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Mixed Methods Use in Project Management Research

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Abstract:

Mixed methods research is increasingly being used in business and management disciplines, in spite of positivist traditions. The aim of the study is twofold, to examine the types of mixed methods approaches being used and to determine the quality of the reporting of mixed methods studies published in the field of project management. A retrospective content analysis of articles from three ranked project management journals was undertaken for a sample period of 2004 to 2010. Our findings suggest the field of project management is in need of capacity building in relation to the good reporting of mixed methods studies.

Keywords: mixed methods research; project management; research methods; research designs

Introduction

Mixed methods (MM) research has experienced a growth in popularity over the last decade and has been used to not only provide greater insights into the investigation of research problems but to also address complex phenomena. Mixed methods is being touted as the third methodological movement and is characterised by a growing body of theoretical and methodological frameworks. Prominent mixed methodologists have championed the movement, which has gained strong footholds in the fields of education, health and medicine, and the social and behavioural sciences. The establishment of mixed methods research specific journals, research texts and its acceptance by research funding bodies indicates a growing trend in the adoption of mixed methods as a legitimate research approach.

One of the main issues and common criticisms of mixed methods is that many who are mixing qualitative and quantitative methods in their research have yet to be acquainted with the growing body of foundational concepts that are developing in the mixed methods research community and as such are not referring, acknowledging or delving into this growing area of mixed methodology and associated theoretical frames and tools. For example, Leech &

Onwugebuzie (2009) point to a “plethora” of mixed methods research designs and typologies available which now provides researchers with a greater choice in methodological approaches. “For years, the choice has seemed to be dichotomous; one could choose either a quantitative design or a qualitative design. Yet, there is a third viable choice, that of mixed methods. Mixed methods research, which involves combining quantitative and qualitative approaches, is still in its adolescence, and thus, is still relatively unknown and confusing to many researchers” (Leech & Onwugebuzie, 2009, p. 265-6). Mertens (2011) notes “Sometimes, authors do not make reference to other literature in the field of mixed methods research, despite the ever-increasing number of resources that are emerging” (p. 3).

Another common criticism of those reporting studies in which qualitative and quantitative methods are being used is that due to a combination of reasons researchers are only reporting part of their mixed methods studies (usually the quantitative part) so as to increase the probability of being published (as many journal seems to favour papers using quantitative methods) or because of the word limitations associated with the length of journal submissions. Stange, Crabtree & Miller (2006), editors for the *Annals of Family Medicine* lament this issue “the dramatic advances in the scope and sophistication of conducting mixed methods research have not been met with parallel progress in ways of disseminating the results of mixed methods studies. From our point of view, a major dilemma is that the results of multimethod studies often are segregated in different publications that reach limited and often nonclinical audiences” (p. 292). Mertens (2011) in attending to her editorial role with the *Journal of Mixed Methods Research*, refers to these common criticisms in relation to the reporting of mixed methods studies: “Sometimes manuscripts include only quantitative or only qualitative approaches; sometimes they include both quantitative and qualitative approaches, but there is no integration of the methods, analysis, or reporting of findings” (p. 3).

Project management (PM) is a rapidly expanding field with its theoretical roots in planning techniques (Koskela & Howell, 2002; Williams, 2004) which was dominant in the engineering sciences (Soderlund, 2004). In an effort to explore, expand and inform the field of project management, PM researchers have begun looking at different scientific and management fields. In 2004 for instance the UK’s Engineering and Physical Sciences Research Council (EPSRC) funded a research network – Rethinking Project Management – with the aim of enriching and extending the subject of project management beyond its current conceptual foundations (Winter, Smith, Morris, & Cicmil, 2006). Bredillet (2007a, b and c; Anbari, Bredillet, & Turner 2008) reviewed the PM academic literature and organised the literature around nine major schools of thought: optimization, modelling, governance, behaviour, success, decision, process, marketing, and contingency. More recently, Soderlund (2011) has suggested six schools of project management research: optimization; factor; contingency; behaviour; governance; relationship and decision. He identified growing support for methodological pluralism as project management becomes increasingly viewed from different perspectives and by different scholars.

Several authors have noted the expanding nature of project management research and its evolution over the past two decades (Kwak & Anbari, 2009; Müller, Sankaran & Droiun, 2013; Soderlund, 2004; Turner, Pinto & Bredillet, 2011). Soderlund (2004) identified the expansion of project management research into company-wide issues and across various levels of analysis. Turner et al., (2011) refer to the “increasing sophistication and methodological rigour” (p. 103) of project management research as a result of an analysis of the topics, methodologies and citations of project management research published in three project management journals from 1987-2007. Kwak & Anbari (2009) studied project management research through allied disciplines as a means to better understand the field as a

research based academic discipline. They argue the project management research community needs to actively promote PM as an academic discipline through related management disciplines and concluded PM is now a more applied and interdisciplinary field as compared to other fields of management (Kwak & Anbari, 2009).

A recently published edited book on novel approaches to organizational project management (OPM) research has the stated aim of improving the rigour of project management research by “open[ing] the minds of project management researchers to the necessity of transforming and translating knowledge from various sources including allied fields into OPM research to raise the level and variety of research approaches that they employed” (Müller et al., 2013, p. 472). Müller et al., (2013) in a discussion on OPM research refer to the:

...trend towards plurality in perspectives, multi-paradigm approaches and the integration of the results from multi- paradigm research in the form of a disciplined search for complementarities, and convergent and divergent results in order to build a holistic understanding of research phenomena (p. 473).

These authors cite several trends in project management research including: the use of more rigorous methodologies; the increasing breadth of topics; the increase in methodological commentaries; the increase in literature reviews, survey based research and case studies and; an increase in the publication of qualitative studies. Methodological diversity and variety “nurtures the growth in knowledge and understanding in the field” (Müller et al., 2013 p. 24). As has been asserted by Cameron & Sankaran (2013), the use of MM by project management researchers could encourage a move away from traditional methods (surveys, interviews and case studies) and to the adoption of “more innovative approaches by using MM research designs not just for triangulation as a validation strategy, but also to add more in-depth investigation and a broader perspective of the phenomenon being researched” (p. 398). Frequently using only a small number of methodologies in project research is not desirable to the development of the field itself since it produces inertia and can limit the ability to produce new and interesting research. In addition to the authors cited above several other PM researchers have recognised this and have proposed the adoption of different lenses from which to view project management problems (Malgrati & Damiani, 2002; Bredillet, 2004; Cicmil, Williams, Thomas & Hodgson, 2006).

This study has taken an exploratory approach to investigate the use and quality of the reporting of mixed methods in recent project management research as represented by a sample of published research in three project management journals from 2004 to 2010. The three chosen journals are the: *International Journal of Project Management (IJPM)*; *Project Management Journal (PMJ)* and; *IEEE Transactions on Engineering Management (IEEE-TEM)*. These three journals were also chosen by Turner, Pinto and Bredillet (2011) in their study which was subsequently published in the *Oxford Handbook of Project Management*. They analysed PM research reported in these journals from 1997 to 2007 in respect to the topics covered, methodologies employed and citation patterns. These authors also consulted with project management academic researchers to confirm that this choice was appropriate. The study and its findings identified these three journals as leading the publication of PM research whilst Kwak & Anbari (2009) refer to IJPM and PMJ as the “flagship” journals of project management research. This study also chose these journals due to their standing in the field and impact factors (IJPM = 1.758; PMJ = 0.63 ; IEEE-TEM = 0.94).

The research being reported here has made use of a multi-strand conversion mixed model research design with an overarching research question and separate quantitative and

qualitative sub-questions. The retrospective content analysis provides a broad-based scan of methodological use, employing collections of separate keywords associated with qualitative and quantitative research methodologies. This resulted in a sample of 214 papers from across the three journals. These articles were then categorised as follows: conceptual (non-empirical); qualitative; quantitative; and mixed methods. This resulted in 25 articles being identified as mixed methods studies. The study then classified the identified mixed methods papers in terms of data collection sequencing, dominance and analysis. This was followed by a qualitative analysis of the mixed methods papers using a set of quality criteria for the reporting of a mixed methods study developed by Morse & Neihaus (2009) as elaborated on further in the paper. Two papers from the 25 were identified as being examples of good quality reporting of mixed methods research (not the quality of the research itself) and are discussed against the evaluative framework for the reporting of mixed methods research. It is hoped the findings of this study informs the project management research community about what constitutes the good reporting of mixed methods studies and how they can use mixed methods in the future to investigate complex phenomena, to utilise innovative methodologies with confidence and to fully report these studies using not only methodological justification, logic and rigour but the increasingly sophisticated mix methodology tool kit.

The paper will briefly outline the rise of mixed methods as a third methodological movement and discuss mixed methods prevalence rate studies from across business and management disciplines. The purposes or rationales provided for utilising mixed methods as posited by the mixed methods research community is explained before detailing the aims, research design, methodology and findings of the study being reported. The findings point to MM remaining rare in the field of project management and to researchers being tentative in their application of the various approaches, choosing largely to keep quantitative and qualitative narratives separate. They are also not describing their reasons for using MM, making it difficult to establish whether their approach to their research questions is consistent with the epistemology underlying the choice of methods.

A key contribution of this study is in evaluating the reporting of MM research in project management by the best practices established and lessons learned in other disciplines which are leading the adoption of MM. We hope to assist new researchers in project management and allied fields to use a MM approach more confidently and with justification, without fear of rejection by editors and reviewers all too familiar with reading project management research outputs developed using conventional methods. The paper concludes with recommendations for the future reporting of mixed methods research in the project management field.

Mixed Methods Research: What is it and how is it judged?

Mixed methods research is an emerging methodology that has been referred to as the third methodological movement. It is a growing area of methodological choice for many academics and researchers from across a variety of discipline areas. Creswell & Plano Clark (2011) have mapped a brief history of MM and its evolution to date, and have posited five, overlapping, time periods in the evolution of MM. These periods are: *formative* (1950s–1980s); *paradigm debate* (1970s–late 1990s); *procedural development* (late 1980s–2000), *advocacy and expansion* (2000–2009) and *reflective* (2003+).

According to Johnson & Onwugebuzie (2004), “Mixed methods research is formally defined here as the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single

study” (p. 17). Tashakkori & Teddlie (2003) define MM as “a type of research design in which QUAL [qualitative] and QUAN [quantitative] approaches are used in types of questions, research methods, data collection and analysis procedures and/or inferences” (p. 711). Stange et al (2006) refer to mixed methods research which “brings together numbers and narratives, description, hypothesis testing, hypothesis generation, and understanding of meaning and context to provide fuller discernment and greater transportability of the phenomenon under study” (p. 292).

Creswell & Plano Clark (2007) define MM as:

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 of data and the mixture of qualitative and quantitative 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 that either approach alone (p. 5).

Thus MM can be used at any stage of the research and within a single study or in a program of studies. However, both quantitative and qualitative methods have to be used in some combination to qualify as mixed methods research. Mixed methods is different to multi-method research which is defined as ‘designs in which the research questions are answered by using two data collection procedures (e.g., participant observation and oral histories) or two research methods (e.g., ethnography and case study), each of which is from the same QUAL or QUAN tradition’ (Tashakkori & Teddlie 2003, p. 11). The distinction between MM and multi-method research being the former utilises of both qualitative and quantitative data.

Tashakkori & Teddlie (2010) state that MM has:

gone through a relatively rapid growth spurt ... it has acquired a formal methodology that did not exist before and is subscribed to by an emerging community of practitioners and methodologists across the disciplines. In the process of developing a distinct identity, as compared with other major research communities of researchers in the social and human sciences, mixed methods [research] has been adopted as the de facto third alternative, or ‘third methodological movement. (p. 803-804).

Why has the MM movement been gaining momentum?

A look at the purposes of using MM will give us some clues to its increasing popularity and utility. Greene (2007) proposes five major purposes for using mixed methods in research studies: triangulation; complementarity; development; initiation and; expansion. Triangulation is a classic technique of using a combination of methods in a study as a validation strategy. The second purpose, complementarity is where different methods are used so as to enable a deeper and richer understanding of a complex research phenomenon. The development purpose for using a mix of methods is related to one method informing another thereby leveraging off the strengths of both methods in the assessment of a set of constructs or phenomena. Using mixed methods to initiate fresh ideas, insights and perspectives and to look for divergence and dissonance is the fourth purpose and the last is expansion. In the latter case mixed methods can be used to expand a study in terms of its range and scope.

There have been a handful of evaluative criteria developed to judge the quality of the reporting of MM and these criteria and frameworks shed light on what needs to be reported in a study

which has utilised mixed methods. Sale & Brazil (2004) identified criteria for assessing the quality of mixed methods studies to: “promote standards for guiding and assessing the methodological quality of [mixed methods] studies” (p. 361). Their quality criteria identified for mixed methods studies includes:

- Truth value (Credibility vs. Internal validity)
- Applicability (Transferability/Fittingness vs. External Validity/Generalisability)
- Consistency (Dependability v. Reliability)
- Neutrality (Confirmability vs Objectivity).

These criteria have been aligned to commonly used criteria found in both quantitative and qualitative quality criteria. An oft cited quality framework for judging the reporting of mixed methods is the Good Reporting of A Mixed Methods Study (GRAMMS) framework. The GRAMMS was developed by O’Cathain, Murphy & Nicholl, (2008) and is a practical and valuable set of quality criteria questions for reporting mixed methods studies as follows:

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
6. Describe any insights gained from mixing or integrating methods (p. 92).

The increasing legitimacy and acceptance of MM has seen various research grant awarding bodies such as the US based National Institute of Health (NIH), suggesting guidelines to evaluate MM funding applications (NIH, 2010). They propose applicants refer to several standards for reviewing the quality of the reporting of MM such as those developed by Creswell & Plano Clark (2011), Schifferdecker & Reed (2009) and the GRAMMS.

Morse & Neihaus (2009) developed an evaluative framework for mixed methods studies and this is the framework employed to evaluate the 25 mixed methods articles identified in this study. Morse & Niehaus (2009) developed a “dissection chart” to systematically examine and clarify the design of MM in published papers. They suggest that in order to dissect a paper, one will have to start reading the entire article by first making notes, highlighting the aim of the study, examining the research questions that were asked, looking at the sample used for the components of study, noting the methods and examining the pacing of the data collection and interface points. The analysis should then begin using the criteria listed below:

- 1) Identify:
 - a) Theoretical drive — investigating whether the researcher approached the study inductively or deductively will allow the reader to determine the theoretical drive.
 - b) Core component or the primary part of the aim(s) and research questions.
 - c) Supplemental component or the component that is not complete but supports the core component.
 - d) Points(s) of interface to note how the data sets were combined and analysed (separately and then combined or together).
- 2) Identify the type of MM design (qualitatively driven and quantitatively driven designs).
- 3) Evaluate the adequacy of the study by answering the following questions:
 - a) What is the nature of the phenomenon under investigation?
 - b) Were the QUAL/QUAN methods/strategies appropriately used? Give reasons.

- c) What is the nature of the primary sample? Was it appropriate? Was it adequate?
 - d) Did the supplementary component of the project require a different sample? If so, was it adequate and appropriate?
 - e) Consider the generalisability of the study? Has the author(s) over/undergeneralised? Give reasons.
- 4) This is followed by an evaluation of the rigour of the study:
 - a) Can the core component stand alone?
 - b) Is the supplementary component adequate for the study purposes?
 - c) What violations to reliability and validity (if any) occurred?
 - 5) Outline the design of each MM article by drawing a flowchart.

The dissection chart described is very thorough and assisted the authors in deciding to use this evaluative framework over the others mentioned above.

Prevalence rates studies of mixed methods research in business and management disciplines

Cameron & Molina-Azorin (2011) investigated the acceptance of mixed methods in business and management research by synthesising the results of several MM prevalence studies across the following disciplines: marketing; international business; operations management; entrepreneurship; strategic management and; organizational behaviour (see Cameron & Molina-Azorin for details of actual journals used in these studies). All the studies endeavoured to discover the extent and the current role MM plays in business/management fields through a process of content analysis of empirical studies published in discipline based academic journals. Alise & Teddlie (2010) refer to these as prevalence rate studies which are emerging from within the MM community. The conceptual articles were removed from the analyses to enable a presentation of the results based on the empirical papers (qualitative, quantitative or mixed methods) identified as summarized in Table 1.

Table 1 Summary of empirical papers identified in MM prevalence studies

DISCIPLINE	QUANT	QUAL	MIXED	TOTAL
Marketing	553	78	105	736
3 Journals 1993-2002	(75%)	(11%)	(14%)	(100%)
Hanson and Grimmer (2005)				(31%)
International business	269	57	68	394
4 Journals 2000-2003	(68%)	(15%)	(17%)	(100%)
Hurmerinta-Peltomaki and Nummela (2006)				(17%)
Strategic management	441	30	99	570
1 Journal 1997-2006	(78%)	(5%)	(17%)	(100%)
Molina-Azorin (2009)				(24%)
Organizational behaviour	197	17	17	231
1 Journal 2003-2008	(85%)	(7.5%)	(7.5%)	(100%)
Molina-Azorin and Lopez-Fernandez (2009)				(10%)
Operations management	146	23	18	187
1 Journal 2003-2007	(78%)	(12%)	(10%)	(100%)
Molina-Azorin (2008)				(8%)

Entrepreneurship	178	37	20	235
2 Journals 2003-2007	(76%)	(16%)	(8%)	(100%)
Molina-Azorin (2008)				(10%)
TOTAL	1784	242	327	2,353
	(76%)	(10%)	(14%)	(100%)

Source: Adapted from Cameron and Molina-Azorin (2011, p. 259)

Cameron & Molina-Azorin (2011) identified disciplines where the reporting of MM was minimal (organizational behaviour and entrepreneurship), and where it was more prevalent than qualitative research (strategic management, marketing and international business). They found quantitative methods (76%) dominated across the disciplines reported for all the studies with mixed method studies representing 14% and qualitative studies representing 10% of all the empirical articles.

Research purpose and questions

The aim of this study is twofold, to examine the types of mixed methods approaches being used in project management research and to determine the quality of the reporting of mixed methods studies published in the field of project management. We have chosen to use a mixed methods approach to address these aims as a single method approach would not provide enough detail and data to allow us to fully explore these two aims. Not only do we want to obtain a sense of the utility of MM across the project management field but we also want to explore the quality of the reporting of these studies. This requires us to collect and merge quantitative and qualitative data to develop a more complete understanding of the issues we are trying to explore. If we return to Greene's (2007) five purposes for using mixed methods then complementarity would be the purpose assigned to this study. We decided the use of different methods (both quantitative and qualitative) would enable a deeper and richer understanding of the use and quality of the reporting of the MM studies.

Teddle & Tashakkori (2009, p. 133) refer to an approach to framing research questions in MM which involves proposing an overarching research question and then expanding on this through sub-questions that are either qualitative or quantitative. This has been the approach taken in this study with the aim of achieving a deeper understanding and as a result, the following overarching research question and research sub-questions were posited:

Overarching research question

RQ1: What is the use and quality of reporting of MM research in project management research?

Quantitative sub-questions

RQ2: What is the frequency of use of MM research within project management research?

RQ3: Is the integration of data collection and analysis in project management MM research being reported?

Qualitative sub-questions

RQ4: Do researchers who use MM in project management research explicitly state a rationale or purpose for undertaking mixed methods?

RQ5: Is the priority and sequencing given to qualitative and quantitative data in MM project management research being reported?

Research Design

There is a vast array of MM typologies and research designs reported in the literature that can be bewildering even for the experienced researcher. Tashakkori & Teddlie (2003) developed a four-dimensional typology based on a set of four criteria: number of methods used; number of strands or phases; type of implementation — concurrent, sequential or conversion and; stage of integration. One of the research designs from this typology is the multi-strand conversion mixed model research design, which has been chosen for this research: “In this type of design multiple approach questions are asked. One type of data is collected and analyzed and is then transformed to another data type (qualitized/quantitized) and analyzed accordingly. Two types of inferences are made on the basis of each set of results and are pulled together at the end to generate meta-inferences ... This design ...can also [be] mixed in the conceptualization stage (e.g., questions) as well as in the inference stage” (Tashakkori & Teddlie, 2003, p. 689). This design has allowed us to quantitize the qualitative data and enables us to answer both the qualitative and quantitative research sub-questions posited.

Figure 1 provides a visual depiction of the multi-strand conversion mixed model research design. In the first strand qualitative secondary data was utilised and was quantitized through answering the quantitative research sub-questions. The mixed methods articles identified in the first strand were then also analysed qualitatively in the second strand through answering the qualitative research questions focusing on the reviewer's interpretation of the author's reporting of MM justification, sequence, dominance etc. Data was collected and analysed sequentially with both the quantitative and qualitative data being of equal importance. Inferences are obtained for both strands of data collection and analysis. A meta-inference is achieved that attends to the overarching research question.

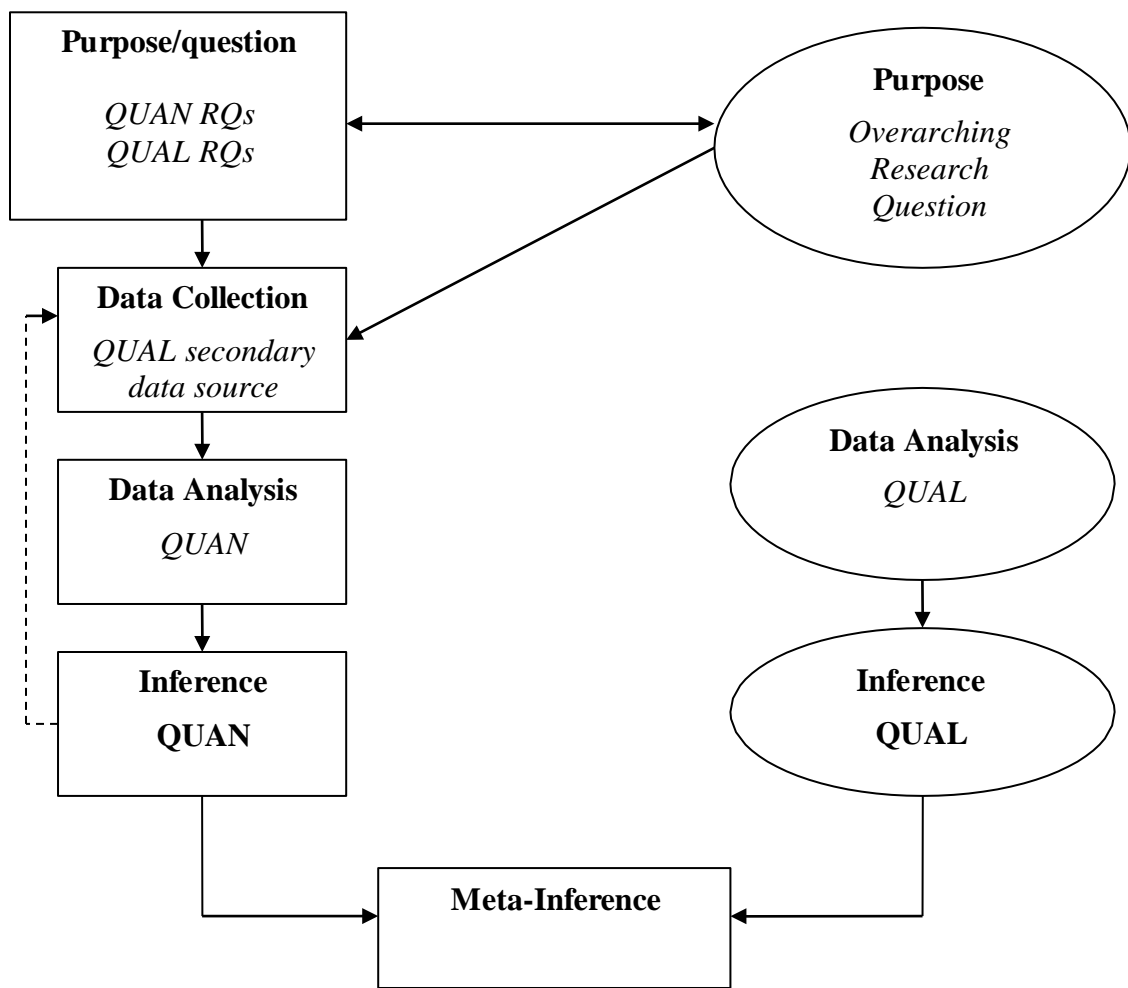


Figure 1 Multi-strand Conversion Mixed Model Design

Source: Adapted from Tashakkori and Teddlie (2003, p. 689).

Methodology

The study conducted a retrospective content analysis of papers published in three selected journals prominent in the discipline of project management. The study builds on previous scans of methodological use within the management literature as outlined in Table 1, with a particular focus on articles reporting MM. A retrospective content analysis of articles from three ranked project management journals, selected in consultation with prominent project management scholars, was undertaken. The analysis included four steps: 1. Searching 1755 articles; 2. identifying a sample size of 214 articles that were likely to have used mixed methods; 3. Evaluating and selecting 25 articles that met the evaluation criteria used for analysis and finally selecting two articles that were considered as having reported the use of mixed methods well based on the criteria applied. The 25 articles have been classified and analysed in terms of sequencing and dominance of methods and the level of data integration. The three major journals associated with the discipline of project management were chosen based on a previous study undertaken by Turner et al., (2011). The journals selected were the *International Journal of Project Management (IJPM)*, *Project Management Journal (PMJ)* and *IEEE Transactions on Engineering Management (IEEE-TEM)*. A date range from 2004 to 2010 was chosen to enable electronic searching of publication databases for keywords and to limit the potential sample size. The purpose was not to perform an exhaustive search of all papers published but to look at prominent journals in the discipline over a selected period of time. This study was initiated in 2011 and preliminary results presented at the EURAM 2012 conference in Rotterdam. A further study is under way focusing on the *International Journal of Managing Projects in Business* which did not meet the criteria applied for this study having only begun publication in 2008.

Data collection

From the literature reviewed, separate collections of keywords associated with qualitative and quantitative research methodologies were generated. Keyword searches were made using the online databases of the chosen journals that allowed Boolean coding of search parameters. The electronic search parameters looked for papers containing any one of the qualitative keywords (a Boolean OR function) plus (a Boolean AND function), any one of the quantitative keywords (another Boolean OR function) in the paper's title, abstract or text body. The premise being that this encapsulates all MM articles that described the use of both a qualitative and a quantitative methodology while also capturing papers that simply referred to such methodologies. Data collection terms were used as evidence of qualitative or quantitative approaches based on their usage in a standard text on business research methods, Bryman & Bell (2007).

Searches were structured to result in a collection of journal articles that included any of the quantitative terms as well as any of the qualitative terms. Total search = (OR of Quantitative terms) AND (OR of Qualitative terms). The actual syntax and process used to achieve this varied depending on the parameters allowed by the particular database being accessed. The IJPM was accessed through Science Direct; the PMJ through ProQuest and the IEEE TEM through IEEE Xplore. The electronic search parameters yielded an initial sample size of 214 papers which contained at least one keyword from both the qualitative and quantitative lists from a pool of 1755 papers published in the three selected journals during the sample period. These 214 papers were then analysed to determine whether they were in fact mixed methods studies. Strand1 coding then proceeded to categorise the selected papers using Hurmerinta-Peltomaki & Nummela's (2006) four categories of research article: conceptual; qualitative; quantitative; and mixed methods. Papers were also coded for their general design type,

following Cameron (2009), and for the methods used in generating any empirical data, adapted from Bryman & Bell (2007). This coding process identified 53 papers with the superficial characteristics of a mixed methods approach.

Data analysis

Coding focused only on papers identified as potentially mixed methods in Strand1 and involved applying three MM classification systems. The first was Hurmerinta-Peltomaki & Nummela’s (2006) 2 x 2 matrix of data collection/data analysis (Figure 2 below).The second was classifications in relation to priority and implementation in mixed methods approaches adapted from Teddlie & Tashakkori (2009). The third was in accordance with Cameron & Molina-Azorin (2010), and included the identification of a stated purpose for utilising mixed methods and whether the paper was explicit in its use of a mixed methods approach. All three classification systems look at separate dimensions of a mixed methods study.

		Data Analysis	
		Qualitative	Quantitative
Data Collection	Qualitative	A	B
	Quantitative	C	D

Figure 2: Classification Tool for Mixed Methods Studies

Source: Hurmerinta-Peltomaki and Nummela (2006)

During each strand of the data analysis at least two reviewers were involved in the coding which they did separately (R1 and R2). Papers were initially coded by one reviewer (R1) and were then checked by the other (R2), to reduce the impact of reviewer bias. The two reviewers (R1 and R2) extracted data from the identified studies using a data collection form with final coding for each paper being discussed at a face-to-face session between the two reviewers (R1 and R2). Disagreements were resolved by discussion. If this was not possible the third reviewer (R3) adjudicated the discussions (R3).

This coding process identified 53 papers with the superficial characteristics of a mixed methods approach. Strand 2 coding then identified 26 papers that both reviewers (R1 and R2) agreed showed the necessary characteristics of a mixed methods approach. Finally, when a detailed analysis of the twenty-six papers using a mixed methods evaluation framework (Morse & Niehaus, 2009) was carried out, one of the papers was set aside as being a very marginal “B”. Therefore 25 papers were included in the final evaluation. For the 25 papers identified, a detailed table was then prepared elaborating how mixed methods were used in

each article as per selected results from the three classification systems. A further evaluation of the 25 papers was then carried out using the evaluation criteria suggested by Morse & Niehaus (2009) for analysing the quality of the reporting of mixed methods, described earlier. It was not possible to evaluate all the selected papers using the above criteria due to the lack of information in some of the papers. This is an area where the reporting of mixed methods research in project management could be greatly improved through a process of author reflexivity in which the key quality criteria used in evaluating the reporting of MM is applied to their work.

The documents produced from the analysis were as follows:

Excel software was the only software utilised in the data analysis with an Excel workbook with five sheets describing the approaches used for searching, with two sheets showing the results of the two stages of coding and a sheet presenting the summary of findings. For each paper that was set aside for further analysis, the following information was recorded in the coding sheet in addition to the bibliographic data:

- 1) Type of paper: Conceptual/Quantitative/Qualitative/Mixed methods
- 2) Type of design: Explanatory/Exploratory/Descriptive/Longitudinal/Case Study/Action Research/Quasi-experimental/Experimental/Grounded Theory/ Mixed Methods/Others/Unstated
- 3) Whether the usage of mixed methods explicitly stated in the paper
- 4) Whether the purpose or reason for using mixed methods stated in the paper
- 5) Whether the dimensions of priority and implementation of the two methods were clarified using the following characteristics:
 - Equivalent status and simultaneous or sequential design
 - Dominant status and simultaneous and sequential design
- 6) Mixed methods classification as per Humernita-Peltomaki & Nummela (2006)
- 7) An initial comment about the paper — for e.g. Purpose of mixing stated as supplementary confirmation of main approach, i.e. Triangulation; simple statistical analysis of quantitative data, no specific analysis of qualitative data, used mainly as explanation/confirmation of quantitative findings
- 8) Reviewer 1 then recorded conclusions about the paper, for e.g. *States that both QUAN and QUAL data were gathered; a mixed methods paper*
- 9) Reviewer 2 then performed an independent assessment and recorded comments, for e.g. *Not a mixed methods paper as qualitative data was used only to come up with the research questions*
- 10) The reviewers then met and entered their final conclusion about the paper, *For e.g., Not a mixed methods paper; an example of a paper claiming it is using mixed methods without actually doing so*

Table 2 summarises the results of the evaluation, which allowed the authors to select examples based on the quality of reporting MM. It is to be noted that due to a lack of information provided in the description of the methodology the intended dominant method in some papers was often not clear and the authors had to use their best judgement to determine this primarily from an analysis of the findings section of the papers. Often the sequencing of the data collection was not apparent or explicitly stated and this was also deciphered through closer reading and discussions between the reviewers.

Table 2 Results of evaluation

	MM Description	Type	Paper	Sequence and dominance
1	MM not declared	B	2	QUAL → QUAN
2.	MM not declared	AD	20	QUAL → QUAN
3	Used term “combined method”	AD	21	qual → QUAN + qual
4	Used term “integrated method”	ABD	29	QUAN → qual
5	MM not declared	B	34	QUAN → QUAL
6	MM not declared	AD	39	QUAL → QUAN → qual
7	MM not declared	AD	41	QUAL → QUAN
8	MM not declared	AB	53	QUAL → qual → quan
9	MM declared & rationale provided	AD	59	QUAL → QUAN
10	Declared MM two stage design	ACD	69	QUAN → QUAL
11	MM not declared	BD	71	QUAN + qual → (quan + qual)
12	MM not declared	ABD	72	QUAL + quan + qual
13	MM not declared	AD	95	QUAL → QUAN → qual
14	MM not declared	B	97	QUAL → quan → quan
15	MM not declared	C	100	QUAL → QUAN
16	MM not declared	B	106	QUAL → quan
17	Split MM study into two papers (Evaluated paper was mainly quan)	AC	116	QUAL + quan
18	MM not declared	AD	126	QUAL + QUAN
19	MM not declared	AC	130	qual → QUAN → qual
20	MM not declared	AB	137	QUAL → qual → qual → qual →
21	Used the term “triangulated methods” to describe methodology	AD	168	qual → qual → QUAN
22	MM not declared	BD	185	QUAN → quan → QUAL
23	MM not declared Rationale for two steps given	AB	187	QUAL → QUAN → qual
24	Used term “Multilevel”	AC	188	QUAL + QUAN → qual
25	MM not declared	AD	206	QUAN + qual

Discussion

Our findings point to the fact that while the use of mixed methods is increasing in project management research, most researchers are not explicitly identifying their studies as MM, as per guidelines we used in evaluating MMR studies in the literature available at the time of the study. We will focus the discussions around the research questions posited based on the journal papers analysed, followed by some general observations in the conclusion section of the paper. We start with the secondary research questions first before attending to the overarching research question.

Quantitative sub-question

RQ2: What is the frequency of use of MM research within project management research?

Table 3 displays the summary of the content analysis of the three journals. There has been some increase in the percentage of papers reporting the use of mixed methods but the trend is

not consistent. The IJPM had the majority of MM papers (n=18). Overall, only 1.5% of the sample articles could be found to be using mixed methods over the period sampled. This is low compared to what was found in management journals in earlier research as depicted in Table 1 (Cameron & Molina-Azorin, 2011) where MM articles represented 14% of all empirical articles reported across the six discipline based MM prevalence studies. For example International Business and Strategic Management journals had 17% mixed methods articles and the lowest rates were for Organizational Behaviour had 7.5%. All above the mixed methods rates from this study (1.5%).

Table 3 Percentage of mixed methods papers found in sampled journals

Journal	Year	2004	2005	2006	2007	2008	2009	2010	Total
IJPM	Total	95	87	91	99	98	92	92	654
	MM	2	3	2	3	4	3	1	18
	% MM	2.11%	3.45%	2.20%	3.03%	4.08%	3.26%	1.09%	2.75%
IEEE-TM	Total	102	94	93	118	101	94	112	714
	MM	1	1	1	0	0	0	0	3
	% MM	0.98%	1.06%	1.08%	0.00%	0.00%	0.00%	0.00%	0.42%
PMJ	Total	45	46	59	56	62	53	66	387
	MM	0	1	2	0	0	2	0	5
	% MM	0.00%	2.17%	3.39%	0.00%	0.00%	3.77%	0.00%	1.29%
Total	Total	242	227	243	273	261	239	270	1755
	MM	3	5	5	3	4	5	1	26*
	% MM	1.24%	2.20%	2.06%	1.10%	1.53%	2.09%	0.37%	1.48%

*One MM paper was deemed marginal and no further analysis undertaken

RQ3: Is the integration of data collection and analysis in project management MM research being reported?

Table 4 displays the frequency of usage of a particular MM design in the evaluated papers as per the Humernita-Peltomaki & Nummela (2006) 2 x 2 matrix. This classification system explores the level of data integration being undertaken.

Table 4 Frequency of usage of mixed methods approaches

Code	Description	Number of Studies
B	Qualitative data analyzed quantitatively	4
C	Quantitative data analyzed qualitatively	1
AB	Qualitative data analyzed qualitatively and quantitatively	3
AC	Qualitative and quantitative data, both analyzed qualitatively	3
AD	Qualitative data analyzed qualitatively, quantitative data analysed quantitatively	9
BC	Qualitative data analyzed quantitatively, quantitative data analysed qualitatively	Nil

BD	Qualitative and quantitative data, both analyzed quantitatively	2
CD	Quantitative data analyzed qualitatively and quantitatively	Nil
ABC	Qualitative and quantitative data, both analyzed qualitatively, qualitative data also analysed qualitatively	Nil
ABD	Qualitative and quantitative data, both analyzed quantitatively, qualitative data also analysed qualitatively	2
ACD	Qualitative and quantitative data, both analyzed qualitatively, quantitative data also analysed quantitatively	1
BCD	Qualitative and quantitative data, both analyzed quantitatively, quantitative data also analysed qualitatively	Nil
ABCD	Qualitative and quantitative data, both analyzed concurrently with qualitative and quantitative research methods	Nil
Total		25

The most frequently found MM approach was AD, i.e. when the data collection and analysis used the same method. The next highest was B, where qualitative data was analysed using quantitative methods. Three papers used slightly more complex arrangements (ABD and ACD), i.e. where data was analysed using both methods. There appears to be varying levels of data integration (AC, BD, ABD & ACD) however, the separate treatment of quantitative and qualitative data dominates.

Qualitative sub-questions

RQ4: Do researchers who use MM in project management research explicitly state a rationale or purpose for undertaking mixed methods?

Generally, this was not done in the papers; however, we found one paper that stated it used mixed methods only to find that it did not. Some other terms were used to indicate the use of mixed methods such as “combined”, “integrated” and “multilevel” as shown in Table 2. It may be that these researchers have not been exposed to mixed methods and/or have very little experience with mixing methods. In some respects this may be explained by the emergent nature of the mixed methods movement. Nonetheless, the growing body of MM literature and resources indicates this cannot continue to be ignored.

RQ5: Is the priority and sequencing given to qualitative and quantitative data collection and data in MM project management research being reported?

The last column in Table 2 depicts the sequences detected and the priority of the data collected. It is important to point out that since the sequence was not stated clearly in many of the papers (as per the quality conventions of reporting MM), the researchers had to make the best judgement as to the intended priority and sequence of the data collection by thorough and closer reading of the paper. Only four of the 25 papers used a rationale to justify their data collection sequencing, the remainder stated the sequence but did not include a rationale.

The researchers found it difficult to identify the dominant method in many of the papers and where there was doubt both methods were given equal prominence. This is not considered good practice in the guidelines for the good reporting of a MM study. Paper number 137 had a very complex sequence. Paper 116 mentioned a previous paper that had published the qualitative aspects of the research, providing an example of a paper where the two components of the

study have been published separately. This is an interesting issue faced by those who utilise MM in their research. Researchers must decide how to best publish these studies especially if they are large and complex. Many journals prescribe word limits for manuscripts and it can be difficult to report a complete mixed methods study given these limitations. Sometimes, authors will only submit the quantitative part of the mixed methods study in the hope of increasing their chances of being published, especially if the discipline and/or journal has a strong quantitative tradition and preferences. This is a dilemma many MM researchers face.

Overarching research question:

RQ1: What is the use and quality of reporting of MM research in project management research?

Nine papers were identified as being good examples of reporting MM after the Stage 2 coding process and are listed below:

- | | | |
|---|--|-----|
| 1 | Chai & Xin, (2006), <i>IEEE-TEM</i> , | AD |
| 2 | Luu, Kim & Huynh. (2008), <i>IJPM</i> , | AD |
| 3 | Milosevic, & Patanakul, (2005), <i>IJPM</i> , | AD |
| 4 | Morris & Jamieson, (2005), <i>PMJ</i> , | AD |
| 5 | Müller & Turner, (2007), <i>IJPM</i> , | AD |
| 6 | Kutsch & Hall, (2009), <i>PMJ</i> , | AB |
| 7 | Lechler & Cohen, (2009), <i>PMJ</i> , | AC |
| 8 | Morris, Jamieson & Shepherd, (2006), <i>IJPM</i> , | BD |
| 9 | Lee-Kelley, (2006), <i>IJPM</i> | ACD |

The two papers selected as quality examples of reported MM as per the evaluation criteria are briefly discussed further to provide some guidelines as to the good reporting of a mixed methods study.

The first paper, by Milosevic & Patanakul (2005), described an empirical research carried out to investigate whether standardised project management (SPM) may increase (product) development project success. They justified the use of a three-staged research process as they were investigating a phenomenon about which very little was known – “SPM and Organizational Project Management Maturity Models (OPM) in high velocity industries” (p. 183).

Although the authors declared that they were using a three-staged research, they did not identify the study as mixed methods. The first stage involved semi-structured interviews of 12 project managers, document analysis and observations. This assisted the authors to develop the research hypotheses and informed the design of a questionnaire that was used in several workshops. Multiple, follow-up interviews with five project managers, from five companies followed. The dominant data collection was quantitative with the qualitative data used to achieve a deeper understanding of the issues. For e.g. a t-test carried out of numerical means followed by an ANOVA did not show any significant difference between two groups of cases that were being studied. However, the content analysis of qualitative data showed otherwise. The paper interweaved the results from both analyses while discussing the managerial implications of the study thereby integrating the quantitative and qualitative data.

The authors explained how the research was sequential and analysed:

[we] use a case research methodology as the first step to develop SPM constructs drawn from real-life context and use its results for the subsequent steps of developing and testing hypothesis for the quantitative study (research step 2). To ensure the validity of our findings and to enrich and refine them we implement step 3, the follow-up case interviews which is again of qualitative nature. (p. 183).

In addition the authors provided a flow chart to depict the stages which is very similar to the visual flow charts which typify those utilized by the MMR community.

The second paper, by Lee-Kelley (2006), reported a study of the locus of control and attitudes of those working within virtual teams. The author referred to the study as a two-staged design:

a prior survey of professional workers involved in defence projects tested the effects of locus of control on team member perceptions of role conflict and job satisfaction. The quantitative results were then compared with the findings of a case-study of IT professionals using in- depth interviews to elicit a deeper understanding of issues facing individuals that was initially indicated in the first study. (p. 238).

Seven hypotheses were derived from the literature and a survey was sent out via the Association of Project Management. The first stage applied bivariate data analysis and in the second stage the author conducted interviews of 12 participants from a service company to collect data for a case study. The paper demonstrated a sound use of both quantitative and qualitative methods of analysis.

In analyzing the results from the two methods the author states:

closer examination of the survey and case-study results in relation to the existing literature suggest that internals' enthusiastic approach to their surroundings and problems could be thwarted by their over- positive judgement of their own abilities to bring about improvements. (p. 242).

This led the author to suggest that while self-management is practical and necessary when managing from a distance regular project status and performance reviews are required to manage virtual project team effectively.

These papers could be used as exemplars of how to justify and design a mixed methods study along with recommendations suggested in the conclusions of this paper.

Limitations

This study was limited in scope due to time and budget constraints. Hence only three recognised journals were chosen and the study was limited to six years (2004–2010). Despite these constraints, we feel that this will provide a representative picture of the use of MMR as the journals selected were those used in a previous study (Turner et al., 2011). In addition to this mixed methods has become more popular since 2003 which was the year the seminal *Handbook of Mixed Methods in Social and Behavioural Research* was first published. There could be management, engineering, construction or information systems related journals where project management research may have been reported using MMR. Kwak & Anbari (2009) identified several journals from eight allied discipline groupings in their study on the publication of PM research across related disciplines. Identifying such papers would have taken a lot more effort and time and maybe a worthwhile endeavor for future research. Another

limitation was the sample size. The analysis in this study was focused on the mixed methods papers. A fuller analysis of all empirical studies (quantitative, qualitative and mixed methods) would have provided a broader methodological scan of the project management research from within the sample. Quality criteria could also be applied to the for the single, or monomethod, quantitative and qualitative research studies as a means of comparison. The paper uses one suggested guide (Morse & Niehaus, 2009) for evaluating MM. the articles scanned. Other guides for evaluating MMR are available, as mentioned in the literature review, and these could also be used to triangulate the findings.

Given the length of time that has elapsed since the data included in this analysis were first recorded the first two steps in the sampling process were revisited. This included the database search and the collation of articles meeting the search criteria by year of publication. The results obtained for the period 2004 to 2010 matched those originally recorded with small variations. The data was then extended to the years 2011 to 2014. Total articles published per year and the percentage meeting the search criteria were then averaged separately for the original and more recent periods. The IEEE-TEM averaged 100 articles per annum in both periods and those meeting the search criteria rose from 26% to 29%. The PMJ increased from 55 to 70 articles per annum but the percentage meeting the criteria remained stable at 4%. The IJPM increased from 93 to 127 articles per annum and also increased the percentage meeting the criteria from 30% to 39%. Prima facie evidence perhaps that the mixing of qualitative and quantitative methods within project management research is a growing phenomenon.

A further limitation stems from the keyword lists used as the basis for the database searches and how these interact with the changing capabilities of the available search engines. There is also the issue of the varied and changing capabilities of the search engines available on the various databases accessed. These capabilities were seen to change, generally for the better, during the analysis period generating variations in the raw data and requiring manual intervention to maintain consistency. Although we attempted to limit the effects of any personal interpretation of the common uses applied to the keywords by referencing a standard text, including any particular term was in the end the choice of the researchers. It is suggested that further research overcoming these limitations could be carried out to provide a more comprehensive picture of the application of mixed methods in project management research.

Conclusions

The general observations from this study on the reporting of MMR in project management are: the research design is not explicitly identified as mixed methods research; the sequencing of research methods is not explained using the conventions of MMR; some authors use names other than MMR to explain their staged data collection sequence; at least two papers defined and applied mixed methods well and seven others partially applied it; and some authors who used mixed methods decided to present their research as two separate papers, with each paper focusing on one set of data.

Our findings indicate that the use of mixed methods in project management research has increased marginally since 2004. However, it is not keeping pace with the use of mixed methods in other fields of management research. Project management research papers do not explicitly acknowledge the use of mixed methods and it was difficult to identify a paper in the study that followed the guidelines for reporting MMR as located in the literature of mixed methodology. This is not surprising, as project management researchers often do not explain their methodological bases in their papers (Smyth & Morris, 2007, p. 423) and by not doing so fail to give due consideration to “the importance of coherence in ontology, epistemology and

methodology in building a valid philosophical basis for the interpretation of study results” (Biedenbach & Müller, 2011, p. 83).

If authors followed the guidelines or criteria suggested in the MMR literature, such as the one used to evaluate the studies in this paper, their papers will become richer, more rigorous and more reflexive. We suggest that, as a minimum requirement, authors should explain the theoretical drive for using mixed methods, identify and describe the core and supplemental components and the purpose for mixing the components, state the points of interface, identify the type of mixed methods design inclusive of diagram or flowchart displaying how the methods were sequenced and which data was given priority or dominance, as per the MMR notation system. Ideally, we would like to see MMR become part of the armamentarium of project management researchers in order to achieve Teddlie & Tashakkori (2009)’s aim of simultaneously addressing confirmatory and exploratory questions, providing stronger inferences and a greater assortment of divergent views. Our findings suggest that the field of project management is in need of capacity building in relation to the good reporting of mixed methods studies and that the study of complex phenomena can benefit from the use of mixed methods approaches in a field needing to break free from a level of methodological inertia and to promote the field as an academic discipline. A recommendation from this study could be aimed at journal editorial boards and a proposed proactive stance on journals providing guidance on the reporting of mixed methods studies/submissions.

Mixed methods research designs can aide project management researchers in the investigation of multifaceted phenomena in innovative ways and need to be encouraged to explore methodological approaches that may be less traditional. Mixed methods can assist project management researchers in conducting trans-disciplinary studies with researchers in healthcare, education, social research and organisational research where MMR designs are prevalent (Cameron & Sankaran, 2013).

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