Practitioner views on project management methodology (PMM) effectiveness

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ABSTRACT: This paper reports the results of a study investigating the organizational conditions that impact the effectiveness of project management methodology (PMM) implementation. It was conducted with a sample of experienced practitioners across a range of industries and disciplines covering engineering infrastructure and IT in Queensland, Australia. The implementations covered generally aligned with either the American PMBOK or the British PRINCE2, while some attempts had been made to hybridize.

The study found general practitioner agreement on the effectiveness of having a methodology. It synthesized from the data collected a list of six organizational conditions impacting the effectiveness of PMM implementation, providing a guide to practitioners looking to implement a PMM. Evidence of quantification of PMM benefits was found in two large organizations whose PMBOK based PMMs had been delivering better than 90% on time and budget across all their infrastructure projects. This study included but did not focus on IT and did not uncover any information on the actual performance of PRINCE2 implementations. It indicated a need for research on the effectiveness of PMM implementation and found that this could be facilitated by analyzing internal organizational project performance data records, which are sometimes published in annual reports. It also found the PRINCE2 claim of suitability for application to all project types was disputed for physical engineering infrastructure. The paper also puts a case for defining Project Management Methodology (PMM) as an organization's process for the whole lifecycle of its projects, which would exclude PMBOK and PRINCE2 from being so labelled.

KEYWORDS: project management methodology implementation, PMM, project governance, change management, PMBOK, PRINCE2

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1 Introduction

The benefits of project management methodology could be considered obvious, as evident from the success of the worldwide marketing of PRINCE2, MSP and associated products. KnowledgeTRAIN (2017) states under its FAQs for PRINCE2 online courses that "In total, more than 1.4 million examinations have been taken worldwide since 1996. Of these, almost half were taken in the UK". This comes despite a lack of empirical evidence as to their effectiveness and views to the contrary, as noted by Wells (2012). It was not until several years later that Joslin and Müller (2015) were able to show a quantitative positive impact (22.3%) of project management methodology (PMM)s on project success.

However, attempts at quantification of the effectiveness of any particular (or all) PMM presume a positivist paradigm and difficulties arise with intangibles/ contextual/ environmental variables. For example, it is quite difficult to attribute a proportion of success to leadership, as distinct from the leader's organization having and following a methodology that the leader supports. The full effect of introducing a PMM may also not become evident for some years and there are many variables, such as the appropriateness of the starting methodology to the content material, the effectiveness of the modifications made to tailor it to the local content, the level of flexibility provided for in its application, the level of documentation it calls for, the persistence of the effort to implement and maintain it and the acceptance it receives from project managers and senior executives within the organization. These conditions are also likely to change over time, making quantification of the effect of a particular PMM implementation a quite difficult and possibly unproductive path to pursue. Nevertheless, considering a PMM implementation within the boundaries of a single organization limits the variability of these conditions to a much narrower band.

Any attempt at measurement of methodology effectiveness in dollar terms at the lower project level is fraught with even more difficulty. Quantification for a successful project involves estimating how much the PMM might have either saved or avoided wasting, which can only be speculation; it was not actually incurred and so was not there to be measured. Where a project fails, such as abandonment after significant expenditure, the costs are much easier to measure. But in the absence of any Royal Commission or similar investigation, any attempt to allocate blame, including the percentage contribution coming from its PMM, is likely to be strongly contested as reputations and career/ economic prospects will be at stake.

We therefore focused at the organizational level on the portfolio of projects managed by a single methodology. Given the difficulties with quantification, we sought to undertake a qualitative investigation of conditions impacting the effectiveness of PMMs at that (organizational) level. We decided to investigate practitioner views on their PMMs to determine what organizational conditions they considered important and to see if any quantifiable evidence of effectiveness emerged.

It should be noted that we are not here investigating project success factors. We are investigating the effectiveness of PMMs at the organizational level. We first investigated the literature to see what post-implementation evaluation of PMMs had been done, before developing research questions and determining the research design. We adopted a semi-structured interview approach so that we could explore any unexpected conditions that may emerge. We also explored across both engineering infrastructure and IT, allowing

investigation of anecdotal evidence of clash of methodologies causing difficulty. We then conducted the interviews, transcribed and analyzed them, seeking to identify organizational conditions that emerged affecting PMM effectiveness. We identify six such organizational conditions and found evidence of quantification of PMM benefits in two large organizations.

2 Literature Review

The literature reviewed specifically targets the evaluation of actual PMM implementations. We used deductive reasoning to develop search terms to find only evaluations. We conducted searches for those terms, reviewed all the abstracts located, and then report on the contents of those found to be relevant. We used the EBSCO database as it is an aggregator which searches multiple databases from multiple sources.

Our search terms were determined by the following reasoning: Any evaluation of PMMs would have to have the word methodology and may also have one of effectiveness, evaluation or success also in its title, as such an exercise could not be conducted incidental to another investigation. To restrict the search to the project management field, an additional AND criterion of "project management" in all text was included. Searches for these terms were done in various combinations as detailed below.

A search of all EBSCO aggregator databases on 22/11/2017 for methodology effectiveness in the title and "project management" in all text found 3 items. Only one dealt with project management methodology. That was by Łuczak and Górzna (2012). It effectively summarised PRINCE2 and was concerned with adopting it rather than with evaluating any implementation of it.

A similar search for effectiveness in the title and "project management methodology" in all text also found only 3 items, one of which was Łuczak and Górzna (2012) and the other two were different to the previous search but also did not evaluate project management methodology.

A similar search for evaluation in the title and "project management methodology" in all text also found 17 items, all of which were examined and only two were relevant. One was by Łuczak and Górzna (2012) and the other was by Wells (2012) who studied practitioners with varying levels of experience, all within an IT/ IS environment. She noted there had been a "drive from government and the public sector toward the promotion and usage of the PRINCE2 (Office of Government Commerce [OGC], 2009) PMM in recent years for the development and management of large and complex IT/IS projects" (Wells, 2012, pp. 43-44). She also documented difficulties with PMMs including "the indifference of the methodologies to their organizational business interests and benefits beyond those of a single project; complexity in tailoring and modification; leadership and strategy; and their reliance on documentation and their inflexibility of dealing with change" (Wells, 2012, p. 44). She noted PMMs being applied "as a fetish used with pathological rigidity for its own sake" (Wells, 2012, p. 45). Her research approach was "phenomenological with an exploratory purpose" and also with "an inductive approach and reasoning" and "a multiple-case-study approach" (Wells, 2012, p. 46). Four PMM cases were examined; PRINCE2, a tailored PRINCE2 and two other methodologies. Data were collected through semi-structured interviews with 48 practitioners. She also noted that "The research used an inductive approach and the interpretivism paradigm" (Wells, 2012, p. 57). A significant conclusion of this work was that "Most project managers perceived the prime purpose of PMM to be management, control, and compliance rather than support and guidance. The investigation on

this aspect reveals that 47.9% of project managers… claimed that using PMMs hinders their project delivery" (Wells, 2012, p. 57).

A search of all EBSCO aggregator databases on 30/11/2017 for methodology success in the title and "project management" in all text found 15 items of which 11 dealt with evaluation of methodology. Three considered project management methodology generically and are examined below. The other eight were concerned with software development; three were from 1988 to 1992, too dated to be relevant in the current IT environment, and two were effectively duplicates – a paper and a thesis with the same title by the same author. This effectively left three IT papers which are also examined below.

The most recent and most comprehensive of the three cross-industry papers were two complimentary ones by Joslin and Müller (2015, 2016). Both papers dealt with the relationship between the use of a project management methodology (PMM) and project success, and the impact of project governance context on this relationship. The first surveyed 246 PMI members and found that "the application of a PMM account for 22.3% of the variation in project success" (Joslin & Müller, 2015, p. 1377). The second paper was qualitative, conducting 19 semi-structured interviews covering 19 organisations across 11 industrial sectors including IT, process and finance industries, with none in engineering infrastructure. Furthermore, all were within IT. It concluded that "environmental factors, notably project governance, influence the use and effectiveness of a project methodology and its elements with a resulting impact on the characteristics of project success" (Joslin & Müller, 2016, p. 364). They also noted that "Research on project methodologies is limited, and the results are somewhat contradictory" (Joslin & Müller, 2016, p. 368).

The third non-IT focused paper was by Patah and de Carvalho (2012). It conducted a quantitative study in one multinational company with several divisions acting in different markets, where it was possible to obtain data from a large number of projects for a period of analysis. This company produced and installed a wide range of equipment and earnt 60% of its gross sales from projects. 1387 projects with complete data across Argentina, Brazil and Chile were analyzed directly from the organization's databases, covering a three-year period between July 2006 and June 2008.The study considered budget, deadlines and financial margin and "The results show a positive and significant influence from the implementation degree in the project success, from the schedule point of view" (Patah & de Carvalho, 2012, p. 1). This paper dealt with a subset of the elements of project management rather than with project management methodology (PMM) specifically.

The three IT papers were all concerned with evaluating Agile against what could be labelled as 'waterfall' approaches. The results were somewhat inconclusive, as outlined below.

Ahimbisibwe, Daellenbach, and Cavana (2017) developed and tested a contingency fit model comparing the differences between critical success factors (CSFs) for outsourced software development projects in the context of traditional plan-based and agile methodologies. This study conducted an online survey of senior software project managers and practitioners who were involved in international outsourced software development projects across the globe and received 984 valid responses. It found that various CSFs differ significantly across agile and traditional plan-based methodologies, and in different ways for various project success measures. It recommended further refinement of the instrument using different sources of data for variables and future replication using a longitudinal approach. The results "suggest project managers should tailor PMMs according to various organizational, team, customer and project factors to reduce project failure rates" (Ahimbisibwe et al., 2017, p. Abstract).

Tripp (2012) quantitatively evaluated the impact of various Agile methodologies on IT project success by survey of 83 Agile development teams. He noted "that the distinctive element of agile methodologies is their strong emphasis on obtaining and processing feedback from the environment" and observed that "the use of the practices of agile methodologies… has been observed in non-agile methodology environments". He found that "agile methodology use positively impacts project success, while structural complexity negatively moderates the impact of agile use" (Tripp, 2012, p. Abstract).

Wright (2014) was concerned with quantifying the impact of software development methodologies on 10 measures of project success. The software development methodology used was classified as either agile, structured, or with some degree of hybridization. He found that for supplier satisfaction, agile projects exhibit slightly higher success rates than structured projects and for "the other nine measures of success, software development methodology choice does not appear to impact the success rates. This suggests that practitioners should make software development methodology choices without concern about the impact on the ten measures of success" (Wright, 2014, p. Abstract).

Joslin (2017, p. 162) said:

> Several decades of methodology development would imply a common understanding of the term 'methodology.' However, the opposite is true; for example, PMI (2013a) describes a methodology as a 'system of practices, techniques, and procedures, and rules,' whereas the Office of Government Commerce (OGC, 2002) describes its PRINCE2 not as a methodology, but as a method, which contains processes and not techniques… Irrespective of the type of project methodology, all methodologies comprise a heterogeneous collection of practices that vary from organization to organization (Joslin, 2017, p. 162).

We note that despite this claim of PRINCE2 not to be a methodology, other academic authors also refer to it as such – (Muller, 2017b, p. 108) refers to "Predictive methodologies, such as PRINCE2", Muller (2017a, p. 176) refers to "professional standards or methodologies, such as those of PRINCE2" and Wells (2012) includes PRINCE2 in her assessment of PMMs.

Joslin (2017, p. 166) also noted a case where "a highly evolved methodology that was aligned to the needs of the different business divisions in an engineering company was replaced with a standardized methodology with catastrophic results – project success rates dropped from 90% to 55%". He did not name the methodology. Data on such occurrences is difficult to obtain and name for commercial and reputational reasons.

In summary, the literature search has found:

- only marginal support for the effectiveness of Agile relative to traditional sequential 'waterfall' methodology,
- only one research group conducting a recent (2015/6) post-implementation assessment of generic project management methodology in relation to quantifying its effectiveness and the impact of governance upon it and
- only one not quite so recent (2012) evaluation with conclusions rather uncomplimentary to PMMs.
- Lack of an agreed definition of what a PMM is.

The literature review found no interviews exploring the views of experienced practitioners outside IT. Wells (2012) interviewed experienced IT practitioners and noted that PMMs typically fail to accommodate their requirements. Joslin and Müller (2016) also interviewed only experienced IT practitioners. This provides support for interviewing experienced practitioners outside IT.

We also note the absence of a PMM definition and so will develop one before proceeding to generate our research questions.

3 Definition of Methodology and PMM

The (Oxford) dictionary defines method as "A particular procedure for accomplishing or approaching something" and methodology as "a system of methods used in a particular area of study or activity". We will extract the essential parts of these definitions, in the manner of McGrath and Whitty (2019) and define the method as a procedure for approaching a task and methodology as a system of methods. This allows a methodology to be a system of procedures or a label describing a particular approach, e.g., critical realism. It allows for and is compatible with the definitions of academic method and methodology, according to Crotty (1998, p. 3):

- Method: the techniques or procedures used to gather and analyze data related to some research question or hypothesis.
- Methodology: the strategy, plan of action, process or design lying behind the choice and use of particular methods and linking the choice and use of methods to the desired outcomes.

Applying the above essential definitions to project management, adding two qualifying words to methodology produces the term project management methodology (PMM), which can then be defined as a system of methods used in project management.

Both PMBOK and PRINCE2 provide a system of methods that would appear to satisfy both the Oxford Dictionary and Crotty definitions of a methodology, as both advocate tailoring their contents to individual projects. However, both PMBOK and PRINCE2 declare themselves to be 'non-methodologies'.

The PRINCE2 2017 manual does not use the term methodology and the PRINCE2 2009 manual mentioned it only in its foreword. (AXELOS, 2017b, p. xix) describes itself as an "a product-focused project management method". It also says

> If PRINCE2 is not tailored, it is unlikely that the project management effort and approach would be appropriate for the needs of the project. This can lead to 'mechanistic' project management at one extreme (a method is followed without question) or 'heroic' project management at the other extreme (a method is not followed at all) (AXELOS, 2017b, p. 27).

So PRINCE2 is claimed to be a method rather than a methodology.

PMBOK says:

> This PMBOK guide is different from a methodology. A methodology is a system of practices, techniques, procedures, and rules used by those who work in a discipline.

> This PMBOK guide is a foundation upon which organizations can build methodologies, policies, procedures, rules, tools and techniques, and life cycle phases needed to practice project management" (Project Management Institute, 2017, p. 2).

The previous fifth edition also said, "this standard is a guide rather than a specific methodology" (Project Management Institute, 2013, Section 1.1). The subsequent sixth edition included a separate standard. In other words, the PMBOK is claiming to be a BOK, upon which methodology can be based, but is not claiming to be a methodology.

This does not accord with various authors (Christiansen, 2016, p. 4; Muller, 2017a, p. 176; 2017b, p. 108; Wells, 2012) having regarded PRINCE2 as a project management methodology or with AXELOS (2017a) actually proclaiming it as such. This confirms the statement of Joslin (2017, p. 162) in the literature review, commenting on the absence of agreement on what a methodology is.

PRINCE2 also appears to confuse lifecycle with methodology/ method in saying:

> Although PRINCE2 does not prescribe the use of any particular project lifecycle, it does require that one is used. Rather than each project manager designing their own, consider including one in the project management method, describing the purpose of each management stage and linking back to the PRINCE2 processes and themes (AXELOS, 2017b, p. 276).

This requires an inversion of the method/ methodology hierarchy, suggesting a (presumably project) lifecycle, which is broader than its method, should be brought in underneath its method. This all indicates confusion in methodology terminology in the PRINCE2 manual and its marketing.

Within the local engineering infrastructure industry in Queensland, with which the authors are familiar, the term 'methodology' (i.e. a PMM) has had the sense of being something required by the organisation that will own the asset that the project will create; something relieving the project manager of the need to invent or experiment with unnecessary time-wasting parent organizational process and associated politics, and providing information on its application to various project types and scale. This distinction does not emerge from the academic literature we have read. Neither PRINCE2 nor PMBOK would satisfy this 'definition'. The PMBOK has been regarded locally as not being a methodology because it did not specify what degree of implementation of each knowledge area was appropriate at different phases of the project and did not deal with options analysis/ feasibility studies.

This suggests that a PMM is actually a higher level than PRINCE2 or PMBOK. The problem could be avoided by proposing there are levels or degrees, depending upon their process and lifecycle bases, which determine the degree of tailoring required or number of process uncertainties remaining for the project manager to figure out. This would lead to proposing three levels of PMMs:

1. Product process and product lifecycle
2. Knowledge area process and project lifecycle
3. An organisation's process for the full lifecycle of its projects.

PRINCE2 could be considered as level 1, PMBOK as level 2, and a system suitable for application as an organizational PMM, as level 3. However, given the tendency to drop qualifying words, it would be preferable if the term PMM was referred to as level 3 only, as that is the only level that gives full end-to-end processes for particular projects. This would align with the claims of both products to not be methodologies. This produces a definition of a PMM specific to organizational project management as an organisation's process for managing the full lifecycle of its projects.

3.1 Summary of definitions:

- Method = A procedure for approaching a task.
- Methodology = A system of methods.
- Project Management Methodology = PMM = a system of methods used in project management = an organization's process for managing the full lifecycle of its projects.

4 Research Questions (RQs)

This research sought to:

1. determine experienced practitioner views on methodology effectiveness
2. generally investigate across engineering infrastructure and IT (to guard against drawing conclusions that may be generic to one field only)
3. identify any organizational conditions that emerge as being important for PMM effectiveness
4. see if any participants were able to present information verifying the benefits that had accrued from the use of their methodology and
5. identify any issues that may warrant further investigation.

The following research questions were therefore developed:

RQ1: Do experienced practitioners consider the project management methodology (PMM) their organization uses is effective and or beneficial?

RQ2: Can any of the participants present information verifying the effectiveness and benefits that have accrued from the use of their PMM?

RQ3: What organizational conditions emerge as being important for the effectiveness of PMMs?

5 Research Design

Our research approach is qualitative and similar to that of Wells (2012), who described her approach as phenomenological, exploratory and interpretivist. However, our approach differs in that we seek to employ deduction rather than induction, as Popper (1979, p. 86) noted "Hume had shown induction invalid". While we do seek to identify views and issues that may be of use or interest outside the sample, none of the RQs seek to make any inferences on practitioner views beyond the sample. However, if an issue has been identified in one place, any denial of its existence can be definitely refuted, rendering possible the inference that it may be an issue in other places.

Our research approach is also similar to Joslin and Müller (2016) who adopted a philosophical stance of critical realism.

This research calls for use of a qualitative method of data collection with deductive analysis and interpretation of the responses.

5.1 Instrument selection

Fontana and Prokos (2007, p. 23); Wengraf (2001) considered "Face-to-face interviews have many advantages over less interactive methods. As Shuy (2002) notes, many situations benefit from face-to-face interviews, including those in which the interview is long, or includes complicated topics or sensitive questions". Methodology is a complex subject and face-to-face interviewing was considered an appropriate means of canvassing it while avoiding positivist oversight.

We nevertheless sought to structure the interviews so they did not become undirected conversations. Fontana and Prokos (2007, p. 19) noted that in structured interviewing, "all respondents receive the same set of questions asked in the same order" and "The interviewers must perfect a style of "interested listening" that rewards the respondent's participation but does not evaluate these responses (Converse and Schuman 1974)" (Fontana & Prokos, 2007, p. 20). This was appropriate for our particular research questions, and suggested use of a semi-structured interview which Wengraf (2001, p. 1) noted as appropriate for depth interviewing. Barriball and While (1994, p. 330); Fontana and Prokos (2007) also noted "semi-structured interviews are well suited for the exploration of the perceptions and opinions of respondents regarding complex and sometimes sensitive issues and enable probing for more information and clarification of answers".

Wengraf (2001, p. 162) noted "Semi-structured interviewing is characterized by an emphasis on relatively open questions. However, you may wish also to put certain closed questions". Fontana and Prokos (2007) said "the structured interview … often elicits rational responses, but it overlooks or inadequately assesses the emotional dimension" (Fontana & Prokos, 2007, p. 22).

We therefore decided to use semi-structured face-to-face interviews with a combination of open and closed questions.

5.2 Question design

Question design was based on the categories of questions used in a management study by Kummerow and Kirby (2013). These categories were evaluation, personal experience and context. Their questions were a mixture of open and closed. The actual questions used in this study were tailor-made for this investigation and were only very loosely based the actual Kummerow and Kirby (2013, pp. 542-544) protocol as their investigation occurred within a contained organizational boundary and was more amenable to statistical analysis than the investigation being conducted here.

For this particular research, it was appropriate for the interview questions to be open, with some closed questions being used to produce classification information or as prompts.

The interview strategy was to first confirm the background/ context of the person by determining various classificatory factors, then ask the pre-determined interview questions. The background/ context factors were:

- the sector of their organization (Public or Private enterprise (G=Government, P = Private, H = Hybrid))
- the area within the Sector (SG = State Government, LG = Local Government, SGA = State Government Authority, M = Manufacturing, E = Education)
- the person's work type = the type of products worked with (I = Infrastructure (Civil/ Building/Electrical/Mechanical), IT = Information Technology, including IT infrastructure, BD = Business Development).

Semi-structured interview questions were then developed to capture as many perspectives on project management methodologies as possible. The approach was to have evaluation questions that covered both the nature of and the outcomes from use of these methodologies before evaluating their operation. The initial evaluation questions (Q1) therefore addressed their nature and questions (3 to 5) explored the effectiveness of their implementation.

A combination of open-ended and closed questions was developed as follows:

1. Does your organization require use of a single common project management system or methodology?
2. What is it/ are these?
3. What is its/ their parentage?
4. How closely is it/ are they followed?
5. Is it effective? In what ways? Where/ how is it least effective?

The closed questions (1 to 3) were designed to explore the organizational context and alignment of the methodology with major approaches within the industry. The open-ended questions (4 and 5) were intended to prompt participant discussion.

Other closed questions were asked by way of "impromptu" prompts to either stimulate further observations or to clarify meaning when the response was not clear. In the latter cases a summary or interpretation of the view expressed was related back to the participant for confirmation or correction.

5.3 Sample selection

As noted above, a qualitative deductive approach was adopted. This rendered statistical analysis inappropriate. It was therefore not necessary to have a statistically significant minimum sample size, as would be required for the purpose of gaining inductive confidence.

Only people who were both knowledgeable on the topic and held organizational positions where they would be required to implement their knowledge. This avoided assessing issues of training and experience. This also conforms with consensus theory which is based on the principle that experts tend to agree more with each other within their particular domain than do novices (Romney, Weller, & Batchelder, 1986). They also indicated stable results with sample sizes of around six 'experts'. We decided to select only people who were all at least a program manager or a head of a project management support office. More recently, Guest, Bunce, and Johnson (2006) have indicated a sample size of six to 12 is sufficient where the

participants share common experiences, participants are interviewed separately and in private and the questions asked comprise a common domain of knowledge and a similar set of questions is asked of all participants. On this basis, given that we were interested in differences between engineering infrastructure and IT and given the literature review found previous IT practitioner interviews but none in engineering infrastructure, we set out to interview at least 12 with an engineering infrastructure project background plus six from an IT background.

The likelihood of detecting divergent views was increased by selecting the interview sample across the boundaries of discipline and organization type. A range of these were selected; from government and private enterprise, from physical infrastructure and IT, and from consulting and project owner organizations.

The sample location was also considered. The researchers are based in Queensland, Australia, and consideration was given to whether participants would be selected locally or from interstate or overseas. Australia sits at cultural and geographic crossroads between England/ Europe, the Americas and Asia. Local members of The Australian Institute of Project Management are heavily involved with the International Project Management Association (IPMA) and local practitioners were involved in the development of the first PMBOK. The Project management Institute (PMI) also has a strong local presence. This, together with the ease of global communication, global access to databases and the existence of internationally accepted bodies of knowledge should ensure that worldwide trends influence local participants. It was therefore considered that the sample could be selected locally.

5.4 Question 1 – Single project methodology

The question asked was ‘Does your organization require use of a single common project management system or methodology? ‘

16 answered yes and 4 answered no. 1 said “not explicitly” but actually had an organizational process meaning the response was effectively yes. All 9 organization C participants said yes and they ranged across infrastructure, ICT and business development. The 7 Organization B participants, who were from infrastructure and ICT gave differing responses. 4 said yes and 3 said no. Some of these answered from the perspective of their part of the organization. That organization used to have one single methodology before the ICT area was required to adopt PRINCE2 and before its accounting area developed another methodology for particularly large projects.

Several other comments made are worthy of explicit mention.

19E said “PRINCE2 is geared more towards ICT”.

5D said:

> I’m a fan of PRINCE2 in IT. It’s not necessarily good for engineering projects or when you don’t have a physical project. In engineering you have a spectacular amount of standards and approaches, but with software, it is still a discipline that’s in its infancy. I think PRINCE2 has helped software development projects immensely.

2G chronicled the difficulty of getting a single system implemented across a diverse organization and referred to a rather unusual committee title, the "project management framework board" which was set up "to help develop the methodology and framework".

21F made an observation that warrants mentioning in full:

> We've noticed that people develop their own methodologies then lose them, develop them again then lose them. I was talking to an old friend who said when I asked what he was doing, that he was developing an asset management framework for an organization I previously worked for, as they've got nothing. I suggested to him that when he's next in there, walk down to Person x's desk and tell him what you are doing. The American Water Association paid the organization to send him and the current head of a similar large interstate organization over there to give them the strategic framework for asset management only three years earlier. I just sit there and shake my head! But I've seen it so many times.

5.5 Question 2 – Project methodology used

The question asked was 'What is it/ are these?'

18 indicated they used an in-house methodology, 2 used PRINCE2 and 1 used none.

Some of the 18 mentioned PRINCE2. Although the respondents in Organisation C did not use PRINCE2, the terminology they used indicated there had been some influence from it. Other packages that were mentioned were the American PMBOK and the PRINCE2 stable-mate 3PCM.

2G mentioned several examples of projects considered successful and unsuccessful and was able to compare installations of the same Enterprise Resource Planning (ERP) system into two comparable organizations. The one that did not customize the package and changed their own forms and processes to accommodate it, successfully delivered it for around $16M. The one that customized the system so it did not have to change its forms and processes cost one CEO their job along the way, had a re-tender in the middle and was eventually delivered some years late at a total cost of $60-70M.

7C made the following comment about adopting a modified scheduling package across their organization:

> When we first came together …, we all thought we were special and had special ways of doing things but over time we found we can actually manage the same way… and it was really just the formatting that was the issue.

5.6 Question 3 – Project methodology parentage

The question asked was 'What is its/ their parentage?'

8 said PMBOK and PRINCE2 (all from Organisation C), 5 said PMBOK (all from Organisation B), 2 said PRINCE2 (both from Organisation B and working in IT), 2 said experience that went into development of the PMBOK (1A, 21F). 2 also mentioned experience as well as PMBOK (5D, 19E), 1 was not applicable, having no methodology and 1 was not asked.

This question flushed out several interesting comments on PMBOK, PRINCE2 and ERPs.

21F provided comments on PMBOK in saying:

> My AIPM number is xxx, virtually a foundation member. That was in the days when the PMBOK was being developed by us in Brisbane. I can tell you the names of the guys who developed the stuff you read there. In Australia, the AIPM co-developed PMBOK with PMI. Then PMI cut AIPM adrift and claimed it so they could sell it and they turned themselves into a commercial organization rather than an industry body. That really grated on us, especially when we had to buy copies of PMBOK. The risk part of its methodology is basically AS4360 re-written. I think the PMBOK is a clear methodology - Inputs/ Outputs/ Processes. If you want to have boxes to tick, no. That's an interesting issue. I lecture at a university and one of the things I'm finding is the expectation of students in the industry that we change everything into a checkbox arrangement. Management has to think and project management is about applying something – the concepts, from PMBOK or whatever they are and apply to your project or circumstance or whatever. You have to do some interpretation of stuff.

17C commented on PRINCE2 in saying that his organization's internal methodology here referred to as IM(C) as being:

> based on a waterfall approach to most things. The closest it is to PRINCE2 is in governance – PCGs – Owner, Senior User and Senior Supplier. The artifacts are nowhere near PRINCE2. It uses more PMBOK/ AIPM terminology. Project mandate and business case terms aren't the same as PRINCE2. It gives a lot more credibility to risk than PRINCE2 does. I think PRINCE2 is quite light on risk. It also doesn't separate project managing from project doing i.e. what is a project manager actually responsible for (as distinct from content)?

10C mentioned an ancillary system IM(C1), which is an adjunct to their project management methodology, IM(C). 10C explained that IM(C1) aligns their "IT infrastructure, financial infrastructure and business operations to a parent-child methodology so the financial systems can roll down and the PM methodology, tools and techniques can roll back up", and they will "now be able to align … structures in both financial and project management". It is a scheduling and reporting system that attempts to accommodate cross-program linkages and the separation of budget and physical accountabilities. It is based around Microsoft Project and was effectively an attempt to develop a project monitoring system that would interface with their ERP.

5.7 Question 4 – How closely methodology is followed

The question asked was, 'How closely is it/ are they followed?'

Participant responses were assessed on the basis of whether the participant's response indicated high (H), medium (M) or low (L) compliance. These were a little arbitrary and useful only for gaining an overall impression. The main value was again in what the participants said.

14 were classified as indicating high compliance, 6 as medium, none as low and 1 was not applicable. 1 who was classified as'M' said "a lot of our clients have their own project management system that we as consultants are required to follow" (19E).

This indicates a reasonably high level of compliance with corporate systems within Organisations A to F, irrespective of whether single or multiple methodologies are in use.

One participant raised the issue of compliance when there is political involvement, saying "There are significant conversations around business cases being required when there is political direction to do something" (12C).

14B from IT said "PRINCE2 is closely followed with flexibility on how deep/ light you go with it, as without that, you can kill yourself with paperwork".

There was one interesting comment on the nature of project management: "As project managers are we artists or scientists? We're somewhere in the middle' (19E)".

5.8 Question 5 – Methodology effectiveness

The question asked was 'Is it effective? In what ways? Where/ how is it least effective?'

Participant responses were assessed on the basis of whether the participant's response indicated yes (Y), no (N) or maybe (M). 20 indicated yes and the one whose organization did not have any methodology was supportive of their use, as evidenced by the fact that he was involved in an attempt to implement one.

Some participants generally responded regarding methodologies. These are reported below before reporting the responses on particular methodologies.

18B said "All the project methodologies are as good as each other. I'm not wedded to any particular one".

13C was using a hybrid and said:

> It's not industry standard as it's a hybrid. Following either PMBOK or PRINCE2 would have been easier. We spend so much time reviewing when there's stuff on the shelf that's just as effective that could just be adopted and tweaked. We have two people doing this.

In response to a different question (2.1) asked in the same interview, 2G, who lectures practitioners in a project management master's degree program said:

> IT projects tend to have more IT focused project management and methodologies which are different to those used for capital projects. The ones that I have seen tend to be a variation of PRINCE2. I've seen lots of people who say they use PRINCE2 but in fact, it's a home-grown variation. I don't believe many people adopt PRINCE2 in total and use the full suite of PRINCE2 principles.

When responding to Question 4, 11B (from an engineering infrastructure area) expressed a view about PRINCE2's effectiveness in IT without getting specific about any particular feature, saying it was:

> a failure, which may have more to do with the nature of IT projects than the PRINCE2 methodology, but it confuses a lot of people that there's a separate methodology. I don't think that's useful. The majority of the department's projects are either business or infrastructure and they are all run off essentially the same PMBOK methodology. What's grown out of the department's IM(B) has become the norm for everything except for the PRINCE2 stuff. What's in there (PRINCE2) makes sense, but it doesn't mean the IT projects go that well. It's being used on all of them now as that's the government norm but I'm ambivalent because I've seen a lot of IT projects that haven't gone that well. I have seen ones that go well too, and the difference is obviously the people who are running them, whatever their methodology. The ones where the business takes great interest. They go well.

This aligns with the history of that organization, as mentioned above having previously had a common methodology for all projects including IT and having to abandon it for IT related projects in favor of PRINCE2.

Some participants were able to indicate or measure effectiveness for their PMBOK based systems. 7C said 'We deliver projects on time and budget consistently'. 10C said they were 'starting to see benefits and efficiencies. We formerly had paper-based and ad-hoc approach to managing projects. Our process now allows for streamlined business decisions – saving 20-30 mins/ day in document control'. 11B said 'We get 90% on time and 95% under budget with high satisfaction. We have a reduction in the number of major issues and we're getting less re-work and major failures'. 13C said 'We report on project delivery and have more than 90% on time and on budget'.

Participant responses on particular features of their systems that were most and least effective are reported below for organizations B and C systems, as the bulk of the participants were from these two organizations. PRINCE2 responses are also reported separately, with responses drawn collectively across the organizations sampled.

5.8.1 IM(C) – Internal methodology for Organisation C

The most effective aspects of IM(C)

4C IM(C) "It gives a framework."

6C "It's most effective in definition of critical stages – development, business case, delivery and closure."

7C said:

> We deliver projects on time and budget consistently [reported above] … Have assessed maturity at 3-4. The engineering infrastructure area was ahead of the rest of the organization, as expected. Most important is to have a process across all disciplines. It probably doesn't really matter what that is, provided it's consistent across the organization.

10C said:

> IM(C) is simple, light, very easy to follow and you don't have to use all of it for every project. The system/ framework is prescriptive, almost tick-a-box. The way finding is clear.

12C "The system is effective in producing those outcomes when it's used".

13C "We report on project delivery and have > 90% on time on budget and have the stats".

17C "Most -You usually get the supporting documentation you require".

The least effective aspects of IM(C)

4C "if followed blindly, the patient may die."

10C said:

> There's a stigma attached to it in some places, that it is over-governed, bureaucracy has gone mad, too hard, unnecessary, terminology and definitions that are over the top, a bit wanky, especially program/ portfolio/ project. People are right – Program and Programme. That's embarrassing. Program is budget, Programme is works. Program is a line item of money. Programme is for MSP. This decision was taken to avoid confusion. This decision didn't go down so well.

12C said:

> Difficulties with the system being followed rather than absence of system. Most effective in providing the documentation and system. The Nike approach (Just do it) exposes the PM and organization to risk. That's what happens when people are time poor.

16C said:

> Adhering to the start-up process is poor, such as business cases. Other components are followed and then the benefits realization at the end and project closeout would be poor as well. A lot of not following the full process is driven by tight time-frames. The start-up, initiation and decision around investment is not done so well, the doing bit is done fairly well, then the close-out is done poorly. People are choosing the bits they want to do rather than following the whole process. We've been endeavoring to put it into more practical terms. Many areas have people delivering who don't have project management experience, so we want it to be easy to follow. Where we've made it too difficult to follow, compliance is virtually non-existent.

17C said:

> There's nothing to say about what you are doing about the actual management of the project. They call it a project management methodology. It's actually a project delivery methodology. For IT, need a business requirement that leads to solution options to solution architecture to functional requirements (of the IT modules). That's your project methodology. So business requirement should drive your functional requirement. The as-is and to-be are in the business requirements. That's all the technical stuff. You build out from that by determining scope, then schedule, budget, then quality and performance requirements, then resources, then communications, risk

> and procurement. That's all the project management stuff. That to me is a project management methodology. Governance is focused on the business requirement… Where IM(C) falls down is that it covers the work management rather than the project management.

5.8.2 IM(B) – Internal methodology for Organisation B

The most effective aspects of IM(B)

8B "Documentation, simplicity of following steps. It has good background processes and good guidance throughout the documentation is key".

9B said:

> Phasing of project development in a logical sequence, starting with what's the strategic intent of the proposed solution and then building up that proposal through series of phases such as Options Analysis leading to a to Business Case, which is the definitive investment decision point and thereon to development of a tender and construction assurance. The strength of the system is allowing a level of scalability and flexibility within defined parameters.

15B said:

> It has been the tool used to get more discipline around things like estimating and risk management … It's the vehicle that carries the common language that's now embedded within the organization, which, again, we didn't have 10 years ago. The best thing out of IM(B) was the vocabulary. Everybody understands what a business case is. Similarly for… project phases. My opinion is that it has been as valuable as the detailed content, having people speak the same language.

11B "We get 90% on time and 95% under budget with high satisfaction. We have a reduction in the number of major issues and we're getting less re-work and major failures".

The least effective aspects of IM(B)

8B "Project managers and their management understanding the need to use it – Where a project manager deviates from the standard methodology as they see their project doesn't quite fit – the tailoring and principles behind it get left behind".

9B said:

> The need to be adapted to needs of very diverse client base and being clear in the outcome to be achieved. The negative is that the systems aren't clear in the application of that flexibility and the consequences are that you end up with users that withdraw from using it and the adoption rate diminishes or have outcomes not quite meeting suitable requirements and users end up developing alternative approaches – which may be adaptation or going elsewhere. Another weakness or risk is not to be overly prescriptive or repetitive in the information sought as this leads to diminished adoption.

15B said:

> When people don't think about how they are using it, and tend to put more effort into the bits they don't need to and less into those that they do. … Historically, the department culturally likes having black and white rules to follow. You can use it like that, but you don't get the best value out of it that way. We still have the issue of people following a cook book approach, rather than as a tool to document your own experience and expertise.

11B "in the western areas where capability is not so strong, and where we work with other areas of the department that don't have the same focus on a project or program management approach."

5.8.3 PRINCE2

Only 3 participants were fully using PRINCE2 and all considered it was effective for the IT area they were involved in.

The most effective aspects of PRINCE2

14B said:

> It provides a good mechanism for ensuring the project has the right stage-gate decisions as needed. It allows for a good level of planning. PRINCE2 talks about works packages and stages. … It is also good for initiating projects appropriately, to ensure the right sponsorship is in place, the right pieces of information are gathered & understood to inform initiation of a project.

The least effective aspects of PRINCE2

14B said:

> Maybe quality needs strengthening and provide processes and methods for measuring and providing the projects with the ability to proactively work to quality outcomes. One of the principal difficulties is people not understanding that it is a flexible methodology and they bury themselves in paperwork. You add a significant overhead to the project if you don't match how deep you go to the complexity and size of the project.

17C said:

> When I talk about a project management methodology, I'm not really worried about the product development methodology. That's the basis of PRINCE2. PRINCE2 does deal with project management and reaches out to the project executive only via its governance arrangements… I think PRINCE2 pays lip service to risk management. It does a lot around scope and quality… In IT we do it very badly. We focus all our effort on the work management rather than on the project management, and it shows through.

6 Analysis of Findings

6.1 Question 1 – Single project methodology

While most said their organization had a common project management methodology, for some, this referred to their particular part of the organization. So although the responses from

one organization conflicted, the no responses did not indicate the absence of methodology. They rather indicated the absence of a single one followed by all parts of the organization. As noted in the findings, this particular organization previously had one single methodology before the IT area was required by the whole-of-government mandate to adopt PRINCE2, and before its accounting area also developed another methodology for particularly large projects. The PRINCE2 model was introduced for IT without consideration of how it might interact with the core business, which was not using it. The large project methodology was developed without regard for the existing project management methodology, perhaps bearing out the observation of 21F who commented on organizations developing methodologies and then losing them.

The issue that emerges from these observations is the difficulty of both implementing a common methodology and then keeping it, or in other words, the difficulty of introducing and sustaining effective change. It is evident from the remarks that plenty of change can be introduced that is not sustained.

Organizational conditions having the potential to contribute to this include the reduction of corporate loyalty to staff, the acceptance of increased mobility and the expectation of constant change. It appears that the bureaucratic norm has completely changed from the pre-1980s entrenched resistance to change to the complete opposite in the 1990s and 2000s, to the point now where past experience is devalued and retaining anything much of lessons learned is a significant challenge. Both approaches can be described as very risky practices and some balance between the two is obviously necessary. One wonders what productivity gains might be possible if the excesses of both approaches could be avoided. As Duffield and Whitty (2012, p. 1) noted “Both the knowledge and project management literature suggest that the lessons learned process in practice rarely happens, and when it does it fails to deliver the intended results”.

A related issue that emerges is the tendency within bureaucracies to not research outside one’s own silo for previous approaches that may have already solved the same problem. This is facilitated by time pressure producing efficiency rather than effectiveness. This feeds competition between frameworks. There are potential esteem and career promotion prospects involved in developing a ‘new’ framework for others to follow. Such rewards won’t accrue if it should happen to be found that the task has already been done. This also produces a tendency to discredit any such existing frameworks that may be found as being flawed, to justify development of a new one. The need for esteem and attention, manifesting in the desire to provide an example to others without recognizing we are still just learning ourselves, feeds the short-cycling of ineffective change and the proliferation of competing conceptual frameworks. So there is little incentive to do such research, and the time pressure on practitioners for efficiency over effectiveness easily leads to ignoring the potential savings that a little bit of research and investigation may bring. There is rarely time to adequately research or consider what is to be done, but there is all the time in the world to work through the consequences. This has been lost through change advocates adopting moral high ground with evangelizing zeal, labelled206 reasonable questioning as resisting change.

This is perhaps due to the prevailing mind-set, hung over from logical positivism, that everything can be controlled, and we can all have what we want, and we should be able to get it, now. If I perceive a need here and now, I may go out and solve it myself rather than look around too much. This mirrors the difficulty identified in McGrath and Whitty (2017), where

blindness to silent or assumed qualifiers causes difficulty in our communications on abstract concepts. A further difficulty arises that once a position is taken and a career attached to it, egos come into play, as mentioned in the response to a separate set of governance questions asked in conjunction with the methodology questions. 7C said "People find it very difficult to articulate governance because what happens is egos get bruised along the way, so people who think they're important find out they're not important and that's one of the critical factors".

A third issue that emerges is some participants stating that PRINCE2 is much better suited to IT projects than to physical infrastructure (5D and 19E). 11B in response to Question 4 noted his organization did not use it for business or engineering infrastructure projects and that PRINCE2 had been "a failure" for IT projects in his organization. 17C in response to a supplementary question "Are you aware of PRINCE2 being used in infrastructure anywhere?" asked when probing a governance question (1.8) (not reported in this paper) answered "No. I'm not sure if it could be because you can't half build a building; you can't half do a mine". These statements cast doubt on claims in the PRINCE2 manual that it is "generic so that it can be applied to any project regardless of project scale, type, organization, geography or culture" (AXELOS, 2017b, p. 2) and indicate the possibility of proof by induction (that if something seems good in one area it will also work in another) having been accepted without adequate evidence (see Organizational Condition 6 below).

6.2 Question 2 – Project methodology used

The significant factor that emerges here is that some internal methodologies in engineering infrastructure organizations have survived the PRINCE2 challenge noted by Wells (2012, pp. 43-44).

Another issue emerges from the comment of 7C' we all thought we were special and had special ways of doing things but over time we found we can actually manage the same way … it was really just the formatting that was the issue'. This supports the second issue identified in Question 1 of not looking outside silos. It is also instructive relative to the customization of ERP systems mentioned in the findings, with customization multiplying the cost in one case by about 4. This could be taken as a message to either purchasing organizations to select a package closest to existing organizational processes and not to insist on customization, or to ERP suppliers to include more flexibility in their base product to reduce the need for customization. Of course, this may not suit the ERP company business model for ongoing revenue. It may also not support the industry of introducing changed ERPs as a measure to solve organizational problems.

6.3 Question 3 – Project methodology parentage

The findings indicate that both PMBOK and PRINCE2 have had a substantial influence on the organizations the participants had worked in and that these two parentages dominated the organizational systems reported, albeit that some of the older participants were able to relate further back to experience that provided the base for PMBOK. Of course, PRINCE2 has a long history as well, originating from the PROMPT II system, as documented in McKenna and Whitty (2012). However, it is only in the last two decades that it has spread widely beyond the UK.

6.4 Question 4 – How closely methodology is followed

While a high level of compliance with corporate project management systems was indicated in the organizations the participants represented, it was notable that the issue of political involvement compromising compliance was raised by only one of the participants (12C). It may be that the existence of methodology had provided a governance framework to enable such pressure to be resisted, however the interview data enabled no conclusion on this matter to be drawn and it was not the focus of our investigation.

6.5 Question 5 – Methodology effectiveness

From the virtual clean sweep of responses considering their methodology was effective, it is evident that the answer to RQ1 is affirmative. This contrasts markedly with Wells (2012, p. 57) finding only 50% agreement on this. Some were able to report measurable improvements; participants from both organizations B and C reported delivering to better than 90% on time and budget across all their infrastructure projects.

While the difficulties of demonstrating performance improvement are enumerated in the introduction above, practitioners are subject to pressure to get results and so project outcomes are generally well measured at least in terms of time and cost. These are tracked in performance data, which for some larger public project delivery organizations, is contained at some level in annual reports. This study interviewed practitioners from two organizations which do maintain and monitor project performance data. However only one reported this in their annual reports. Two annual reports from this organization were examined, 2014-15 and 2015-16. In Organisation B, the only measure directly comparable, due to reporting differences between the financial years examined was cost. The ‘number of projects costing less than 10% over the programmed estimate’ increased from 87 to 90%. While a single year on year comparison does not validate any statistical trend, the high percentage numbers support the organization’s participants claims. Note that Annual Reports fulfill legal requirements to report, with associated obligation for the truthfulness and any data presented can be subject to FOI (Freedom of information) requests and so can generally be regarded as accurately reported. They are used as public sources of reference. Consequently, performance data is generally kept to the bare minimum and as broad as possible. If the performance data is unfavorable, it is generally either omitted or selectively reported or different measures are used that look less unfavorable. So, if any data that specifically addresses performance is actually reported, particularly if the same measures are used year to year, it can generally be relied on. Close attention to the way it is worded and presented is, of course, necessary.

This indicates that RQ2 can be answered affirmatively; it is possible to achieve consistency and reliability of delivery through having an organization wide methodology, as two organizations sampled have done it. Both had PMBOK based methodology.

7 Discussion

The analysis of findings above indicate that the first two research questions can be answered affirmatively; The experienced practitioners sampled considered the project management methodology (PMM) their organization uses to be effective and beneficial (RQ1), and participants from two organizations were able to present information verifying the effectiveness and benefits that have accrued from use of their PMM (RQ2).

We now turn our attention to RQ3. It is evident that RQ3 can be answered and this will be done in the next section below by distilling the organizational conditions identified in the questions above.

Both organizations where measurable performance benefits were claimed had PMBOK based methodologies and indicated reductions in both re-work and major issues/ failures. Both also reported effectiveness in defining critical stages – development, business case, delivery and closure for IM(C) and phasing of strategic intent, Options Analysis and Business Case for IM(B). Both received favorable comments on simplicity, scalability and flexibility as well as on the documentation provided. IM(B) received a favorable comment on its production of common vocabulary. So it is evident that the aspect of a PMM providing common process was generally considered beneficial. Both were widely supported and followed within their organization.

The main difficulties reported for both systems were the level of adherence to the system at the margin (by the minority in both organizations who did not follow the system), with comments being made on the adequacy of following the start-up process, the level of adherence on the mid-section processes including delivery, and completion of close-out – due to time pressures and staff inexperience. These difficulties were at the margin for the two organizations that had performance measurement data and the level of conformance was high as the systems were mandated from the top of these organizations. The question was asked even-handedly, so even though participants supported their organizational system, they had to come up with something that counterbalanced their support. So even though the questions were asked in a 50/50 way, the responses cannot be interpreted in that way,

However, IM(C) also seemed to have some rigidity of either the system or some implementation features that generated some resistance, which was at least partly addressed by introducing a light version. One rather fulsome comment related to it being a delivery methodology rather than project management methodology, pointing out all the project management omissions (17C). The comment came from the IT area and concluded with the statement that ‘it covers the work management rather than the project management’. This corresponds with the need expressed in McGrath and Whitty (2015) to distinguish process from content. However, in spite of this difficulty, the organization still reported high success rates. This either means IM(C) is a robust system or highlights the relative importance of having some system rather than none, or possibly both.

7.1 Organizational conditions contributing to the effectiveness of PMMs

The following organizational conditions that contribute to the effectiveness of PMMs emerged from the participant responses:

1. **The difficulty of both implementing a common methodology and then keeping it:** This was identified in Question 1 responses and is related to Condition 2 below. It is a difficulty that can result from changes in personnel, which can produce loss of knowledge of organizational history or imposition of different attitudes, priorities or systems.
2. **The tendency within bureaucracies for practitioners to not research outside their own silo for previous approaches that may have already solved the same problem:** This was also identified in Question 1 responses. There is scope here for

promotion of what could be labelled a ‘double helix’, akin to the triple helix concept of Etzkowitz and Leydesdorff (1998). Practitioners are time poor and must produce a useable outcome for their customers/ the community. Unnecessary duplication is difficult to detect within large organizations for many mutually supporting reasons. These include increasing staff turnover, reduced organizational loyalty to staff, expectations of rapid promotion, the career enhancement prospects of introducing change and the removal of sceptical older staff with organizational knowledge.

3. **Competition between methodologies:** This was identified in Question 2 responses and despite the worldwide push for adoption of OGC methodology, other internal methodologies in some engineering infrastructure organisations, two of which were sampled here, have survived the PRINCE2 challenge to replace them. If more performance data was available, as suggested in Research Direction 1 below, this would provide competitive feedback that may drive changes in commercial methodologies. It may also determine the circumstances where some PMMs may work better than others.
4. **Adoption of common formats:** This was identified in Question 2 responses with one participant saying that “we all thought we were special and had special ways of doing things but over time we found we can actually manage the same way… it was really just the formatting that was the issue”. This, taken together with one participant’s observation of the same ERP implementation in two different but comparable organizations where customization of formats in one resulted in the implementation cost being nearly four times that of the other organization, indicates that this issue may well apply more broadly than just within project management.
5. **Flexibility in application:** This was identified in Question 5 responses. While some hankered for an idealized world, desiring purity of methodology and an absence of customization or hybridization, this attitude seemed rooted in the positivist paradigm which provided the origin of project management theory, as noted by Bredillet (2010, p. 6). Rigidity of application seemed to generate adverse reactions of “over-governed, bureaucracy gone mad” (10C) (although this referred to only some parts of the organization) or ‘buried in paperwork’ (14B) (referring to inappropriate applications of PRINCE2). However, both PMMs considered here addressed this by having some fixed elements and some that are allowed to vary, to accommodate project circumstances not fitting some aspect of the framework imposed upon them. Use of a scaling process or having a ‘light’ version available for less complex projects were means that these methodologies had adopted. We also noted that IM(B) also had the ability to accommodate softer i.e. less deterministic project types, such as policy or strategy development or people-oriented projects such as culture change.
6. **Distinguishing content from process:** This was identified in Question 5 responses and was raised in terms of one PMM covering the work management rather than the project management. The very existence of the project management field depends upon identifying the generic process characteristics, separate to and independent of the content area it is applied to. This poses the challenge of identifying items thought to be generic within one field that may not be so in another. This may be relevant in further examination of Research Direction 3 below.

This list constitutes the response to RQ3.

7.2 Future research directions identified

The future research directions identified in the analysis of findings above were as follows:

1. **There is a lack of post-implementation evaluations of the effectiveness of PMMs:** The literature review located only one such study and that was in 2012. That is rather surprising, given the scale and continuing spread of the OGC methodologies worldwide, the possibility of attempted implementation of IT PMMs to engineering infrastructure and the persistent lack of improvement in IT project performance reported in sources such as Yates and Hughes (2018) who said "Recent research suggests that only 40% of project objectives are aligned with organizational strategy. (APM, 2015; PMI, 2015; Standish Group, 2015)" and "only 17% of organizations report a high level of benefits realization maturity and this figure has remained unchanged from 2014 to 2016 (APM, 2015; PMI, 2015; Standish Group, 2015)".
2. **Evaluations of PMM performance is increasingly possible through analysis of annual reports and internal data systems:** This was identified in Question 5. While annual reports may not provide specific detailed performance data, some actually do, even though they may only cover the traditional parameters of time and cost. One study by Patah and de Carvalho (2012) identified in the literature review actually accessed internal time and cost information and records of one company. However, some organizations, such as the two large public organizations covered in this study do now actually record such internal data that is not published in annual reports but which can potentially be used and which the ethical obligation of anonymity of academic investigation may facilitate unlocking. This can contribute to Research Direction 1 above.
3. **Claims that PRINCE2 is unsuitable for application to physical infrastructure:** This was identified in Question 1 and warrants separate investigation that is beyond the scope of this paper.

7.3 Observations

We also note that the data collection, analysis and reporting periods of this paper overlapped with Joslin and Müller (2015, 2016). The latter paper adopted the same philosophical stance (critical realism), data collection method (semi-structured interviews) and deductive analysis approach as used in this paper. Our sample, however, focused on engineering infrastructure and included IT that served it, rather than focusing on IT enterprises and process industries from a purely IT viewpoint. This enabled us to examine whether IT-based methodology was influencing engineering infrastructure project management.

We also note the tendency of previous studies identified in the literature review to select samples from across industry but wholly within the field of IT. This may cover a range of IT projects but does not actually produce a view of cross-industry physical project types at all. This is potentially quite dangerous as it can lull the researcher into a false sense of thinking their findings are generic when they are not.

8 Limitations and future research

The limitation of this work is that it is based upon a sample of organizations and industries in one state in one country. While the factors mentioned above in sample selection should result in worldwide trends affecting local participants in this study, there is no guarantee of that.

During this study, data was also collected on project governance and this has been analyzed separately. The organizational conditions identified in this study have led to several suggestions for future research, as detailed above.

We consider it would be desirable for future research in the project management field to make it explicit when 'cross-industry' samples all come from within the field of IT projects as the success rates of IT projects may well be different to that of engineering infrastructure projects.

9 Conclusion

This paper has documented the collection and analysis of data from experienced practitioners concerning project methodologies. It found general agreement on the desirability of PMMs and identified two large infrastructure organizations with PMBOK based methodologies that were achieving greater than 90% of their projects on time and cost. It also identified six organizational conditions that contribute to the effectiveness of PMMs, providing a guide to practitioners looking to implement a PMM. It suggests future research on PMM effectiveness and on the suitability of PRINCE2 for use in engineering infrastructure. It also recommends that a Project Management Methodology (PMM) be defined as an organization's process for managing the whole lifecycle of its projects. This would exclude both PMBOK and PRINCE2 from being so labelled.

About Authors

Dr. Stephen McGrath completed his Ph.D. at the University of Southern Queensland. He researched the cross-discipline impacts of 'generic' project, program and portfolio management methodology and terminology, particularly relating to governance, across civil infrastructure and IT. This led him to identify and propose various means of avoiding linguistic traps that generate unnecessary conflict in project management as well as in general management and daily life. He is a civil engineer and Fellow of both the Institution of Engineers Australia and the Australian Institute of Project Management. He has 40 years of experience in developing, planning and delivering civil infrastructure projects as well as strategy and business development projects across the roads, busways, rail, marine and aviation areas of transport. He also led the team that developed the Queensland Department of Transport and Main Roads 'OnQ' project management system that has been in operation since 2000 and has now been used in delivering more than $20B of civil infrastructure, business development, and IT projects.

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