Chapter 3

Research Methodology

The research methodology using the principle of Research and Development, focused on factors and indicators of the empowerment – based supervision. Create and study the implementation of the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region, research methodology 3 phases as follows:

Phase 1: Analysis factors and indicators of the empowerment – Based supervision.

Phase 2: Create the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region.

Phase 3: Study the implementation of the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region.

The 3 phases of research methodologies were shown in chart 5

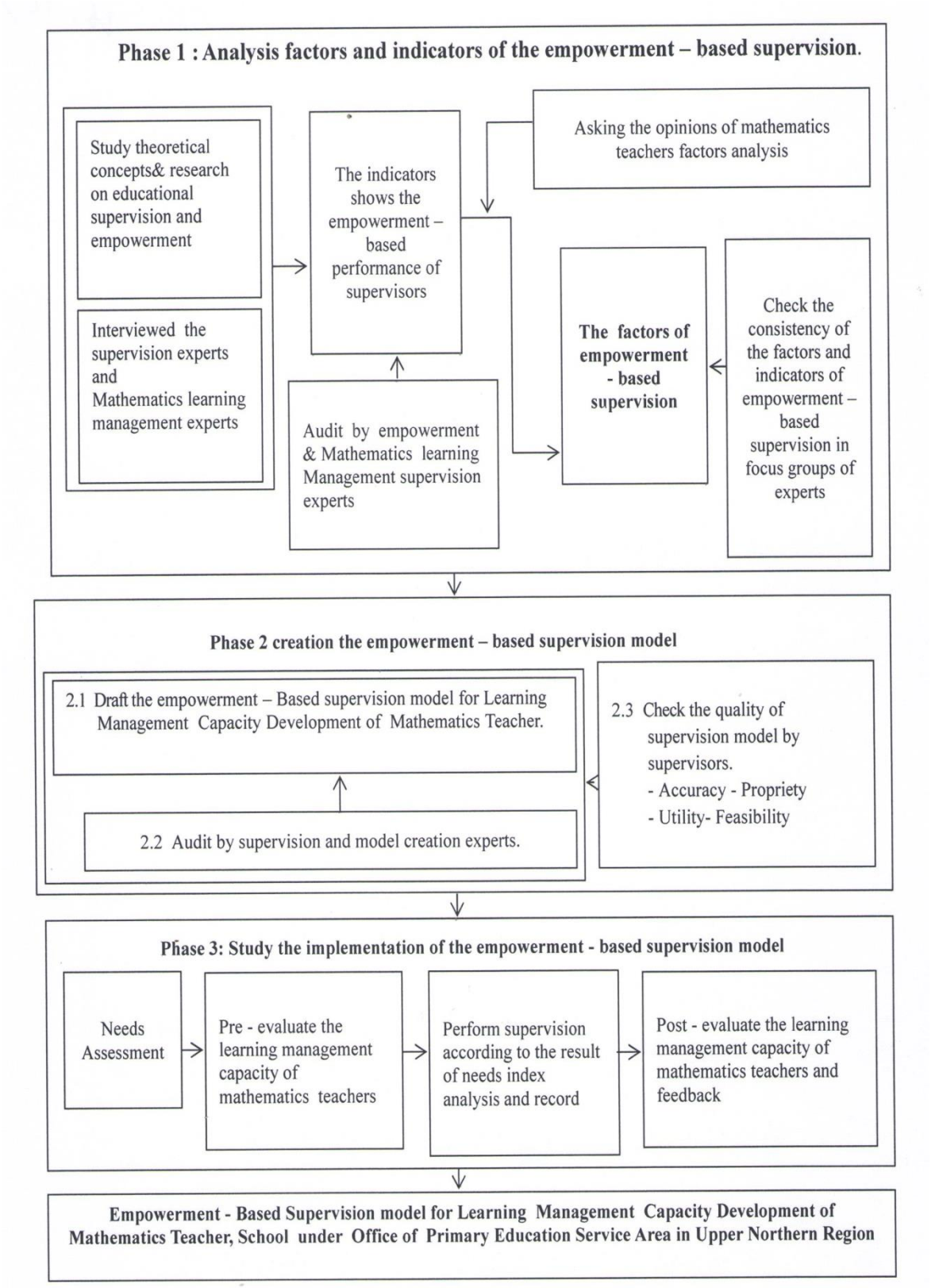

Chart 5 Research Methodology

Chart 5 shows the details of the research methodology in each phase respectively.

Phase 1 : Analysis factors and indicators of the empowerment – based supervision

Analysis factors and indicators of the empowerment–based supervision were as follows:

1. Study the concept, theories, research reports, graduate thesis, both domestic and abroad about the supervision and the empowerment.

2. Interview 4 education supervision experts and 1 mathematic expert teacher.

3. Synthesize the factors and indicators of the empowerment-based supervisors' performance, present to the empowerment experts to determine if it is empowering or not.

4. Apply the indicators, which is the operation of empowerment-based supervision from item 3. Present the empowerment - based supervisors' performance to the expert of learning management of mathematics learning management supervision to determine if the operation to develop the capacity of learning management of mathematics teacher is working or not.

5. Collected data on the samples and analyzed by exploratory factor analysis: EFA with the method of Principal.

6. Present the factors and indicators of empowerment-based supervision. At the focus group, have 4 mathematics learning management supervision experts, 3 creating model experts, consider the consistency of the factors and indicators.

The sample were used in Phase 1

For analysis of factors and indicators of empowerment - based supervision, the samples were selected by stratified random sampling as specified by the Primary Education Area, Northern Region on 23 areas to be classified. Samples of the details as follows:

1. Define the size of the sample according to the factors analysis that Kallaya Vanichbancha (2001, page 257) suggested that should have data more than 10 times the variables.This research has 114 variables. Thus, the sample size used for data collection is 1,140 people. The researcher has adjusted the size to 1,575 samples, and collected the data from one mathematics teacher in each school.

2. Define the proportion of mathematics teachers according to a number of schools in each areas.

3. Manage each sample with simple random sampling. Each stratum (areas) has a number of samples, as shown in table 8

Table 8 Shows the population and samples for factors analysis and indicators of empowerment-based supervision.

Primary Educational Service Area	Population		sample
	Number of Schools	Number of mathematics Teacher	
Chiang Mai Area1	93	93	46
Chiang Mai Area2	158	158	79
Chiang Mai Area3	156	156	78
Chiang Mai Area4	108	108	54
Chiang Mai Area5	102	102	51
Chiang Mai Area6	101	101	50
Mae Hong Son Area1	135	135	67
Mae Hong Son Area2	178	178	89
Lamphun Area1	144	144	72
Lamphun Area 2	89	89	44
Lampang Area 1	136	136	68
Lampang Area 2	160	160	80
Lampang Area 3	95	95	47
Chiang Rai Area 1	110	110	55
Chiang Rai Area 2	186	186	93
Chiang Rai Area 3	153	153	76
Chiang Rai Area 4	151	151	75
Phayao Area 1	101	101	50
Phayao Area2	142	142	71
Phrae Area 1	123	123	61
Phrae Area2	132	132	66
Nan Area 1	201	201	100
Nan Area2	151	151	75
Total	**3,205**	**3,205**	**1,575**

Research instrument were used in phase 1

Instruments were used in phase 1. There were 5 sets of instruments as follows:

Set 1: The synthesis of factors and indicators of educational supervision form used for recording the factors and indicators from documents, concepts, theories, research reports, graduate thesis', both domestic and international about educational supervision.

Set 2 : The interviews of the experts of educational supervision using the empowerment – based model used for recording the data of empowerment – based performance of educational supervision.

Set 3 : The synthesis of factors and indicators of empowerment form using for the record of factors and indicators from documents, concepts, theories, research reports, graduate thesis', both domestic and international about the empowerment model.

Set 4 : Questionnaire to obtain the opinion of mathematics teachers on the performance of supervisors to improve the learning management of mathematics teachers. These are the tools for rating scales and open-ended questions.

Set 5 : Consistency evaluation form of the factors and indicators of the empowerment – base supervision.

The creation and finding qualitative research instrument in phase 1

Set 1: the synthesis of factors and indicators of educational supervision form. The creation were as follows:

1. Study the principles, documents, concepts, theories, and research related to educational supervision both domestic and international.

2. Specify the issues in the synthesis of factors and indicators of learning management of mathematics teachers.

3. Create the synthesis factors and indicators of educational supervision.

4. Have three experts evaluate and verify the authenticity of the language and reform, and to add an item about date/month/year of record.

5. To record the factors and indicators of educational supervision from the documents, concepts, theories, and research that relate to educational supervision, both domestic and international.

6. Improve the synthesized record before bringing it to use in the research (Appendix B, page 183).

Set 2 : The interviews form of the empowerment - base supervision operation, The creation were as follows.

1. Study principles, documents, concepts, theories, and research that relate to educational supervision both domestic and international.

2. Define the issues in the empowerment - base operation of supervisors interviewed.

3. Create the empowerment - base performance of supervisors interviews form. There is no structure for the interview form.

4. Present to 3 evaluation experts to verify the authenticity of the language and reform according to the recommendation of experts, and add what they suggest recording the date/month/year of the change.

5. Record in the interview form the empowerment - base on supervisors performance, the interview from the experts.

6. Improve the questionnaire form of synthesis before bring it to use in the research. (Appendix B, page 186).

Set 3: The record of the synthesis of factors and indicators of empowerment - base. The creation were as follows:

1. Study principles, documents, concepts, theories, and research that relate to empowerment, both domestic and international.

2. Define the issues in the record of the synthesis of factors and indicators of empowerment.

3. Create the form of the synthetic factors and indicators of empowerment.

4. Present the 3 evaluations experts to verify the authenticity of the language and reform according to the recommendation of experts, and add what they suggest recording the date/month/year of the change.

5. Record the factors and indicators of empowerment from documents, concepts, theories, and research that relate to the empowerment model, both domestic and international.

6. Improve the synthesized form before bring it to use in the research. (Appendix B, page 184).

Set 4: The questionnaire for the opinion of mathematics teachers on the performance of supervisors to develop the learning management of mathematics teachers is an instrument for rating scales and open-ended questions. The creation were as follows:

1.Study principles, documents, concepts, theories, and research that are related to the questionnaire for the opinion on the performance of supervisors to develop the learning management of mathematics teacher.

2. Apply the factors and indicators from the synthesized instrument set 1-3 to create a questionnaire for the opinion of mathematics teachers on the performance of supervisors to empower the learning management of mathematics teachers with 116 items.

3. Have the experts of assessment and research check the quality of the questionnaire for accuracy and clarity of language. Then, improve the questionnaire accordingly to add 8 negative questions for checking the respondent is actually reading the questionnaire. All the questions total 124 items.

4. Check the content validity of the performance of supervisors to empower learning management of mathematics teachers by the empowerment experts. Use Index of Item-objective congruence during -1.00 to + 1.00 (Appendix B, page 188-189). The researchers selected the questions with the content validity of +1. This is the performance of empowerment – based learning management of mathematics teachers and questions with the content validity between -1 and 0. This means that the performance does not empower the learning management of mathematics teacher. Then, make improvements based on recommendations from the experts.

4.1 Adjust the order of the questions. Assigned the teachers to practice, have the teachers solve problems, support the teachers in their practicing, and give encouragement to the teacher to keep practicing.

4.2 Adjust the questions about the training, meeting, and supporting various factors by adding the word "Needs"

4.3 Cutting 2 questions that are not supervisor's task directly. So 122 questions were all.

5. Check the content validity of the empowerment – based performance of supervisors to develop learning management of mathematics teachers by experts of mathematics learning management. Use the index of item-objective congruence between -1.00 to +1.00. The researchers selected the questions with the content validity of +1 for the real questions in the questionnaire and on the content validity between -1 and 0 for the questions for checking those not actually reading the questionnaire.

6. Check the reliability with 30 mathematics teachers and use the data to analyze for a base. Find reliability within alpha coefficient based on the concept of Cronbach (Coefficient Alpha) (Kiatsuda Srisuk, 2009, pages 152-155), The correlation value was .96 (Appendix B, page 192).

7. Make a questionnaire of the opinion of mathematics teachers for the performance of supervisors to develop the learning management of mathematics teachers before bring it to use in the research. (Appendix B, page 190).

Set 5: The check-list of consistency evaluation of factors and indicators of empowerment – based supervision. The creation were as follows:

1. Take the factors and indicators of empowerment – based supervision to make the evaluation form of the factors and indicators of empowerment – based supervision.

2. Check the accuracy of the questionnaire of accuracy and clarity of language by the assessment experts to improve it. It provides an additional comments box at the end of the list for the experts to record feedback.

3. Preparation of an original one before using it. (Appendix B, page 193).

Data Collection in Phase 1

1. The synthesis of data for the factors and indicators of the educational supervision from the document and perform the data collection.

1.1 Research, collect the factors and indicators of educational supervision from documents, concepts, theories, and research papers, both domestic and international.

1.2 Prepare a record of the synthetic factors and indicators on the form of

synthesis, of factors and indicators of educational supervision from documents, concepts, theories, and research papers, both domestic and international.

1.3 Take the data from the research concept papers, theories, research papers, both domestic and international to process and synthesizefactors and indicators of educational supervision.

2. The data of empowerment – based performance of the supervisors from interviews of the experts to perform data collection.

2.1 The researcher did the research requested with cooperation from the field of research and development of education, Faculty of Education, Chiang Mai University. Request a permission to interview the experts, coordinate interviews, and interview the experts with the interview form of the empowerment – based of supervisors' performance.

2.2 Prepare the record of the results of the empowerment – based performance of supervisor from the interviews of the experts of educational supervision and the teachers who were experts of mathematics learning management.

2.3 Take the data obtained from interviewing the experts to empowerment – based operational processing.

3. The synthesis data of factors and indicators of empowerment from the document and perform the data collection as follows.

3.1 Research and collect factors and indicators of empowerment from documents, concepts, theories, and research papers, both domestic and international.

3.2 Recorded the factors and indicators of empowerment on the record form from documents, concepts, theories and research papers, both domestic and international.

3.3 Take the data from the documents, concepts, theories, and research papers, both domestic and international and synthesize the process to be a factor and indicators of empowerment.

4. Use the data from the questionnaire of the opinion of the mathematics teachers on the performance of supervisors to develop the learning management of mathematics teachers, and perform the data collection as follows.

4.1 The researcher take the document from the field of research and development of education, Faculty of Education, Chiang Mai University by assisting

with the questionnaire on the opinion of mathematics teachers on the performance of supervisors to develop the learning management of mathematics teachers. For the sample, a total 1,575 mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region, for 23 areas, by the researcher performance sent out a questionnaire and request return by mail.

4.2 Contact by telephone, requesting help from the sample according to an instrument sent by mail.

4.3 Sent the questionnaire to the sample at the appointed time and requesting them to return the questionnaire by mail.

4.4 When 1,316 sets of questionnaires have returned, the researcher determine if the person actually read the questions. They found that 164 questionnaires were answered without reading the questions. 1,152 questionnaires were completed properly, actually reading the questions. The researchers brought the data from questionnaires to analyze the factors and indicators of empowerment – based supervision. Using the techniques of exploratory factor analysis (EFA) with the method of Principal by carrying out the suitability of the information for analysis of the factors from KMO (Kaiser - Meyer - Olkin Measure of Sampling Adequacy) equaled .879 shows that the data is appropriate to use for factors analysis as much level, and the Bartlett's Test of Sphericity also has a statistically significant level (sig = .01). This shows that different variables are interrelated, and can be used to analyze the factors. (Hair and others cited with Supamas Angsuchote and others, 2008, pages 97-98) (Appendix C, Page 211).

4.5 Bringing the factors that have an Eigen Value of more than or equal to +1 and the Indicators that have Factor Loading from .30 and up. Defining the factors and indicators of empowerment – based supervision.

4.6 Taking the factors and indicators of empowerment – based supervision. Present to 4 experts of mathematics learning management supervision and 3 model creating experts, in focus groups of experts to check the consistency of the factors and indicators of empowerment – based supervision.

The data analysis in phase 1

Data analysis in Phase 1 used content analysis, exploratory factor analysis (EFA), and frequency.

The criteria used to interpret and conclude the results of data analysis in phase 1

1. Criterion considers the factors and indicators of empowerment – based supervision. The record of data from documents and interviews with the experts acceptance the factors and indicators that present more than 2 sources.

2. The criteria was used to interpret the factors and indicators of empowerment – based supervision. By the exploratory factor analysis (EFA) consider as follows:

2.1 Consider the factors that have an Eigen Value more than or equal to +1.

2.2 Consider indicators that have a factor loading from .30 and up.

(Phetnoy Singchangchai, 2003, pages 176-178).

3. Criterion considers the consistency of the factors and indicators of empowerment – based supervision. Used the criteria for determining the consistency of more than 5 experts.

Phase 2 Creation the empowerment – Based supervision model for Learning Management Capacity Development of Mathematics Teacher, School under Office of Primary Education Service Area in Upper Northern Region

Creation the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region, were as follows:

1. The researcher brings the factors and indicators of empowerment – based supervision from the analysis data in phase 1, and the factors from the structure of the model of the study of concepts, and the theories about the model creation; To create a draft of the empowerment – based supervision model.

2. The researcher presented a draft of the empowerment – based supervision model to a focus group of 4 mathematics learning management supervision experts, and 3 model creation experts to consider and provide feedback on improvements to the model and model implementation.

3. Researchers took the improved draft of the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region, and presented it to 23 supervisors who were responsible for mathematics learning management supervision, in 23 Office of Primary Education Service Area in Upper Northern Region, To evaluate the accuracy, propriety, utility, and feasibility to apply the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region.

The sample were used in Phase 2

The sample were used in the evaluation of accuracy, propriety, utility, and feasibility to apply the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region. This means 23 supervisors who are responsible for mathematics learning management supervision, in the Office of Primary Education Service Area in Upper Northern Region 23 areas, consider selecting from the supervisors who are responsible for supervising the mathematics learning management in Primary school.

Research instrument were used in Phase 2

Instruments used in the research phase 2 have 2 sets as follows:

Set 1: Record form to consider for recommendation about improvements to the model and applying the model. It is the notes record form.

Set 2: The questionnaire opinion on accuracy, propriety, utility, and feasibility to apply the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region. It is the instrument for rating scales and open-ended questions.

The creation and finding qualitative research instrument in phase 2

Set 1: The recording form to consider for recommendation about improvements to the model and apply the model. The creation were as follows:

1. Take the draft of the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region. To make the list for consideration to suggestions about improving the model.

2. Checking the quality of accuracy and clarity of language by the experts to assess and improve, it means addition for the space to record the message of every list to be wider, for the experts have recorded more suggestions.

3.Making the original before using it. (Appendix B, page 195).

Set 2: The questionnaire form about the opinion on accuracy, propriety, utility, and feasibility to apply the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region. The creation were as follows:

1. Study principles, document, concept, theory, and research that related to the questionnaire the opinion on accuracy, propriety, utility, and feasibility to apply a supervision model, both domestic and international.

2. Define the issued and the questions about the comments on accuracy, suitability, benefits, and possibilities to apply the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region.

3. Create the draft of questionnaire for accuracy, suitability, benefits, and possibilities to apply the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region.

4. Take to check the quality of the questionnaire on the accuracy and clarity of language by the assessment experts. Then improve upon the recommendation of the experts, this means to add suggestions to the end of the questionnaire on each side.

5.Check the content validity of the questionnaire about the opinion of accuracy, propriety, utility, and feasibility by the experts of mathematics learning management supervision. The index of item-objective congruence is 1 in every question

6. Check the reliability with 28 supervisors who are responsible for mathematics learning management supervision, in the lower north, Find reliability within alpha coefficient based on the concept of Cronbach (Coefficient Alpha) (Kietsuda Srisuk, 2009, pages 152-155), The correlation value was .74 (Appendix B, page 199)

7. Making the original documents to apply in further research. (Appendix B, page 196).

Data Collection in Phase 2

1. The data to consider on feedback about improvements and apply the model perform the data collection as follows.

1.1 The researcher did the research requested with cooperation from the field of research and development education, Faculty of Education, Chiang Mai University, to assist in the consideration of the recommendation on improvements and applying the model. The sample are 4 supervisors who are experts on mathematics learning management supervision, and 3 model creation experts, and coordinate to define the time, place for experts focus group.

1.2 The researcher set the experts focus group on January 15, 2015 at 01.00-03.00 p.m., at Huai Nam Rin Meeting room, Holiday Garden Hotel, Muang, Chiang Mai, to consider the suggestions about improving and apply the model.

2. The data comments on accuracy, propriety, utility, and feasibility to apply the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region, and perform the data collection as follows.

2.1 The researcher did the research requested with cooperation from the field of research and development education, Faculty of Education, Chiang Mai University, to assist in determining on accuracy, propriety, utility, and feasibility to apply the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region. To 23 Offices of Primary Education Service

Area in Upper Northern Region, the researcher conducted the survey by sending a questionnaire and returned by mail.

2.2 Contact and coordinate by telephone to assist in determining on accuracy, propriety, utility, and feasibility to apply the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region, according to the instrument that was sent to them.

2.3 Sending questionnaires to supervisors by appointment and asking to return a questionnaire by mail.

The data analysis in phase 2

The data analysis in Phase 2 used content analysis, mean, and standard deviation.

The criteria used to interpret and conclude the results of data analysis in phase 2.

The criteria to consider the mean about the opinion on accuracy, propriety, utility, and feasibility to apply the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region. By using the concept of John W. Best & James V. Khan (2003, P. 332) as follows:

Mean	Meaning
1.00 – 1.50	Have accuracy, propriety, utility, and have least feasibility.
1.51 – 2.50	Have accuracy, propriety, utility, and have little feasibility.
2.51– 3.50	Have accuracy, propriety, utility, and have moderate feasibility.
3.51– 4.50	Have accuracy, propriety, utility, and have much feasibility.
4.51 – 5.00	Have accuracy, propriety, utility, and have the most feasibility.

Phase 3: Study the implementation of the Empowerment - Based Supervision Model for Learning Management Capacity Development of Mathematics Teacher, School under Office of Primary Education Service Area in Upper Northern Region

The implement study of the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region, and operation in order to:

1. The researcher used the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region on trial with 5 mathematics teacher during on February 1, 2015 - March 31, 2015.

2. The researcher expanded the research results to use the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region, to supervisors who are responsible for mathematics learning management supervision, In the Office of Primary Education Service Area in Upper Northern Region during April 1 - May 30, 2015 for 2 supervisors as follows:

2.1 First supervisor, identification code is M.S. 1.

2.2 Second supervisor, identification code is M.S. 2.

The sample were used in phase 3

The sample was obtained by selecting the person who was an interested participants in the research were 5 teachers in the first school, 2 teachers in the second school, and 1 teacher in the third school

Research instrument were used in phase 3

Instrument used in phase 3.

1. Questionnaire of the mathematics teachers supervisory.
2. Capacity evaluation form of learning management.
3. Record form of supervision.

The creation and finding qualitative research instrument in phase 3

1. The questionnaire of the mathematics teachers supervisory.

1.1 Create the draft of questionnaire to get the supervision of mathematics teachers from the performance data of supervisors. According to the factors of the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region, and determine the characteristics of the questionnaire in a multiple data sets in 5 level.

1.2 Check the quality of the questionnaire on accuracy and clarity of language by the assessment experts, then make improvements based on the recommendation of experts to adjust the order comments.

Original form

5	4	3	2	1

Edit to

1	2	3	4	5

1.3 Check the reliability with 27 mathematics teachers in School under Office of Chiangmai Primary Education Service Area office 1, Find reliability within alpha coefficient based on the concept of Cronbach (Coefficient Alpha) (Khiatsuda Srisuk, 2009, pages 152-155), The correlation value was .99 (Appendix B, page 203).

1.4 Making the original documents for use in further research. (Appendix B, Page 201).

2. Capacity evaluation form of learning management as follows:

2.1 Study the content of process, factors, and indicators of mathematics learning management.

2.2 Create the capacity evaluation form of mathematics learning management, School under Office of Primary Education Service Area in Upper Northern Region, which used the checklist, a rating scales, and notes record form.

2.3 Present to the experts in educational supervision and the experts in measurement and evaluation, making changes to improve upon the recommendation of experts, and adding the criteria for determining the appropriateness of the learning management at the end of the evaluation form as follows:

2.3.1 Rating 2 means learning management is consistent with the curriculum and the suitable with the age of students.

2.3.2 Rating 1 means learning management lacks consistency with the curriculum and/or inappropriate for the age of the students.

2.4 Checking the content validity of the evaluation of the capacity of learning management by experts of mathematics learning management supervision. This will have the index of item - objective congruence is 1.00 all of the score.

2.5 Trial the capacity evaluation form of mathematics learning management by 3 supervisors who are responsible for mathematics learning management supervision, Trials evaluating the capacity of learning management of 4 mathematics teachers, and then taking the data to analyzed the Generalizability Coefficient (ρ^2), The correlation value was .85. (Appendix B, page 207).

2.6 Making the capacity evaluation form of learning management to apply in research. (Appendix B, page 204).

3. Record form of supervision as follows:

3.1 Study the content of the structure of the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region.

3.2 Create the record form of the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region, which is the check list and notes record.

3.3 Present to the experts of educational supervision and the experts in measurement and evaluation, and take to improve upon the recommendation of experts.

3.4 Trial to apply the record form of supervision with the mathematics teacher, to improve, and making the record form of supervision application.

Data Collection in Phase 3

The implement study result of the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region, and perform the data collection in 2 stages.

Stage 1 : Study the results to use the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region. The researchers use a model during February 1, 2015 - March 31, 2015; as follows.

1.1 The researcher did the research requested with cooperation from the field of research and development education, Faculty of Education, Chiang Mai University, to request assistance in the form of the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region, to the school that used the trial forms is the first school, 5 mathematics teachers participation as follow:

1.1.1 Mathematics teachers, grade 1, identity code is MT. 1.

1.1.2 Mathematics teachers, grade 3, identity code is MT. 2.

1.1.3 Mathematics teachers, grade 4, identity code is MT. 3.

1.1.4 Mathematics teachers, grade 5, identity code is MT. 4.

1.1.5 Mathematics teachers, grade 6, identity code is MT. 5.

1.2 The researcher assess the needs of mathematics teachers. The researcher work together with school administrators and academic teachers to pre - evaluate the capacity to learning management of mathematics teachers. (Appendix B, Page 204), and the researcher perform supervision according to the result of needs index analysis, in the higher level (2.01 or higher) by recording the information of supervision every time that performance supervision, with a record form of the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region. (Appendix B, Page 209).

1.3 At the end of the time period using the empowerment - based supervision model for learning management capacity development of mathematics

teacher, School under Office of Primary Education Service Area in Upper Northern Region, researchers worked together with the school administrators and academic teachers to post - evaluate the learning management capacity of the mathematics teacher with the same evaluation form in pre - evaluation. Mathematics teacher gave a comment about the benefits of supervision and gave other suggestions.

Stage 2 : The results study of the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region. The researcher expanded results of the supervision model during April 1, 2015 - May 31, 2015 as follows:

1. The second school, 2 mathematics teachers participate the project.

1.1 Mathematics teacher, grade 3, identity code was MT. 6.

1.2 Mathematics teacher, grade 6, identity code was MT. 7.

Supervisor who used supervision model was MS. 1.

2. The third school, 1 of grade 5 mathematics teachers participate the project, identity code was MT. 8. Supervisor who used the supervision model was MS. 2. Also implementation of data collection were as follows.

2.1 The researcher did the research requested with cooperation from the field of research and development education, Faculty of Education, Chiang Mai University, to request assistance in the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region to schools as sample to use the model.

2.2 The researcher explained details of the supervision model and used the model of supervision with supervisors who used the model and understood the patterns of supervision and used the model of supervision in order as follows:

2.2.1 Supervisors assessment of the needs to analyze needs index.

2.2.2 Supervisors work together with school administrators and academic teachers to pre - evaluated the capacity of learning management.

2.2.3 Supervision of operational supervision according to the analysis the index of needs in the most level (2.01 or higher) both individual and groups by recording supervision every time that performance supervision occurred, with a record

form of the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region.

2.2.4 At the end of the time period, using the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region. Supervisors worked together with school administrators and academic teachers to post - evaluate learning management, with the same form of pre - evaluation. Mathematics teacher gave comments about the benefits of supervision and gave other suggestions.

The data analysis in phase 3

The data analysis in phase 3; Used needs index analysis, frequency, means, standard deviation, and content analysis.

The criteria used to interpret and conclude the results of data analysis in phase 3.

1. Criteria determining the need for supervision operations by using the concept of John W. Best & James V. Khan (2003, P. 332).

Mean	Meaning
Lower than 0.00	Without the needs of supervisory.
0.00 – 1.00	The needs of supervisory as low level.
1.01 – 2.00	The needs of supervisory as medium level.
2.01 – 3.00	The needs of supervisory as much level
3.01 – 4.00	The needs of supervisory as the most levels.

2. The criteria used to summary results of supervision according to the empowerment - based supervision model for learning management capacity development of mathematics teacher, School under Office of Primary Education Service Area in Upper Northern Region. From the content analysis using the summary of every event.

3. The criteria to evaluate the capacity of learning management of mathematics teachers by using the concept of John W. Best & James V. Khan (2003, P. 332) as follows:

Mean	Meaning
0.00-0.66	Have capable to learning management as little level.
0.67-1.33	Have capable to learning management as medium level.
1.34-2.00	Have capable to learning management as much level.

And the criteria assessing the capacity of learning management that define for acceptance to be passed must be evaluatethe resultsas much (Mean 1:34 to 2:00).

4. The criteria for summary comments and giving further suggestions of mathematics teachers was conclusion of the incident that happened from two or more events.