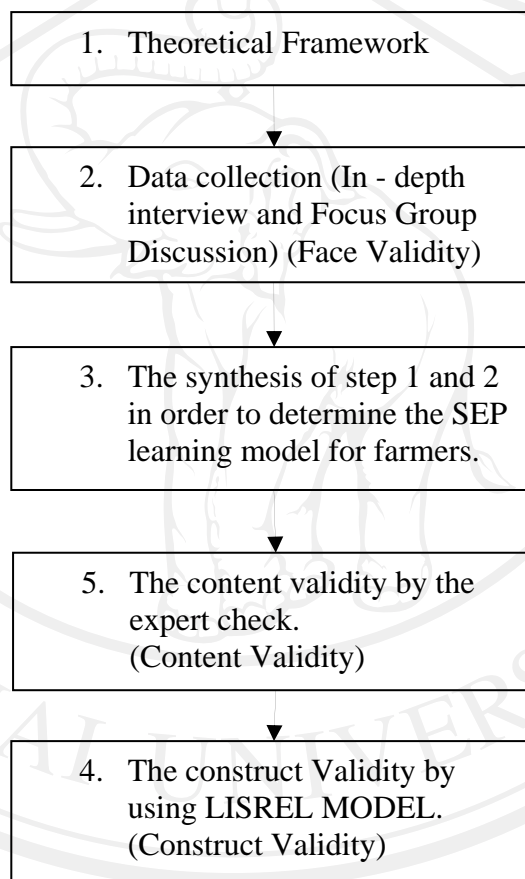
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┌─────────────────────────────────────┐
│  1.  Theoretical Framework           │
└─────────────────────────────────────┘
                  │
                  ▼
┌─────────────────────────────────────┐
│  2.  Data collection (In - depth     │
│      interview and Focus Group       │
│      Discussion) (Face Validity)     │
└─────────────────────────────────────┘
                  │
                  ▼
┌─────────────────────────────────────┐
│  3.  The synthesis of step 1 and 2   │
│      in order to determine the SEP   │
│      learning model for farmers.     │
└─────────────────────────────────────┘
                  │
                  ▼
┌─────────────────────────────────────┐
│  5.  The content validity by the     │
│      expert check.                   │
│      (Content Validity)              │
└─────────────────────────────────────┘
                  │
                  ▼
┌─────────────────────────────────────┐
│  4.  The construct Validity by       │
│      using LISREL MODEL.             │
│      (Construct Validity)            │
└─────────────────────────────────────┘
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Figure 3.1 Show the Steps Taken in Investigating and Developing the SEP Learning

Model for Farmers

In figure 3.1, the development steps of SEP learning model were as follows:

1. A theoretical framework was a study of model or guideline in supporting learning process acquired from fundamental concepts, documents and research

involved the development of SEP learning process which was divided into four parts that was 1) adult study or Adult learning 2) the extension and supporting in learning of farmers 3) learning model of farmers and 4) the SEP in agriculture.

The objectives of these theoretical studies were to analyze and synthesize the content to determine the method for investigating a learning model in order to define the framework of interview in field data collection.

2.	The field study for qualitative data study was carried out by using 1) in-depth interview techniques by interviewing 18 selected farmers in nine districts from phitsanulok that applied SEP in agriculture. 2) focus group discussion technique in small groups with the officers from the 18 agricultural extension and learning support agencies for farmers in Phitsanulok

3.	The data from steps one and two were analyzed to find a factor and component for defining the framework of SEP learning model of farmers.

4.	The content validation was done by examining the developed SEP learning model by 5 experts.

5.	The construct validity of the developed SEP learning model by using the confirmatory factors analysis model to confirm that the developed model fit with the empirical data with the interview of 326 farmers.