Mixed methods for strategizing in project management research

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Table of Contents

Table of Figures

Abstract

There are typical or common applications of research methodologies used in project management research work. However, there is no ‘one-size-fits all’ approach to strategizing and designing one’s research methodology. In contemporary project management research settings, it is now increasingly common to combine different methods and inquiry approaches in practice. This is because the project management context and environment are usually complex and at times, might require a breadth and depth of exploration or explanation to capture a more integrated and wholistic way of understanding the phenomenon understudy. Depending on the research purpose, scope and questions to address, the study might require an appropriate and synergistic application of more than one methodology. This chapter explores the various strategies that a researcher might decide to undertake in their mixed or multi-methods research design to address their unique research questions pertaining to the field of project management, to fulfil the aims of their research study.

Keywords: Mixed-methods, research design, research strategy, methodologies

Introduction

There is no ‘one-size-fits all’ approach to designing one’s research methodology(s). As stated by Martin Denscombe, “there is no single pathway to good research: there are always options and alternatives” [1]. There are typical or common applications of research methodologies used in project management research work. In contemporary project management research settings, the decisions as to which research strategy to adopt would depend greatly upon the purpose of the research, its scale and scope. It is now increasingly common for project management researchers to embrace a plurality of perspectives by combining different methods and inquiry strategies for an in-depth investigation and provide broader perspectives of the research phenomenon being studied [2-4]. Moreover, results that are both convergent and divergent can enhance the research insights and address complex project management phenomena more holistically [4].

Without going into lengthy explanations about research strategies for large-scaled research projects that require significant research budgets and have fairly long time frames, this chapter focuses on strategies that are more appropriate for the small-scale researcher. This does not mean that the chapter ignores larger scale, multi-phased project management research projects. These concepts are by all means, scalable from single to multi-phased and longitudinal studies. We will explore the various strategies and pathways that a researcher might decide to undertake in their research design in order to fulfill their academic or professional project management research requirements. For instance, the researcher might be an academic scholar completing their post-graduate Masters or PhD research thesis; or they could be an industry professional or project management practitioner who is embarking on some research on behalf of their organisation.

This paper provides several pointers about research methodologies and methods with the intention of helping researchers address their unique research questions pertaining to projects, to fulfil the aims of their research study that is generally conducted over a short-term time frame, and at a relatively lower-cost budget. This will help PM researchers make considered judgements over their choice of methods in the overall research design, whether they eventually choose a single, mixed or multi-methods in their project management research.

The chapter assumes that the reader has some knowledge of the ontological and epistemological aspects of research methodologies (see Chapter 4 on O.J. Klakegg's 'Ontology and Epistemology: research philosophy'). This is fundamental, firstly, as 'Methodology' stems from '*methodos'* (pursuit of knowledge), '*meta'* (expressing development) + *'hodo*s' (way). Methods would be the next 'ology' following '*ōn, ont*' (being) and '*epistēmē*' (knowledge). Research methodologies lead the way to pursue knowledge, underpinned by the assumptions, paradigms or philosophical stance about what is knowledge and what forms would knowledge come in, that come hand-in-hand with the researcher and the research project.

A large portion of this chapter will focus on the mixed and multi-methodologies, as well as multiple strategies of inquiry that operate alongside the choice of research methodologies. There are typical or common applications of research methodologies used in project management research work. Nevertheless, in contemporary project management research settings, it is now increasingly common to combine different methods and inquiry strategies in practice. The predicament many researchers often face is '*How do I decide which method or methods are the most appropriate ones to apply in my study*?' The decision as to which research method(s) to adopt depends on the research questions (e.g., what…, why…, how…, what-if…), scope (research aims and stakeholder expectations), resources (time, manpower, budgets), rigour (including aspects of triangulation, validity, reliability, and trustworthiness) and other parameters that the researcher may need to work within for instance, ethical considerations and access to the sample or data. These will be discussed in greater detail in this chapter.

All in all, the chapter aims to guide new researchers in becoming more confident in their choice of 'mixed and/or multi' research methodologies and strategies of inquiry in line with their philosophical underpinnings and research questions. This chapter also identifies contemporary methodological and inquiry strategies that could extend the research repertoire of seasoned researchers.

This chapter is structured as follows: A range of common research terms and methodologies will be briefly introduced. These include differentiating between research design, methodology and methods; and what quantitative and qualitative methodologies entail. Next, mixed and multi-methods is discussed in further depth. The rest of the chapter focuses on the strategies and considerations researchers might undertake when making decisions about methodologies for project management research.

Research design, methodologies and methods

In the research that you are planning to do, what are you seeking to find out within the field of project management? Do you wish to explore, evaluate, measure, identify, differentiate, describe, investigate, assess, segment, prove, test? Each of these words provide a hint as to the strategies you could adopt in your research

design and methodology. Before we dive into the strategies, let us clarify some foundational terms in research: design, methodologies and methods.

Research ***design*** is not to be confused with research ***methodology***. A research design would provide the overall wholistic conceptual structure for your research. In the design, one would consider the 'why' or purpose of the research, your research philosophies or paradigms, the type of methodology(ies) required to address the research problem or questions, and considerations of how one might achieve the kinds of results expected. In other words, it is a carefully composed 'plan of action' designed with the best prospects to achieve your research success [1]. The research design could be flexible where it accommodates the different aspects of the research problems and allow for emergent issues identified to direct the methods, or rigid in nature where it sufficiently protects the research against bias and ensures reliability in the data.

A research ***methodology*** depends on the overall research design. Following the overall research design, the methodology is about how to systematically address the research problems or questions. Methodologies are a ***system*** or ***strategy of methods*** that comprise the procedures and sequences one would employ to achieve the research objectives when collecting and analysing the data. Methodologies include the quantitative, qualitative, mixed and multi-methodologies.

Hence, given the methodology, the ***method*** is simply the investigation technique, procedures or the tools used to collect data [1, 5]. Tools for gathering research data could include literature reviews, interviews, focus groups, site visits with behavioural observations, questionnaires, social media forums, organisational charts, documents or archives. Table 1 summarises each term and provides some examples.

Term	**Description**	**Examples**
Research design	Overall wholistic conceptual structure for the research study including the paradigm, research questions, methodology and methods	The research questions might contain 'how many', 'to what extent' (quantitative numerical measures); and 'what', 'how' and why' (qualitative in-depth investigations) calling for a pragmatic or critical realism worldview that adopts a mixed-methodology approach.
Research methodology	Strategy for how to systematically address the research problems or questions via the procedures and sequences needed in data collection and analysis.	Quantitative Qualitative Mixed-methodologies Multi-methodologies
Research method	How the data is to be collected	Interviews: structured, semi-structured or open

	The inquiry approach to be undertaken The investigation technique(s) or the actual tool(s) or step(s) taken to conduct the research	Observations Focus groups Workshops Artefacts/documents for content analysis Experiments: true or quasi, random or non-random Surveys: cross sectional, longitudinal; random or non-random

Table 1: Research design, methodology and methods - what it is and examples

In sum, determining the purpose of the research, the philosophies or paradigms underpinning the study, the overall combination of the type of research, methodology(s) and inquiry approaches would all constitute your overall research design.

The typical terminology in research methodologies employed to find solutions to the research problems or questions are quantitative, qualitative, and mixed and multi-methodologies. Table 2 further describes each of the research methodologies. Creswell [5] suggests that there are various strategies of inquiry depending on the methodology adopted. Qualitative methodologies reflect an interpretive and multi-perspective worldview of the researcher. Qualitative strategies of inquiry could include ethnographies, grounded theory, case studies, phenomenological research, action research and narrative research. Within each strategy of inquiry, the data is collected via different means. Data or evidence comes in many forms. Through qualitative inquiry methods like in-depth or semi-structured interviews, observations and artefacts/document content analysis, some of the types of data outputs produced include video and audio recordings, participant sketches, or photographs of project environments and team workspaces. Organisational artefacts could include publicly available documents that can be accessed as hard-copies or electronically through websites, organisation charts, promotional brochures, annual reports, newsletters, social media and other web-based organisational resources. Documentation can also comprise confidential information, or visual information disclosed during an interview, for instance sketches, flow diagrams, organisational charts, business reports, internal templates, presentation slides, emails, governance diagrams or project plans and gantt charts.

Quantitative methods are used for validation, numbers and statistics. It suggests a pre-determined, objective, singular worldview of the researcher. Quantitative strategies of inquiry include experiments and surveys. Experiments cover true and quasi-experiments with subjects (although in the world of project management research, I prefer to call them research participants) that are randomised in the former, or non-randomised in the latter. Surveys, executed through structured interviews or questionnaires can be cross-sectional or longitudinal. These interviews or questionnaire surveys are required to have a sufficiently large sample for statistical analysis, compared to qualitative interviews. With questionnaires, data can be collected online, face-to-face, by phone or administered by paper. Other less

typical means of quantitative data collection in project management research might include data mining of social media platforms and data extracted from organisational databases. Data outputs would include numeric measures to test for counts and percentages in terms of frequencies, averages, ratings, rankings and incidences.

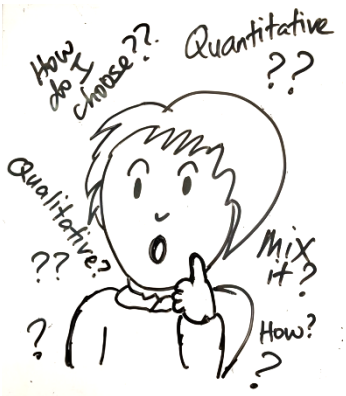
Types of research methodologies	**Research methods (how will you collect the data)**	**Types of data outputs**	**Analysis approach (how will you analyse the data)**
Qualitative	In-depth open interviews, semi-structured interviews Focus group discussions Literature review Workshops Observations Forums	Video and/or audio recordings of project management environment and interviews Photographs or images Literature Media Sketches, charts and diagrams Organisation documentation – e.g. reports, bulletins, emails, newsletters, brochures	Propositions and data exploration through: • Text or word clouds • Thematic or Concept mapping • Thematic analysis • Discourse analysis • Content analysis • CAQDAS • Inductive, deductive and abductive analysis
Quantitative	True or Quasi experiments Surveys Polls Social media data mining Experiments Observations Secondary quantitative data mining	Multiple choice responses Rating scales Numeric Rankings Coding of open-ended responses (limited)	Statistical measurements of the data and testing of hypotheses and. theories: Descriptive statistics (e.g. frequencies, counts) Correlations across variables or groups

			Analysis of variance in different groups Clustering or segmentation Factor analysis, regressions
Mixed methods	Integration of qualitative and quantitative methods triangulated in a sequential, concurrent order	Sequential: Quantitative survey followed by qualitative in-depth semi-structured interviews Qualitative semi-structured interviews and observations followed by quantitative surveys. Concurrent: Both qualitative and quantitative methods occur at the same time to address the research question	As above, plus the data from both methods are analysed and triangulated to form the overall results and conclusions.
Multi-methods	Use of multiple methods combined to address different research questions	Qualitative observations of participant behaviours and worksite followed by interviews with participants (both qualitative methods). Quantitative experiment of different groups followed by (or concurrently) a survey (questionnaire).	Qualitative data is analysed accordingly to provide a rich in-depth picture of the overall phenomenon Quantitative data is analysed accordingly to address different hypotheses in the study.

Table 2: Summary of research methodologies, methods, data types and analysis

Application of the methodologies

A novice might ask, ‘How would I know whether I should use a quantitative or qualitative method?’ or, ‘when should I mix the methods, or could I use more than one type of qualitative methodology in my research’?



On one hand, quantitative methods are typically used to statistically measure and interpret performance, attitudes, preferences or demographic and census data. The data is generally analysed using statistical software. If you are looking to measure variables and incidences with larger samples through ranking, rating, counting or segmenting; modelling and comparing different statistical relationships in the data; testing a theory or hypothesis in your research and generalising it to a specific population, a quantitative approach would suit your study. The variables are pre-determined prior to launching the study, and therefore the parameters of what is analysed is set upfront as most quantitative methods would deploy close-ended questions. There may be a handful of open-ended questions in your survey or questionnaire that could be coded to provide some qualitative elaborations, but these open-ended questions should not form the main body of inquiry for your quantitative method.

On the other hand, qualitative methods are applied to discovery and exploration; or in-depth explanation. It provides data about emerging views, and questions are open-ended. Data collection approaches for qualitative methods would have protocols rather than instruments. You would have qualitative research propositions rather than quantitative hypotheses. A qualitative methodology could produce data comprising of an interpretive mix of words, images, sounds, observed or stated emotions and behaviours. It can explain the reasons for particular behaviours, provide rich descriptions of certain phenomenon or occurrences and emotions in particular contexts. Qualitative methods use coding and computer-aided qualitative data analysis software (CAQDAS) programs to analyse processes, patterns, themes, categories, relationships and provide the depth of information not possible in a quantitative method. However, qualitative methodologies use small samples, and therefore the findings cannot be statistically generalised to an overall population.

Mixing it up

A researcher might find that different methods have their own distinct strengths and limitations They might realise that their study could benefit from combining both methodologies (mixed-methodologies), or perhaps, they see the need to use more than one method within a particular methodology (multi-methods).

Mixed methods

Mixed methods research is an approach to knowledge that embraces multiple viewpoints and perspectives (qualitative and quantitative research) [6]. Creswell [7] describes mixed methods as "*research in which the investigator collects and analyses data, integrates the findings, and draws conclusions using both qualitative and quantitative approaches or methods in a single study or a program of inquiry*" (p. 4). Teddlie and Tashakkori [8] define mixed methods as ''*research designs using qualitative and quantitative data collection and analysis techniques in either parallel or sequential phases''* (p. 11).

Elements of qualitative and quantitative methodologies are both used in the research "*for the broad purposes of breadth and depth of understanding and corroboration*." [6](p.123). The definitions suggest that mixed-methods has at least one quantitative and one qualitative method within a single study, whereby the different data are integrated at some point for triangulation and corroboration. For instance, when we have a single research question that is addressed by both qualitative and quantitative methods within the study, a mixed methodology is employed. The results or solutions of the single research question are addressed by both qualitative and quantitative methods. The findings can support each other. Quantitative symptoms can be further explained and enriched by the qualitative insights [9, 10]. Qualitative findings can be used to enhance the sensitivity and accuracy of the quantitative results. Qualitative insights can provide preliminary variables for further testing using quantitative methods. Therefore, when the two methods are corroboratively used together, it is often more robust.

Greene adds that when a researcher mixes at a method, methodology, and paradigm level, the approach values both consonance and dissonance; and provides opportunities to ''meaningfully engage with difference'' (p. 607) to benefit from different ways of knowing and valuing [11].

Mixing different methods and types of data, and triangulating the data source as a means of seeking convergence across various methods contribute to the popularity of mixed methodologies. Triangulation is the use different methods of data collection, different data sources of data, or data at different times, in different modes to come to reach or support common conclusions [12-14]. Triangulation is needed to provide robustness, confidence, trustworthiness and rigour to the research results. One could use two or more data sets to triangulate the data. Consequently, increased variety of methods to produce different forms of triangulation should contribute to enhancing the researcher's ability to draw conclusions from their studies [12-15].

Johnson, Onwuegbuzie and Turner [6] elaborate on how mixed methods are able to:

- corroborate, validate and confirm findings to produce fuller, deeper and more comprehensive, internally consistent, valid and therefore reliable findings;
- expound on understanding and provide greater confidence in conclusions;
- provide broader, richer and potentially more meaningful and more useful solutions to research questions and insights.

Numbers from the quantitative method form statistical trends, while words from the qualitative build stories (or narratives) and observations. When these two perspectives are integrated and evidence together, they can provide a clearer and

richer research conclusion. Project management researchers using mixed methods need to be able to confidently articulate a well-framed, well-designed and integrated research methodology that rigorously combines stories with numbers to provide a more complete understanding of the research problem.

Strategies with mixed methods: Sequential, concurrent or transformative procedures

In a sequential procedure, results from one method informs the design of the next method [5]. The findings found in one method could be explained by another. For instance, a qualitative method can firstly be applied exploratively. In the exploratory sequential design, propositions and findings from the qualitative phase can then be built into a measurement instrument and quantified to test and generalise the results to a population. Alternatively, a study could commence with a quantitative methodology to test certain concepts or theories (also known as hypotheses) and then followed through with a qualitative approach that provides further richness and in-depth exploratory or explanatory views of the topic area and theories initially tested. In other words, the qualitative phase provides an interpretation of the quantitative results. The quantitative results might be able to provide information about 'how many'; 'what'; 'where', 'who' but the qualitative findings will be able to provide a deeper exploration and explanation of 'why' or 'what that really means', 'what the underlying emotions were' or 'how was the result decided upon', 'what else happened'.

When quantitative and qualitative data is collected in parallel within the study, this is known as a concurrent process. Both forms of information are then integrated in the interpretation of the overall results. Researchers nest one method within another method to analyse different levels, questions or units of analysis to provide further insight [16]. The results from the concurrent approach are merged and compared, in a design known as a convergent design [5].

There is a third procedure identified by Creswell as transformative. This procedure requires the researcher to apply a theoretical lens upfront as a framework for the topic area, data collection methods, and outcomes or anticipated changes occurring in the study [5]. This lens provides an overarching perspective within the research design that contains both quantitative and qualitative data, and could involve either the concurrent or sequential approach.

Multi-methods

Mixed methodologies are not to be confused with multi-methodologies. Multi-method research indicates that multiple styles of research could be incorporated within the same research study. These studies involve multiple types of qualitative research (e.g., case studies and ethnographic studies) or multiple types of quantitative research (e.g., surveys and experiments) [11, 17]. For example, case studies in project organisations could incorporate qualitative in-depth interviews with different project stakeholders, followed by several focus group discussions, and ethnographic studies could explore what people say through interviews and then observe how they behave (workplace observations). Multi-methods need not be restricted to having both the quantitative and qualitative in one study. It could combine a quantitative survey with quantitative social network analysis or a quantitative experimental research. If one follows this train of thought, there could also be a strategy for a

mixed and multi-methodology within the research design, if one's resources (e.g., capacity, time, budgets, manpower) allow for it.

Mixing and more mixing

According to Greene, multi and mixed methods both seek to understand complex phenomena with greater depth and breadth [11]. Engagement and dialogue can meaningfully occur across different types of methods of data collection and data outputs, through different logics of inquiry, different worldviews (that is, different perspectives or ways of knowing), and thus different perspectives on exploring and understanding important project management phenomena breadth [11].

Strategizing your project management research

It is one thing to know what the various methodologies and inquiry approaches are, but it is another to know which one(s) to utilise and in what order, to best address the research aims and questions. It is very much about the theoretical frameworks and research design when it comes to strategically mixing methodologies. Adopting a mixed methods approach in the research provides opportunities to meaningfully engage with plurality and difference by mixing at multiple levels. Strategically, determining the different levels that need to be mixed in a mixed methods inquiry study is a 'key design decision' (p. 2) [11].

As with any small to medium-scaled project, a research study is also a project. You will need to consider your purpose, objectives, scope and context, resources, stakeholders and timeframes. Consequently, the research study should always ensure that it adheres to the ethical codes of research conduct.

Project considerations

Purpose, expected outcomes and value: Why are you embarking on this study? What is the research problem? Beyond delivering research outputs like a thesis, industry white papers, journal articles or presentations, what is the value you are attempting to provide from this research?

Scope and context: What are the research objectives? What is expected of the study and research outcomes? What will you be required to deliver? What are your strengths, limitations and risk factors in the research? What access to data do you have?

Theoretical frameworks: The researcher needs to identify the research framework in which the study resides, for instance, is it a case study, participatory action research or experiment/trial? Does the study come under the theoretical model or lens of certain types of emancipatory theories that could make the study one that is transformative, e.g. social change theory, or through the perspective of actor network theory? There are many theoretical models and perspectives out there that could frame and guide the research design, methodologies and procedures undertaken in the research.

Resources: Resources include your opportunities and constraints and could consist of manpower, time, funding and budgets.

Manpower: Will you be conducting the study as a solo researcher or as part of a team? Will you have any research assistance, and are you able to outsource parts of the work, e.g. transcribing qualitative data?

Timeframes: What is your timeframe from its commencement to the completion of the project? Will the project be conducted in stages/phases? When do you need to complete this research study? Whether sequentially or concurrently executed, it is necessary that you are able to break down the mixed methodology into smaller chunks of actionable tasks, similar to a work breakdown structure.

Stakeholders: Who could influence, impact or be impacted by your research? Who will your research benefit? Who is funding your research? Do you have a research team, co-investigators, supervisors and/or committees to work with or report to? What are their expectations? If you are working alongside a team of researchers, there is the value of pluralistic perspectives but there is also the need for the research team to communicate well, and have trust and respect for both methods.

Ethical considerations: What ethical considerations and research codes of conduct do you need to adhere to? Depending on the geographical coverage of your research, there could also be different local and international ethical considerations.

Mixed-methods is not just about having two methods in a study. There are many features that could be considered in an advanced and elegantly designed mixed-methods strategy. Beyond knowing the technical differences between qualitative and quantitative methods and then combining the two methods, researchers need to grasp the basics of the type of research they are embarking on for instance, the nature of the research as explanatory or exploratory; the convergent and sequential procedures when combining the two methods, and the timeframes for the study.

These elements will help determine if the research is to follow a sequential or concurrent order in the procedure. Within that, you will need to consider which methodology will come first? Will the mix be distributed evenly in terms of weight and attention or will one method dominate the study?

The design typologies for mixed methods research synthesized by Nastasi, Hitchcock, and Brown [8, 18] offer several basic to complex design conceptualizations that lend us to consider the multiple dimensions of mixed methods involved in designing project management research: number of strands, priority of data, stages in which mixing occurs and integration approaches. *"…by employing multiple dimensions from basic typologies, integrating approaches at multiple stages of research in an iterative manner, and synergetic mixing (predominantly in the interpretation of the results) as a gestalt (our label) leading to an understanding that is bigger than the sum of its (QUAL and QUAN) components."* [18]

Conclusion

For researchers in the project management field, it is important to embark on the research journey with identifying a worthwhile issue, problem, or concern in the project world. Once a researcher has traversed the landscape of current knowledge, theory, and practice through a review of the literature regarding the concerns, the researcher then needs to identify where the issues and gaps are. From here, specific research questions that warrant further empirical investigation are formulated. At this juncture, strategies about how to address the research questions are considered: the

theoretical underpinnings, research design and methods to be applied. The elegantly designed synergistic mix of the various methods in an integrated and corroborative manner that they are as one, a gestalt, forms a whole that is greater than all its parts (qualitative and quantitative).

There is no 'either-or' paradigm debate in selecting a methodology when it comes to mixing methodologies [19]. Teddlie and Tashakkori, advocates of mixed methods research talk about *methodological eclecticism* whereby researchers carefully select, synergistically and appropriately integrate various approaches from the qualitative, quantitative and mixed strategies to study a phenomenon thoroughly. The same authors are cited by Cameron et al (p. 101) in their desire for the ideal, *"Ideally, we would like to see mixed methods research become part of the armamentarium of project management researchers in order to achieve Teddlie and Tashakkori (2009)'s aim of simultaneously addressing confirmatory and exploratory questions, providing stronger inferences and a greater assortment of divergent views."* [3, 20]

Key points and questions for students to consider

It would be useful for a researcher to map out their research project using some of the following guiding questions.

- What is the purpose and context of your research study?
- What is your research question and likely orientation for your research study?
- What are the constraints of your study? What resources do you have to overcome those constraints?
- Considering the project purpose, research aims and research questions, what can you realistically design and deliver within the scope and resource limitations of your research study?
- At which stage or level of research will you mix?
- Will all methods have equal status or will one method be dominant over the other? What gains will the study have with your selected strategy and research design?

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