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Mixed Methods Research in Project Management

Roslyn Cameron and Shankar Sankaran

The inspiration behind this chapter derives from a passion for mixed methods research (MMR) and many years of teaching and providing capacity building in mixed methods to novice and experienced researchers alike. Other management fields have started adopting mixed methods in their research. PM needs to keep up, as we naturally think qualitatively and quantitatively to solve problems we encounter in projects.

The aim of this chapter to provide doctoral students with a broad-brush view of mixed methods research (MMR) and to place MMR historically and paradigmatically against the paradigm wars of the 1970s. This will provide an historical context for MMR's growing popularity and utility across many disciplines and fields of inquiry. The chapter defines MMR and provides a discussion on the paradigmatic stances, designs, typologies and notation systems of MMR. It reviews MMR prevalence studies and the purposes for utilising a MMR study before advising on the reporting of MMR studies. The chapter includes tips for supervisors and researchers/students and exercises to assist those new to MMR in a practical and applied sense.

At the end of this chapter, the reader can:

- define MMR and the associated mixed methods notation system;
- recognise the need for those utilising MMR to position themselves paradigmatically and explicitly articulating the rationale for using MMR designs;
- apply the good reporting of a mixed methods research (GRAMMS) framework when reporting an MMR study.

Keywords: mixed methods; paradigms, typologies, GRAMMS

MMR has been lauded as the third methodological movement, and several authorities, texts and journals have emerged as leading the movement's increasingly popular growth from within education, the social and behavioural sciences and health, medicine and nursing, to a much wider audience and discipline fields. In business and management fields, the use of MMR is growing and has been researched through several prevalence studies (Bazeley, 2008; Bryman, 2008; Cameron, 2010, 2011; Currall and Towler, 2003; Molina-Azorin, 2008, 2009; Molina-Azorin and Cameron, 2010).

The definitions of MMR will be explored before tracing the MMR movement's history and evolution. The paradigmatic stances taken in MMR will be presented before discussing MMR design typologies and associated notation systems. This will be followed by reference to MMR prevalence studies across business and management disciplines before discussing rationales and purposes for MMR. Case studies demonstrating how MMR is being utilised in the field of PM will then be presented.

Defining MMR becomes critical to establishing what we are discussing, and this is no simple matter. The definitions of MMR have evolved as the movement has, and now more than ever, the problematic issue of definitions needs to be addressed. As De Lisle (2011) noted, **'**The complexity and diversity of mixed methods approaches means that definition and typology have become critical to good practice' (p. 92).

Definitions of Mixed Methods Research (MMR)

There are several definitions of MMR and as the field of MMR has developed and evolved, these definitions have multiplied, leading Johnson, Onwuegbuzie and Turner (2007) to undertake a detailed analysis of MMR definitions. Creswell (2011) claimed that the 'changing and expanding definitions of mixed methods research' (p. 270) is one of 11 current controversies and questions raised in respect to MMR. He cited definitions that have made an impact and signify the different stages in the development of MMR. Some of these definitions have been listed in Table 22.1.

Table 22.1 Significant definitions of MMR (1989–2007)

Greene, Caracelli and Graham (1989, p. 256)
In this study, we defined mixed method designs as those that include at least one quantitative method (designed to collect numbers) and one qualitative method (designed to collect words), where neither type of method is inherently linked to any particular inquiry paradigm.
Tashakkori and Teddlie (1998, p. ix) …the combination of 'qualitative and quantitative approaches in the methodology of a study'.
Tashakkori and Teddlie (2003, p. x). …mixed methods research has evolved to the point where it is a separate methodological orientation with its own worldview, vocabulary and techniques.
Creswell and Plano Clark (2007, p. 5) Mixed methods research is a research design with philosophical assumptions as well as methods of inquiry. As a methodology, it involves philosophical assumptions that guide the direction of the collection and analysis and the mixture of qualitative and quantitative approaches in many phases of the research process. As a method, it focuses on collecting, analysing and mixing both quantitative and qualitative data in a single study or series of studies. Its central premise is that the use of quantitative and qualitative approaches, in combination, provides a better understanding of research problems than either approach alone.
Johnson, Onwuegbuzie and Turner (2007, p. 123) Mixed methods research is 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 purposes of breadth and depth of understanding and corroboration.

The History and Evolution of Mixed Methods Research (MMR) as a 'Third Methodological Movement'

Tashakkori and Teddlie (2003) referred to the emergence of MMR as the third methodological movement: 'The mixed methods movement is a 'quiet' revolution in that its orientation has been to resolve conflicts between qualitative and quantitative inquiry' (p. 697). The movement gained momentum in the 1980s as a distinct methodological force.

The formal emergence of MMR has been mapped by Johnson and Gray (2010), who claimed that after 1935, 'the social and behavioural sciences became increasingly dominated by QUAN approach because it seemed to have the most promising future. The post-1935 period also was a time of increasing disciplinary crystallis ation instead of disciplinary integration of earlier times' (p. 87). Then, in 1966, the concept of triangulation emerged and was developed by Jick (1979) and Denzin (1978). From the mid-1980s and into the late 1990s, MMR concepts and practices were developed, especially in the field of programme evaluation. According to

Johnson and Gray (2010), 'During the emergence of MM as a third methodological paradigm … MM has struggled to somewhat to develop a corresponding philosophical pragmatism' (p. 87). The relationship between pragmatism and MMR will be addressed later in the chapter.

Creswell and Plano Clark (2007) also mapped the emergence of MMR across four overlapping periods as follows:

- formative period: began in the 1950s to 1980s;
- paradigm debate period: 1970s to 1980s;
- procedural developments: 1980s to 2000; and
- advocacy as a separate design period: 2000 to present.

They saw the mixed methods movement as currently entering a stage of increasing interest across multiple disciplines, as exemplified by publication of mixed methods studies, mixed methods texts and journals, funding opportunities and special interest groups.

Paradigmatic Stances in Mixed Methods Research (MMR)

Teddlie and Tashakkori (2003) viewed the utility of MMR as being based on how it:

- answers research questions that other methodologies cannot;
- provides better (stronger) inferences;
- provides the opportunity for presenting a greater diversity of divergent views.

Despite the advances in mixed methods theoretical and methodological foundations over the last ten years, however, several controversies remain.

It is important for those utilising MMR to be cognisant of the common criticisms that are made of mixed methods so that these can be addressed and considered when designing and implementing a mixed methods study. Tashakkori and Teddlie (2010) identified the most frequently mentioned critiques of MMR as follows: the costs of conducting MMR; unrealistic expectations regarding a researcher's competence in both qualitative and quantitative methodology; the complexity of putting together teams to carry out MMR; and the impossibility of examining issues from different perspectives/worldviews or what is referred to as the

incompatibility thesis. The authors had earlier listed six controversial areas or unresolved issues in relation to MMR as follows:

1. The nomenclature and basic definitions used in MMR.
2. The utility of MMR (why we do it).
3. The paradigmatic foundations for MMR.
4. Design issues in MMR.
5. Issues in drawing inferences in MMR.
6. The logistics of conducting MMR (Tashakkori and Teddlie, 2003, p. 672).

This section of the chapter will present the paradigmatic stances taken in relation to MMR. Many within the MMR community have made strong links between MMR and pragmatism, which has also been a source of criticism for the movement. Biesta (2010) presented seven different levels at which ideas about mixing methods, at what levels mixing methods is relatively unproblematic and at what levels issues become more serious, as follows:

- Level 1: Data (unproblematic to have both text and numbers in same research).
- Level 2: Methods (unproblematic to have data collection methods that generate numbers and text in the same research).
- Level 3: Design (issues with having interventionist and non-interventionalist designs in one study).
- Level 4: Epistemology (problematic: which epistemological set of ideas is most appropriate to account for knowledge generated through a mixed methods study?).
- Level 5: Ontology (problematic: is it possible to combine different assumptions about reality in the same research?).
- Level 6: Purposes of research (issues with combining research which seeks to explain and research which seeks to understand).

- Level 7: Practical roles of research (unproblematic to have research oriented toward both technical and cultural role) (p. 100).

The levels at which issues arise are at Level 3, when interventionist and non-interventionist design are used in one study, and at Level 6, when research is trying to combine research that is seeking to explain and seeking to understand. The more serious and complex issues arise at Level 4 and Level 5. Those wishing to utilise MMR need to be aware of these issues and to address them when explaining the methodological choices they are making.

For many researchers, mixing methods and approaches presents important philosophical and paradigmatic dilemmas. In 2003, Teddlie and Tashakkori presented the six philosophical stances taken in relation to research and in particular MMR as follows: the a-paradigmatic stance; the incompatibility thesis; the complementary thesis; the single paradigm thesis; the dialectic thesis; and the multiple paradigm thesis**.** Researchers wishing to use MMR can position themselves using this framework of paradigmatic stances (see Table 22.2).

Table 22.2 Paradigmatic stances in MMR (Teddlie and Tashakkori, 2003)

Stance	Description
A-paradigmatic stance:	*Methods and paradigms are independent of each other*
Incompatibility thesis:	*MMR is impossible (purists)*
Complementary thesis:	*Mixed methods possible BUT must be kept separate to ensure strengths of each paradigm (situationalists)*
Single paradigm thesis:	*A single paradigm should serve the foundation of mixed methods*
Dialectic thesis:	*Mixed methods engages in multiple sets of paradigms and their assumptions. All paradigms are valuable but are only partial worldviews. Reject the selection of one paradigm over another*
Multiple paradigm thesis:	*Multiple paradigms may serve MMR . The difference between this and dialectic is the need to choose one type of paradigm for a particular study over another*

Modell (2010) chose an approach to mixed methods that stimulates inter-paradigmatic dialogue through the use of meta-triangulation:

> The basic idea of meta-triangulation is to mobilize multiple paradigms in examining a particular social phenomenon and at least initially preserve their integrity (rather than modifying and integrating them) whilst remaining aware of the potential transition zones between them. Differences and similarities in research findings may then be systematically analyzed at the levels of ontology, epistemology and methodology. For instances, a particular accounting issue may be examined with the aid of both quantitative and qualitative methods informed by theories and philosophical assumptions associated with the ‘mainstream’ and the ‘alternative’ paradigm, respectively, using a team

of researchers affiliated with both paradigms. This might reveal whether research findings converge or diverge as a result of methodological artifacts or due to more fundamental similarities and differences in philosophical assumptions. Such research may also be extended by paying explicit attention to the positions adopted by various researchers as a result of differences in their backgrounds, such as research training, institutional affiliations and paradigmatic commitments. (p. 127)

A favoured approach to paradigmatic positioning in MMR is to align with pragmatism or a dialectic approach. According to Molina-Azorin and Cameron (2010), 'Pragmatism advances multiple pluralistic approaches to knowing, using "what works", a focus on the research questions as important with all types of methods to follow to answer the questions, and a rejection of a forced choice between postpositivism and constructivism. Thus, a major tenet of pragmatism is that quantitative and qualitative methods are compatible' (p. 97). The development of MMR as a third methodological movement has also seen the evolution of an array of MMR design typologies. This chapter will present two of these.

Mixed Methods Research (MMR) Design Typologies and Notation Systems

As De Lisle (2011) stated, 'Typologies are classification schemes used to describe various mixed methods designs, and are important to good practice because they include implicit rules, procedures, and criteria for mixing. Currently, there are several typologies in the literature' (p. 93). One of the earliest MMR typologies developed was by Morgan (1998). Figure 22.1 provides a visual depiction of the four complementary MMR designs Morgan (1998) developed for health research. This has resulted in four complementary MMR designs developed for health research, as follows: qualitative preliminary, quantitative preliminary, qualitative follow-up and quantitative follow-up. You will also notice that this was the beginning of an MMR notation system where qualitative research is noted by either QUAL or qual depending on whether the qualitative data is more dominant or has greater priority and Quantitative data is noted by QUAN or quan. Arrows (→) denote sequential data collection and plus sign (+) denotes concurrent or simultaneous data collection. This notation system was first developed by Morse

(1991, 2003) and has been further developed by Morse and Neihaus (2009) and Cameron (2012).

Figure 22.1: Complementary MMR designs (Morgan, 1998)

Another set of MMR designs has been developed by Creswell, Plano Clark, Gutmann and Hanson (2003). A summary of these designs is provided in Table 22.3 and indicates whether the designs is sequential, concurrent or nested, at what stage the qualitative and quantitative elements of the research are integrated and which has priority.

Table 22.3 MMR designs (Creswell et al., 2003)

Creswell et al. (2003)	Stage of Integration	Implementation	Priority/Status
Sequential designs Sequential explanatory	Interpretation	QUAN→qual	Usually QUAN, can be QUAL or qual
Sequential exploratory	Interpretation	QUAL→quan	Usually QUAL, can be QUAN or equal
Sequential transformative	Interpretation	QUAL→QUAN QUAN→QUAL	Either dominant or both equal
Concurrent designs Triangulation	Interpretation or analysis	QUAL+QUAN	Equal
Nested	Analysis	Qual within QUAN Quan within QUAL	Either dominant
Transformative	Usually, analysis, can be interpretation	QUAL+QUAN	Either dominant or both equal

There are many more MMR design typologies and those wishing to use MMR need to find the designs that best suit their research purposes.

Prevalence Studies of Mixed Methods Research (MMR)

Prevalence studies of the use of MMR in disciplines are studies which analyse the prevalence of mixed methods studies within a discipline through samples of published research, usually in academic outlets such as journals and conferences proceedings (Alise and Teddlie, 2010). Cameron and Molina-Azorin (2011) undertook a synthesis of the MMR prevalence studies undertaken in several disciplines in management and business. These disciplines included marketing, international business, strategic management, organisational behaviour,

operations management and entrepreneurship. Table 22.4 is a summary of the synthesis undertaken by these two authors. All of the studies aimed to discover the extent and current role of qualitative, quantitative and mixed methods in these business and management fields through a process of content analysis of empirical studies published in academic journals. After taking the conceptual articles out of the analysis, the following summary table was presented on the empirical papers (qualitative, quantitative or MMR).

Table 22.4: Summary of empirical papers aligned with discipline fields (adapted from Cameron and Molina-Azorin, 2011)

Discipline	**Quant**	**Qual**	**Mixed**	**Total**
Marketing *3 Journals 1993–2002* Hanson and Grimmer (2005)	553 *(75%)*	78 *(11%)*	105 *(14%)*	**736** *(100%)* *(31%)*
International business *4 Journals 2000–2003* Hurmerinta-Peltomaki and Nummela (2006)	269 *(68%)*	57 *(15%)*	68 *(17%)*	**394** *(100%)* *(17%)*
Strategic management *1 Journal 1997–2006* Molina-Azorin (2009)	441 *(78%)*	30 *(5%)*	99 *(17%)*	**570** *(100%)* *(24%)*
Organisational behaviour *1 Journal 2003–2008* Molina-Azorin and Lopez-Fernandez (2009)	197 *(85%)*	17 *(7.5%)*	17 *(7.5%)*	**231** *(100%)* *(10%)*
Operations management *1 Journal 2003–2007* Molina-Azorin (2008)	146 *(78%)*	23 *(12%)*	18 *(10%)*	**187** *(100%)* *(8%)*
Entrepreneurship *2 Journals 2003–2007* Molina-Azorin (2008)	178 *(76%)*	37 *(16%)*	20 *(8%)*	**235** *(100%)* *(10%)*
Total	**1784** *(76%)*	**242** *(10%)*	**327** *(14%)*	**2,353** *(100%)*

Cameron and Molina-Azorin (2011) identified disciplines where the prevalence of mixed methods was minimal (organisational behaviour and entrepreneurship) and where it was more prevalent than qualitative research (strategic management, marketing and international business). The authors concluded that:

Quantitative methods (76%) overwhelmingly dominates the methodological choice of the empirical articles reported in the journal samples across the fields reported. Nonetheless, mixed method studies represent 14% of empirical articles followed by qualitative studies at 10%. If the framework for acceptance levels devised by Creswell and Plano

Clark (2007) is applied it would seem, for the business and management fields covered in this synthesis of mixed methods prevalence rates studies, there exists at the least, minimal signs of acceptance of mixed methods. (Cameron and Molina-Azorin, 2011, p. 267)

These studies are now four to ten years old, and current prevalence rates may have increased as MMR has become more widely known and legitimated through the development of the MMR conceptual and foundational knowledge base. The following section of the chapter looks specifically at the utility of MMR within PM research.

Purposes and Rationales for Using Mixed Methods Research (MMR)

The following papers were selected from three key PM journals as examples of how MM has been applied in PM. The journals are *Project Management Journal* (*PMJ*), *International Journal of Project Management* (*IJPM*) and *IEEE Transactions on Engineering Management* (*IEEE TM*).

1. Milosevic and Patanakul, 2005 (PMJ): 'Standardized project management may increase development project success'

Although this paper did not specifically state that it was MMR, an analysis of the paper showed this to be a good example of MMR in PM. Instead, the authors called it a three-step approach (Figure 1, p. 184) and confirmed that it combined qualitative and quantitative methods. The research problem they tried to address was as follows:

What are the major factors in SPM [Standardised Project Management] efforts on the OPM [Organizational Project Management] level? And what SPM factors on the OPM level are of interest because they may impact project success? (p. 182)

The first step used a case study methodology to develop SPM constructs for hypothesis testing through a quantitative study. This was followed by case interviews of a qualitative nature. Thus, the sequence was qual-QUAN-qual.

Step 1 included semi-structured interviews with 12 project managers and a review of SPM-related documents and observations. The data were analysed using content analysis and cross-case analysis to develop sharper construct definitions.

The data from Step 1 were used to develop seven hypotheses and a questionnaire. A sample of 55 participants from development projects in high-velocity industries – computer/software and electronics – were surveyed. The data collected were analysed using two bivariate analysis methods and one multivariate method.

In Step 3, multiple follow-up interviews were conducted in the five companies included in the sample. Five individuals were interviewed.

The discussion used results from both the quantitative and qualitative analysis. While the quantitative results seemed to indicate a mediocre level of PM standardisation, which was surprising, the interviews offered an explanation for these results. Herein lies the advantage of using mixed methods, as using only one method might not have given the valid results. Finally, the researchers compared their findings with industry practices, which helped to throw additional light on their research.

The major contribution of this study was the identification of critical factors at OPM level and the finding that companies standardised PM only to a certain level to maintain flexibility.

2. Lee-Kelly, 2006 (IJPM): 'Locus of control and attitudes to working in virtual teams'

The researcher wanted to 'examine the influence of individual workers' general control expectancies on their attitudes towards distributed working' (p. 236). The purpose was to understand how workers in multi-location and multicultural project teams make sense of their environment beyond operational issues by looking at psychological and emotional drivers. The sequence was QUAN-qual. The authors did not explicitly refer to this as an MMR study.

The research was declared as two-staged. In the first stage, a survey of professional workers in defence projects tested the 'locus of control' on the perception of team members concerning role conflict and job satisfaction. This was followed by using a case study of IT professionals. In-depth interviews were used as the qualitative study method.

The survey used a *t*-test on locus of control and managerial position. The interviews were coded using NVivo qualitative analysis software. The qualitative study was used to elaborate on the results of the survey conducted in the first step. This is a good use of the two methods in

sequence. The discussion employed the results of both the quantitative and qualitative study to derive conclusions that were useful for practice.

3. Chai and Xin, 2006 (IEEE TM): 'The application of new product development tools in industry: The case of Singapore'

The study investigated the diffusion and adoption of new product development tools in industry in Singapore. The authors did not specifically state that this was a mixed methods study.

The study used a case study and survey. The case study along with a literature review was used to generate hypotheses to be tested by a survey. The purpose of using two steps was to render the findings 'much richer' and add 'grounded understanding' (p. 344). These are generally good reasons for an MM approach.

The case study was carried out using semi-structured interviews of both practitioners and academics. There were some differences in opinions between the academics and practitioners, but there was broad agreement that benchmarking was commonly used.

Analysis of the interviews resulted in differentiating between tool-related factors and organisation-related factors. Both descriptive statistics and regression analysis were used to analyse the quantitative data. The discussion was mainly based on the quantitative study. This is an example of one good use of MM, starting with one method to initiate another method.

When we analysed project management journals for the prevalence of MM studies, we found that PM research is not keeping pace with the increased use of MM in management journals. The papers also do not seem to explicitly declare the studies as MM, but use other names to describe MMR. Despite this, they are good examples of the use of MM, as the three papers from the key PM journals demonstrate.

Reporting Mixed Methods Research (MMR)

O'Cathain, Murphy and Nicholl (2008) undertook an analysis of mixed methods studies in the health services research published between 1994 and 2004. The aim of this study was to assess the quality of these mixed methods studies. The authors took note that there had been very little done on developing quality criteria for assessing mixed methods studies and did not wish to

develop these as a result of their study. What they did produce was a set of quality questions to assess these MMR studies.

The study found that the main quality issue was a 'lack of transparency of the mixed methods aspects of the studies and the individual components. The qualitative components were more likely to be poorly described than the quantitative ones' (O'Cathain et al., 2008, pp. 96–97). In terms of integrating the qualitative and quantitative data, there were few if any attempts to do so as there was a 'tendency for researchers to keep the qualitative and quantitative components separate rather than attempt to integrate data or findings in reports or publications' (O'Cathain et al., 2008, p. 97).

The study offered the good reporting of a mixed methods study (GRAMMS) framework, which assists and encourages quality reporting of MMR. This six-item guidance framework includes prompts about the 'success of the study, the mixed methods design, the individual qualitative and quantitative components, the integration between methods and the inferences drawn from completed studies' (O'Cathain et al., 2008, p. 92). GRAMMS includes the following set of quality guidelines (O'Cathain et al., 2008):

1. describe the justification for using a mixed methods approach to the research question;
2. describe the design in terms of the purpose, priority and sequence of methods;
3. describe each method in terms of sampling, data collection and analysis;
4. describe where integration has occurred, how it has occurred and who has participated in it;
5. describe any limitation of one method associated with the presence of the other method; and
6. describe any insights gained from mixing or integrating methods.

It is highly recommended that those wishing to employ MMR designs reflexively use the GRAMMS when designing, conducting and reporting MMR.

Tips and Exercises

Tips for Students

- The research methodology selected should match the research question(s) being asked. So you have to provide a convincing rationale to select MMR. See Chapter 30 of *The Sage Handbook of Mixed methods in Social and Behavioural Research* (Tashakkori and Teddlie, 2010) on how to write good MMR proposals. See also Chapter 8 in Creswell and Plano Clark (2007).
- The guidelines provided (quote some references as examples?) in this chapter on how to set up MMR should be carefully considered while coming up with an appropriate research design.
- You have to consider the integration of qualitative and quantitative integrations right from the start rather than as an afterthought.
- Writing up a mixed methods theses or dissertation can be challenging, as it may seem like writing two theses. Careful consideration of writing up the thesis or report up front could help in managing the task.
- MMR would need specific skills. Refer to Creswell and Plano Clark (2007), Chapter 9. There is also *The Sage Handbook of Mixed and Multimethod Research* being published by Oxford University Press, which may have useful tips.

Tips for Supervisors

- MMR requires both quantitative and qualitative data collection and analysis skills. The student needs to be taught both before venturing to take up mixed methods. Working in different paradigms may pose challenges to researchers. You have to ensure that they do not mix them up while carrying out their research.
- Writing up a MMR thesis or dissertation could be a challenge. Therefore, the chapters of the thesis, dissertation or report would have to be matched to the type of mixed methods design being adopted.

- Encourage your students to enrol in courses that would teach quantitative, qualitative and mixed methods such as the graduate certificate taught online at the University of Nebraska (http://online.unl.edu/Graduate/Programs/Mixed-Methods-Certificate.aspx).

Exercises

1. Apply an MMR design to a particular PM research problem and position yourself paradigmatically. After you have done this, justify your methodological choice by arguing why an MMR study would better answer your research questions as opposed to a mono-method (QUAN or QUAL) or a multimethod (QUAN or QUAL) study.
2. Once you have undertaken exercise 1, follow this by choosing an appropriate MMR design and provide a diagram of the design which includes the key MMR notation system flow diagrams and MMR notation system (see Creswell and Plano Clark, 2007 or Creswell et al., 2003 as a good starting point for ideas on MMR designs).
3. After undertaking exercises 1 and 2, use the GRAMMS guidelines to justify your methodological choices. Use the first three guideline points from GRAMMS:

- describe the justification for using a mixed methods approach to the research question;
- describe the design in terms of the purpose, priority and sequence of methods; and
- describe each method in terms of sampling, data collection and analysis.

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