MIXED METHODS RESEARCH: A COMPARATIVE STUDY OF MMR CONDUCTED IN THE USA AND THAILAND

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ABSTRACT

The objective of this study is to explore the current practices of mixed methods research (MMR). The concept of MMR which includes its definitions, design and critical features were reviewed. Eleven critical features of MMR were identified and used as a basis for review and evaluation of MMR studies conducted in the USA and Thailand. Ten MMR studies conducted from 2002-2010 in the USA and Thailand were selected for review and evaluation. The results of this review were then compared to find the similarities and differences between the two sets of MMR studies. As a result of the comparisons, six critical areas of similarities and four critical areas of differences were identified. The similarities of the MMR studies were: (1) the term "mixed methods research" was identified in the research topic; (2) identification of specific research objectives; (3) questionnaires were the major tool for collecting quantitative data; (4) interviews were the major instrument for qualitative data collection; (5) used descriptive statistics for quantitative data analysis; and (6) used "sequential" design, particularly the sequential explanatory strategy. The differences were: (1) only two MMR studies conducted in the USA specified "pragmatism" as a research paradigm while none of the MMR conducted in Thailand identified a research paradigm; (2) the MMR studies conducted in the USA had a clearer process of analyzing qualitative data than the MMR studies conducted in Thailand; (3) all MMR studies in the USA explained why collecting both types of data are needed while only one of the MMR studies conducted in Thailand mentioned the reason for collecting both types of data; and (4) only two MMR studies conducted in Thailand clarified how the two types of data were mixed. The findings reflect the improvements needed in the two major phases for the conduct of research: (1) research design and (2) data analysis. To improve the quality of MMR studies it is recommended that: (1) research design should include research paradigm identification and justification; and the reasons should also be clearly explained and justified as to why both types of data collection are needed; (2) the process of qualitative data analysis and the combination of two types of data should be clearly explained in the MMR study; (3) more studies using other types of MMR strategies should be conducted, other than

sequential design, to enhance the development of MMR; and (4) more qualitative research should be emphasized in graduate and research training courses than currently provided, particularly in Thailand.

Keywords: Mixed Methods Research, Concurrent Triangulation, Concurrent Embedded, Concurrent Transformative, Sequential Explanatory, Sequential Exploratory, Sequential Transformative.

INTRODUCTION

In recent years, the term "mixed methods research" defined by many researchers or methodologists, has been an ongoing debate and discussion as it has been defined in several ways such as ethnographic residual analysis (Fry, 1981), multi-method research (e.g., Hunter & Brewer, 2003; Morse, 2003), triangulated studies (Sandelowski, 2003), mixed methods approach (Creswell, 2003), integrative research (Johnson & Onwuegbuzie, 2004), and mixed research (Johnson & Christensen, 2004). Some scholars say that combining a qualitative and quantitative approach is not new, but only recently it has been called mixed methods (Johnson, Onwuegbuzie, & Turner, 2007; Tashakkori & Teddlie, 2003). Tashakkori & Creswell (2007) stated that a mixed-method is still developing and will do so for years to come. At present there are several unresolved issues such as the core issue of defining the nature of MMR, how to conduct a mixed methods and whether paradigm can be mixed or integrated in a mixed method study or not. In addition, the utilization quality of mixed methods is emerging in the community of mixed methods scholars because this method has the potential for a broader understanding of social issues, as it provides more robust opportunities for devising policies, and practices to implement positive change (Tashakkori & Teddlie, 2010). Therefore, it is usually employed for answering complex social research questions seemed a non-issue in many cases (Tashakkori & Teddlie, 2010).

This paper aims to understand the current practices of MMR conducted in the USA and Thailand. It begins with a review of the concept of MMR and design followed by the identification of the critical features of MMR. Using the critical features identified as the criterion the authors selected ten research studies conducted in the USA and Thailand using MMR for a review and evaluated by the identified criterion. Similarities and differences are identified, discussed, and conclusions and recommendations were made.

THE CONCEPTS OF MMR

Mixed methods approach is usually employed in the social and human sciences, as that mixed approach closely parallels everyday human problem solving in a way that neither qualitative nor quantitative methods alone can do (Tashakkori & Teddlie,

2010). However, several definitions have been presented by different scholars of MMR. To come up with an acceptable definition Johnson, et al., (2007) conducted a study by asking methodologists from the MMR field employing Tashakkori's "Bridges Website". They presented 19 alternative meanings from leaders in the field, which varied considerably in terms of specificity and content. Based on the study Johnson, et al., (2007, p. 123) concluded the definition of MMR as

> *…the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration.*

In addition, Hesse-Biber (2010) stated that a mixed methods strategy is a rich field for the combination of data, since this design "can provide stronger evidence for a conclusion through convergence and corroboration of findings" (Johnson & Onwuegbuzie, 2004, p. 21). Teddlie & Tashakkori (2009) confirmed a major advantage of mixed methods as "it enables the researcher to simultaneously ask confirmatory and exploratory questions and therefore verify and generate theory in the same study" (p.33). This is similar to Greene (1989) which proposed the five major purposes or rationales for conducting MMR. Greene (1989), Johnson & Onwuegbuzie (2004), and Hesse-Biber (2010) stated the five purposes or rationales as follows: (1) t*riangulation :* this is the most commonly cited reason that mixed methods are incorporated into research (Hesse-Biber, 2010, p. 3), as it helps the researcher to enhance the credibility of the research findings. Campbell (1959) are credited with being the first to coin this term 'triangulation' which is broadly defined by Denzin (1978, p. 291) as "the combination of methodologies in the study of the same phenomenon". Their concept of triangulation is referred to as between- or across-method triangulation, as opposed to within-method triangulation. Denzin also suggested the use of mixed methods, arguing that "the bias inherent in any particular data source, investigators, and particularly method will be canceled out when used in conjunction with other data sources, investigators, and methods" (p. 14); (2) c*omplementarity:* the researcher gains a fuller understanding of the research problem and/or clarifies research results (i.e., seeking elaboration, enhancement, illustration, and clarification of the results from one method with results from the other method); (3) *initiation* : initiating a new study adds new insights to existing theories on the phenomenon under examination (i.e., discovering paradoxes and contradictions that lead to a re-framing of the research questions) (Greene, 1989); (4) *development* : using the findings from one method helps inform the other method; and (5) *expansion* : it seeks to expand the breadth and range of research by using different methods for different inquiry components.

However, mixed methods studies are likely to increase the cost of such research and reconciling disparate research philosophies may introduce practical difficulties and complications in outcomes and interpretation (Bryman, 2007; Sale, Lohfeld, & Brazil, 2002). In addition, multi-method studies also increase the time and resources needed for research (Bryman, 2007; Creswell & Plano Clark, 2007). Thus, the researcher has to keep in mind the impact of these factors in designing MMR.

MMR DESIGN

A research design is "a journey from the intensely philosophical through the procedural to the practical and on to the final step of the representational" (Whiteley, 2002, p.22). It is a plan for collecting and analyzing data in order to answer the research question (Holsti, 1969). It includes "the overall approach to be taken and detailed information about how the study will be carried out, with whom and where" (Maykut & Morehouse, 1994, p.64). It is a "planning for certain broad contingencies without, however, indicating exactly what will be done in relation to each" (Lincoln & Guba, 1985, p.226).

Research paradigm A research design should begin with a paradigm choice (Maykut & Morehouse, 1994). Conducting a research study without a guiding paradigm is just like sailing without direction. A paradigm may be viewed as "a set of basic beliefs (or metaphysics)" that deals with ultimate or first principles. It represents a worldview that defines, for its holder, the nature of the 'world,' the individual's place in it and the range of possible relationships to that world and its parts" (Guba & Lincoln, 1994, p.107). The world views or schemata are so powerful that they demand allegiance in terms of epistemological and methodological procedures, techniques and research tools. Lincoln & Guba (2000) argue that "our actions in the world, including actions that we take as inquirers, cannot occur without reference to those paradigms …" (p.15). Thus in designing any type of research the researcher must choose an appropriate paradigm to guide such research (Joungtrakul, 2009; Maykut & Morehouse, 1994) as different paradigm choices may lead to a different type of strategy and research method including methodology.

Researchers often refer to four paradigms and these are positivism, postpositivism, critical theory, and constructivism (Guba, 1990; Guba & Lincoln, 1989). Later, Lincoln & Guba (2000) added participatory action research (Heron, 1996; Heron & Reason, 1997) as the fifth paradigm in their work. Creswell (2009) classifies research paradigms into four major categories: (1) postpositivism; (2) constructivism; (3) advocacy/participatory; and (4) pragmatism. Based on the classification provided by Creswell (2009) the pragmatism is the most suitable paradigm for an MMR study.

Research strategy Having made an appropriate paradigm choice a selection of proper and specific strategy is also essential for the design of research. Choosing the right strategy for a research project is one of the most important decisions in conducting any research as "a strategy is a framework for action." A strategy provides the basic direction. It permits seemingly isolated tasks and activities to fit together, and it "moves separate efforts toward a common, integrated purpose" (Patton, 1990, p.36). The research strategy selected "provides guidance in selecting particular techniques or methodological practices for specific settings. [And that] method represents a strategic choice" (Patton, 1990, p.36). Creswell (2009) identified six major strategies of mixed methods research: (1) Concurrent Triangulation; (2) Concurrent Embedded; (3) Concurrent Transformative; (4) Sequential Explanatory; (5) Sequential Exploratory; and (6) Sequential Transformative strategy. Each strategy will be described briefly, using mixed methods notation, as adapted from Morse (1991), Creswell & Plano Clark (2007)), and Teddlie & Tashakkori (2009).

The first mixed methods strategy is called the *Concurrent Triangulation* approach (symbolized as QUAN + QUAL or QUAL + QUAN), in which the researcher collects both quantitative (QUAN) and qualitative (QUAL) data concurrently and then compares the two databases to decide whether there is convergence, differences, or some combination. This strategy is familiar to most researchers and may result in well-validated and substantiated findings. However, it requires great effort and expertise to adequately study a phenomenon with two separate methods (Creswell, 2009). The second type is called the *Concurrent Embedded* approach (symbolized as QUAN + qual or QUAL + quan), which has a primary method that guides the project and a secondary database that provides a supporting role in the procedures. Utilizing this strategy will help the researcher gain a broader perspective of the different types of data or from different levels within the study. The third type is called the *Concurrent Transformative* approach, which may take on the design features of either a triangulation or an embedded approach, depending on the researcher's use of a specific theoretical perspective, as well as the concurrent collection of both quantitative and qualitative data. The fourth type is called the *Sequential Explanatory* strategy (symbolized as QUAN → qual), which is a popular strategy for the mixed methods design (Creswell, 2009). It begins with the collection and analysis of the quantitative data in the first phase of the research, followed by the collection and analysis of the qualitative data in the second phase which builds on the results of the initial quantitative results. This design is typically used to explain and interpret quantitative results by collecting and analyzing follow-up qualitative data, particularly when unexpected results arise from a quantitative study. Qualitative data will be employed to examine its findings in more detail. The fifth type is called *Sequential Exploratory* strategy (symbolized as QUAL → quan), which is similar to the sequential explanatory approach, except that the phases are reversed – qualitative data collection and analysis are emphasized. This design uses the quantitative data and results to assist in the interpretation of the qualitative findings. It is useful to explore a phenomenon, together with expanding on the qualitative findings. The last type of mixed methods research strategy is called the *Sequential Transformative* strategy, which is a two-phase project with a theoretical lens overlaying the sequential procedures. The researcher may use either method in the first phase of research, and weight can be given to either phase or distributed evenly to both.

THE FEATURES OF MMR

MMR combines both the quantitative and qualitative research and has its own distinct features. Creswell & Plano Clark (2007) identifies the following critical features of MMR: topic, primary study purpose, quantitative data collection, qualitative data collection, quantitative data analysis, qualitative data analysis, reasons for collecting both types of data, how the two types of data were mixed, notation, and visual diagram. These features can be used as criterion for comparison and evaluation of MMR studies. To fulfill the objectives of this study we have come up with a new set of criterion by deleting the visual diagram and added a research paradigm and a research strategy into the list of eleven selected features to be used as criterion for review and evaluation.

The Current Practices of MMR Conducted in the USA and Thailand

Ten research studies using mixed methods design that have been conducted in the USA and Thailand were selected for review. The data and information used for comparison is mostly based on the methodological part of the studies. A summary of each study conducted in the USA is illustrated in Table 1, while a summary of each study conducted in Thailand is illustrated in Table 2.

TABLE 1 : MMR CONDUCTED IN THE USA

	Robinson (2009)	Myers (2010)	Abbott (2010)	Dilworth (2010)	Razzhavaikina (2007)
Topic	An exploratory comparison of the delivery costs for classroom and online instruction	Organizational and perceived social support, and the intent to resign among psychiatric nurses: A mixed methods study	Constructing a creative self-efficacy inventory: A mixed methods inquiry	Evaluating the impact of professional development: A mixed method study of adult education learning communities	Mandatory counseling: a mixed methods study of factors that contribute to the development of a working alliance
General purpose of the study	To explore the underlying cost elements within two distinct course delivery modalities: traditional face-to-face and completely online.	An exploration of the factors which contribute to the intent of psychiatric nurses to resign.	To examine the latent structure of creative self-efficacy.	To describe and explore how adult education learning communities contribute to programs becoming learning organizations.	To investigate the process of mandatory counseling and factors that are pivotal in this process
Research Paradigm	Pragmatism	Pragmatism	NA	NA	NA
Research strategy	Sequential Explanatory	Sequential Explanatory	Sequential Explanatory	Concurrent - Triangulation	Sequential Explanatory
Notation	QUAN → qual	QUAN → qual	QUAN → qual	QUAN + QUAL	quan → QUAL
Quantitative data collection	• Public online resources	• Survey questionnaire	• Online survey and class	• SPSLC Survey • Demographic and perceptual surveys • Program evaluation tool	• self-report questionnaires
Qualitative data collection	• Semi-structured interview	• Individual in-depth telephone interviews • Email and telephone follow-up interviews	• Interview	• Focus group transcripts • Extant program data • Classroom observation	• Semi-structured Interviews • Observation

Quantitative data analysis	• Descriptive statistics	• Descriptive statistics • Multiple Logistic Regression • Multiple Linear Regression	• SD, Mean, Correlation Matrix • Confirmatory Factor Analysis	• Descriptive statistics	• Latent growth curve modeling analysis
Qualitative data analysis	• Thematic analysis	• Typologies, • Codes and themes	• Descriptive Coding • Topic Coding • Analytic Coding	• Coding and themes using ATLALti	• Coding and thematic analysis • Across-and within case comparison • ATLASti software program
Reasons for collecting both types of data	The qualitative data were needed to explain the quantitative findings.	To provide a more complete picture of the intent to resign by using the second phase qualitative data to elaborate on the initial quantitative findings of the more in-depth words of the psychiatric nurses.	The qualitative data were needed to explain the quantitative findings.	A multilevel model of the triangulation mixed method design that collects data sets from several levels within a system and considers quantitative and qualitative data equally in the interpretation	The qualitative data were needed to explain the quantitative findings.
How the two types of data were mixed	The qualitative data were connected to the quantitative results.	Purposefully select the qualitative participants Develop interview protocol Interpretation and explanation of the quantitative and qualitative results.	The qualitative data were connected to the quantitative results.	Quantitative data and themes of the qualitative results were compared and the data sources treated equally in response to each research question.	The quantitative and qualitative methods were connected in the intermediate phase of the research process while selecting the participants for the case study analysis. The results of two phases were integrated during the interpretation of the research findings of the entire study.

TABLE 1: MMR (CONTINUED)

	Yamchuti (2002)	Roberts (2009)	Stout (2009)	James (2008)	Mitchell (2009)
Topic	Factors influencing college choice by students at newly opened private colleges	A Mixed Methods Study of Secondary Distance-Learning Students: Exploring Learning Styles	Comparing Rural Parent and Teacher Perspectives of Parental Involvement: A Mixed Methods Study	An Empirical Investigation into the Extent of Quality Management Practices in the Jamaican Manufacturing Industry	Job Satisfaction and Burnout among Foreign-Trained Nurses in Saudi Arabia: A Mixed Method Study
General purpose of the study	To determine the factors that led students to enroll at newly opened private colleges in Thailand.	To explore distance-learning applicability within secondary education.	To identify, compare, and analyze the varying perspectives of teachers and parents regarding parental involvement.	To evaluate the international competitiveness of the Jamaican manufacturing industry for TQM versus non-TQM businesses using the quality management model stipulated by the MBNQA criteria.	To explore the relationship between the demographic and work environment factors and hospital characteristics (linked to job satisfaction) and burnout among foreign-trained nurses (FTNs) living and working in Saudi Arabia.
Research Paradigm	NA	NA	NA	NA	NA
Research strategy	Sequential Explanatory	Concurrent Nested	Sequential - Exploratory	Sequential – Explanatory	Concurrent - Triangulation (proposed by authors)
Notation	QUAN → qual	QUAL(quan)	N/A	QUAN → qual	NA
Quantitative data collection	• Student survey by questionnaire	• A distance-learning activities survey	• Teacher questionnaire • Parental questionnaire	• MBNQA questionnaire	• Surveys (NWI-R,PES-NWI,and MBI) • Demographic data questionnaire.
Qualitative data collection	• Focus group interview • Open-ended question	• Individual interviews • Focus group discussions	• Focus group interview •	• Structured face-to-face interviews (both TQM firm and non-TQM firms • Document review – company profile, quality manuals and annual reports	• Focus group interview started during the survey collection time
Quantitative data analysis	• Descriptive and inferential statistics (Mean, Median range, Chi-square)	• Z-Score	• Descriptive statistics • T-test	• Frequency distribution • Descriptive statistic, • One-way ANOVA • Item-total correlation analysis	• Frequency distribution • Descriptive statistic • Bivariate analysis • Multiple Regression analysis

				• Non-response analysis • Reliability test	
Qualitative data analysis	• Coding process (Amanda & Atkison, 1996) – organizing, managing, and retrieving data, identifying relevant concepts according to key themes and patterns.	• Open coding • Axial Coding together with Z-score • Coding statement • Peer reviews	• Coding • Thematic development	• Individual case summaries provided a detailed description of the similarities and contrasts among the TQM and non-TQM firms (cross-case comparison)	
Reasons for collecting both types of data	The qualitative analysis was needed to confirm and amplify on an initial, quantitative survey	To validate the analysis and findings of the three data sources: (a) individual interviews, (b) focus group discussions, and (c) distance-learning surveys.	Collecting both quantitative and qualitative data provided a means of triangulation to assure data reliability.	The qualitative data was needed to explain and elaborate on the quantitative results.	Multiple sources of data and multiple statistical procedures improved the accuracy of the study with a better understanding of the issues that affect the FTN personally and professionally.
How the two types of data were mixed	The qualitative data were connected to the quantitative results.	The interview and focus group discussions were transcribed and then were grouped into meaningful units with the distance-learning activities surveys in an effort to find patterns and meaning from the data. The researcher analyzed	Quantitative and qualitative data were collected for theme and category analysis	The qualitative data were connected to the quantitative results.	The qualitative data were connected to the quantitative results.

		the three sources of data (individual interviews, focus group discussions, and the distance-learning activities surveys) to uncover common themes and findings.			

As shown in Table 1, a review of each study conducted in the USA according to the eleven distinct features of MMR found that: (1) topic: seven research studies identified the term of "a mixed method study" in the research topic, one study used the word "exploratory" in the research topic. The rest of the studies did not identify any term to indicate the mixed methods study in the research topic; (2) purpose of the study: all studies identified the general purpose and some studies also included the specific purposes which referred to the research questions; (3) research paradigm: only two research studies explained the research paradigm and that "pragmatism" was employed; (4) research strategy: nine studies identified the research strategy in which seven of them used "sequential" design; (5) notation: six studies used QUAN at the first phase while another one used QUAN at the second phase to explore the QUAL data and results; the other two studies identified "concurrent" design which are nested and triangulation. Another one did not identify the research strategy but explained the research procedure in which that the research strategy is "Concurrent – Triangulation"; (6) quantitative data collection: All research studies used the questionnaire as a quantitative research instrument, and an online survey was employed. In addition, a program evaluation tool was used; (7) qualitative data collection: each study used an interview as the primary method for the qualitative data collection in which there were two types of interview: in-depth interview (one-on-one) and focus group interview. In addition, observation and document review were employed for the data collection process; (8) quantitative data analysis: all studies employed descriptive statistics as the basis for quantitative data analysis, and some included inferential statistics, such as t-test, z-score, and ANOVA. Four of them also used advanced research statistics which were: multiple logistic regression, confirmatory factor analysis (CFA), and latent growth curve modeling analysis; (9) qualitative data analysis: most of the research studies explained the process of analyzing the qualitative data by using coding process, thematic analysis, and cross-case comparison; (10) reasons for collecting both types of data: the researchers of each study mentioned why they had to collect both types of data, such as to use the qualitative data to explain the quantitative findings, triangulate data or confirmatory results; and (11) how the two types of data were mixed: the authors of each study explained how the two types of data were mixed.

TABLE 2 : MMR CONDUCTED IN THAILAND

	Wannasuthi (2009)	Maralat (2008)	Punphol (2008)	Suksom (2007)	Konpoothorn (2010)
Topic	A multi-level causal model of the influential factors affecting the computer learning achievement of key third stage students: Mixed method research	A causal model development of the factors affecting the success in a community based network for health management: A mixed method approach	The development of scientifically gifted student indicators : An application of mixed methodology	The transferring process of factory control to local government organizations in Lamphun province.	Burnout: A study of private vocational teachers in Pattaya, Thailand
General purpose of the study	To develop a multi-level causal model of the influential factors affecting computer learning achievement of key third stage students	To develop a causal model of the factors influencing the success in a community based network for health management.	To develop character indicators for scientifically gifted students by means of a combined research method: a mixed methodology design which consisted of 3 sequential phases.	NA	NA
Research Paradigm	NA	NA	NA	NA	NA
Research Strategy	Exploratory Design (Sequential Equivalent)	Sequential Equivalent	Sequential Equivalent Design	Sequential Explanatory	Sequential Explanatory
Notation	QUAL → QUAN	QUAL → QUAN	QUAL → QUAN	QUAN → qual	QUAN → qual
Quantitative data collection	• Questionnaire	• Questionnaire	• Questionnaire	• Questionnaire	• Survey questionnaire
Qualitative data collection	• Unstructured interview • Observation	• Observation • Unstructured interview • In-depth interview • Focus group interview • Interview guide	• Document review • Interviewing scientific experts	• Structured interviews with 5 officers from the Lamphun Provincial Industry Office	• In-depth interview
Quantitative data analysis	• Descriptive statistics	• Basic statistics, correlation • Structural equation modeling	• Descriptive statistics • Exploratory factor analysis • Confirmatory	• Descriptive statistics (Frequency,	• Descriptive Statistics (Mean, Standard deviation, Range)

		analysis by using the LISREL program	factor analysis.	Percentage, Mean, Standard deviation)	• Frequency distribution (percentage)
Qualitative data analysis	• Content analysis	• Content analysis • Analytical induction • Cross comparison • Document analysis	• Content analysis • Analytical induction	• NA	• Descriptive issue by issue
Reasons for collecting both types of data	NA	NA	NA	NA	NA
How the two types of data were mixed	NA	Use qualitative findings to creating a theoretical model and extend the findings to generalizing by quantitative methods	NA	NA	NA

TABLE 2 : Table 2: MMR THAILAND (CONTINUED)

	Peukam (2009)	Ketmanee (2006)	Boonrueng (2007)	Phailaor (2004)	Jaikarnpan (2006)
Topic	An investigation of a decision model for outsourcing of human resource functions in Thailand	The management strategy of a non-profit organization for children and youth development: A case study of a center for the protection of a children's rights foundation	An organizational development diagnosis of the Office of the Court of Justice, Region 5	The Effects of Conducting Classroom Action Research on Knowledge and the Working Process Development of Elementary School Teachers : A Mixed Quantitative and Qualitative Research Method	Strategy and Success in Knowledge Management for Organization Development: A Case Study of Ban Tak Hospital, Tak Province
General purpose of the study	To explain the HR outsourcing decision model in a Thai context	NA	NA	To survey and compare the knowledge and working processes of teachers with different experiences in conducting classroom action research, and	NA

				to study the influences that conducting classroom action research has on knowledge development and the working process	
Research Paradigm	NA	NA	NA	NA	NA
Research Strategy	Sequential Explanatory Design	NA (Proposed : Concurrent Triangulation)	NA (Proposed : Concurrent Triangulation)	NA (Proposed: Concurrent – Triangulation)	Exploratory Design (Sequential Equivalent Status Design)
Notation	QUAN → qual	NA	NA	(qual →QUAN) + QUAL	QUAL → QUAN
Quantitative data collection	• Questionnaire	• Quantitative questionnaires from 63 respondents, comprised of 11 executives and 52 staff members.	• Questionnaires were used to collect data from 23 authorities in the Office of the Court of Justice	• Questionnaire	•Questionnaire
Qualitative data collection	• In-depth interview	• Qualitative interview • Participatory observation	• Qualitative interviews from 3 administrators.	• Participatory observation • Interview • Documentary studies	• Interviewing • Observation
Quantitative data analysis	• Descriptive Statistics • Multiple regression model	• Descriptive statistics • Frequency/ Percentage • Arithmetic mean • Standard deviation	• Frequency • Percentage • Mean • Standard deviation	• Descriptive statistics (frequency, percent, mean, standard deviation, minimum, maximum, skewness, kurtosis values) • T-test	• Percentage • Arithmetic mean • Standard deviation
Qualitative data analysis	NA	• Content analysis	NA	• Content Analysis	NA
Reasons for collecting both types of data	NA	NA	NA	Triangulation	NA
How the two types of data were mixed	NA	NA	NA	Use qualitative data for developing a quantitative questionnaire. The second qualitative	NA

				findings were used to confirm or triangulate the quantitative findings.	

As shown in Table 2, a review of each study conducted in Thailand according to the eleven distinct features of MMR found that: (1) topic: four studies identified the term "mixed methods research" in the research topic; (2) purpose of the study: five studies used the general purpose of the study while others studies identified specific purposes which referred to the research questions; (3) research paradigm: none of them presented a guiding research paradigm; (4) research strategy: seven studies identified "sequential" as the research strategy; (5) notation: four studies used QUAL at the first phase, three studies emphasized QUAN at the first phase, one study used qual, followed by QUAN and then used QUAL at the final phase. Two of them did not mention any specific research strategy; (6) quantitative data collection: each study used the questionnaire as a quantitative research instrument; (7) qualitative data collection: each study used an interview (semi-structured or unstructured interview) as the primary method for the qualitative data collection, and some studies used either individual (in-depth) or a focus group. Some studies also included an observation method in order to have a better understanding; (8) quantitative data analysis: all studies employed descriptive statistics as the basis of quantitative data analysis, and some included inferential statistics. Three of them also used advanced research statistics, such as multiple regression, exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and structural equation modeling (SEM); (9) qualitative data analysis: five studies explained how to analyze the qualitative data by using content analysis, analytical induction and descriptive issue by issue. The other five studies did not explain the procedures for analyzing qualitative data; (10) reasons for collecting both types of data: only one study gave a reason for collecting both types of data which was for triangulation; and (11) how the two types of data were mixed: only two studies mentioned how the two types of data were mixed.

COMPARISON OF MMR CONDUCTED IN USA AND THAILAND

Based on the review made in Tables 1 and 2, a comparison of the results using the eleven features of the MMR studies as a basis was made. Six areas of major similarities and four major areas of differences were identified.

The six major areas of similarities are: (1) most of the MMR reviewed identified the term "mixed methods research" in the research topic. Some of them included the strategy of MMR in the topic such as the words "exploratory" or "explanatory"; (2) the majority of the MMR reviewed used the general purpose of the study rather than specific research objectives; (3) most of the MMR reviewed used questionnaires as the major instrument for quantitative data collection; (4) most of the MMR reviewed used an interview as the major instrument for qualitative data collection; (5) most of the MMR reviewed used descriptive statistics for quantitative data analysis; and (6) most of the MMR reviewed used "sequential" design particularly the sequential explanatory strategy.

The four major areas of differences are: (1) only two MMR studies reviewed identified research paradigm and employed "pragmatism" in the studies; (2) most of the MMR studies conducted in Thailand did not provide detailed explanations of the qualitative data analysis; (3) only one MMR study conducted in Thailand provided a reason for collecting both types of data; and (4) only two MMR studies conducted in Thailand clarified how the two types of data were mixed.

DISCUSSION

The findings of this study reflect the need for improvement in conducting MMR in two major areas: research design and data analysis. A number of critical issues in both areas will be selected for discussion in this section.

It should be noted that out of twenty MMR studies conducted in Thailand and the USA only two studies identified and justified research paradigm. In designing any type of research it is essential that a guiding paradigm be identified and justified (Creswell, 2009; Maykut & Morehouse, 1994) as a paradigm provides direction for researchers to select the appropriate strategy and method for their study. In the area of strategy, it was clearly evident that most of the MMR studies conducted in Thailand did not clearly explain the justification for using a specific strategy. This is in contrast to the MMR studies conducted in the USA where most of them specified and justified the selection of a research strategy. Unlike the quantitative part of research, there are several strategies for qualitative research such as narrative, phenomenology, grounded theory, ethnography, case study, etc. (Creswell, 2007). Strategy tells how the researchers are to conduct their research which will lead to the proper selection of a research method (Creswell, 2009; Marshall & Rossman, 1999). Thus, identification, justification and explanation of strategy are essential in the MMR design.

Unlike the MMR studies conducted in the USA most of the MMR studies conducted in Thailand did not clearly explain the process of qualitative data analysis. Although five of them provided certain levels of explanation, they did not clearly specify the procedures for data analysis. Data analysis in qualitative research is usually based on a research strategy. Normally, each strategy has its own type of data analysis (Joungtrakul, 2010), for example, grounded theory study data analysis usually begin with open coding followed by axial coding, selective coding, and theoretical proposition (Creswell, 1998; Glaser & Strauss, 1967; Joungtrakul, 2009, 2010; Strauss & Corbin, 1990). In addition to the identification and explanation of qualitative data analysis, an explanation of how the two types of data were mixed should also be made in the MMR study. Unlike the MMR studies conducted in the USA, only one MRR study conducted in Thailand provided an explanation of how the two types of data were mixed.

In addition, it was noted that out of the twenty MMR studies reviewed fourteen studies were sequential studies (seven studies each in the USA and Thailand). These findings support that MMR is still in its adolescence stage and many issues are confused at the moment (Collins, Onwuegbuzie, & Jiao, 2007). Despite many scholars (Morse, 1991; Morgan, 1998; Creswell, 2003; Johnson & Onwuegbuzie, 2004; Onwuegbuzie & Leech, 2006; Teddlie & Tashakkori, 2006) having presented their

views on how to collect, analyze, and interpret quantitative and qualitative data in a single study, many unresolved issues are still being discussed. One reason that other types of MMR were not employed may be that they take more time, resources and effort, especially the concurrent strategy (Creswell, 2009). To be able to answer various types of research questions other than those answered by the sequential strategy more MMR studies using other types of strategies should be conducted.

It is noticeable in this study that most of the MMR studies conducted in Thailand did not specifically display a literature review on MMR. For example, many MMR research designs explain the process of conducting the research without referring to the theories and concepts of MMR. At the same time similar incidents occurred in the qualitative data analysis. Although an explanation was made on the procedures for data analysis, no reference was made to specific theories and concepts of qualitative data analysis. The reasons may be that qualitative research was not emphasized at the graduate level in Thailand. A study by Joungtrakul (2007) found that most of the Ph. D. courses in Thailand taught only one research course and that most of the research taught emphasize only the quantitative part. Similarly, most available Thai research text books are mainly quantitative. There are very few Thai text books available on qualitative research.

CONCLUSIONS AND RECOMMENDATIONS

The findings of this study reflect the improvements needed in the two major parts of MMR study: (1) research design and (2) data analysis. To improve the quality of MMR studies it is recommended that: (1) research design should include research paradigm identification and justification; and the reasons should also be clearly explained and justified as to why both types of data collection are needed; (2) the process of qualitative data analysis and the combination of two types of data should be clearly explained in the MMR study; (3) more studies using other types of MMR strategies should be conducted, other than sequential design, to enhance the development of MMR; and (4) more qualitative research should be emphasized in graduate and research training courses than currently provided, particularly in Thailand.

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