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Project Management Methodologies: A Comparative Analysis

C. M. M. Chin (Kuala Lumpur Infrastructure University College), (PhD),
Kajang, Selangor, Malaysia

A. C. Spowage, (University of Nottingham Malaysia Campus), (PhD) and E. H. Yap, (University of Nottingham Malaysia Campus), (PhD)
Semenyih, Selangor, Malaysia

Across all industrial sectors, project management has become an essential element in the successful delivery of projects. Regardless of the industrial sector or size of project, project management methodologies (PMM) can be applied to improve the probability of meeting the project goals. In an earlier published work, we had classified PMM in five distinct but interdependent levels. In this paper, our objective is to further extend the discussion on the characteristics of L3 methodologies by comparing the PMM currently being applied in three distinct sectors: (1) academic institutions; (2) industry organizations and (3) government linked organizations. Each of the PMM across the three sectors will be compared and discussed against a list of elements to elicit a common set of requirements.

Keywords: project management methodology, organization specific, comparative analysis.

Introduction

Project management methodologies (PMM) have been popularized for use in various industry sectors for over 30 years (Goff 2007, Johnston & Wierschem 2005). Numerous professional bodies have developed a wide range of methods and techniques to aid in the management of projects. Today, PMM boast tighter project controls, improved approaches and leverage on tremendous experiences, however many projects still fail (Delisle & Olson 2004).

In the previous study (Chin & Spowage, 2010), the Project & Engineering Management group at The University of Nottingham's Malaysian Campus classified PMM into two major categories with five distinct but interdependent levels (Charvat 2003, Pitagorsky 2003, Turbit 2005, Wideman 2006). The two categories were project management methodologies (that provide a high-level framework for the project) and application development methodologies (which provide details on project design and development). The most apparent difference being that application development methodologies have a stronger focus on system testing, which is not covered in PMM. The confusion within the published literature and by project practitioners as to what constitutes a methodology is understandable as opinions vary widely. As a consequence we have classified PMM into five different levels; L1-Best practices, standards and guidelines; L2-Sector specific methodology; L3-Organization specific customized methodology; L4-Project specific methodology and L5-Individualized methodology. Each methodology has a degree of specificity increasing from the root (L1) to the tips of the branches (L5) as illustrated in Figure 1.

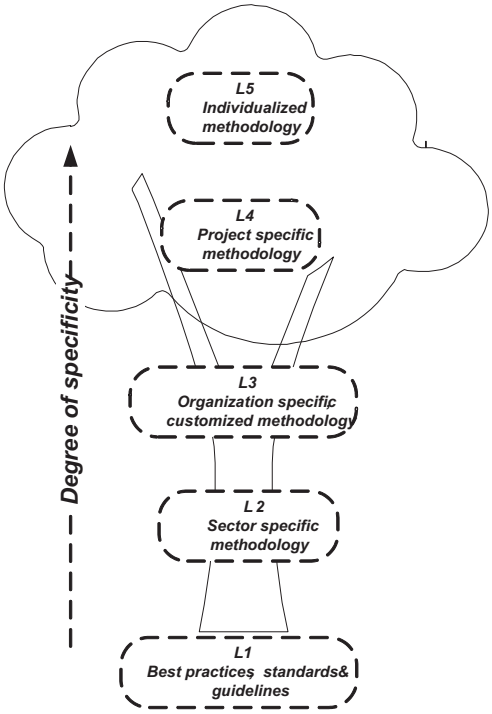

Figure 1: Classification of PMM

The objective in this paper is to further extend the discussion on the characteristics of L3 methodologies by comparing the PMM currently being applied in three distinct sectors: (1) academic institutions; (2) industry organizations and (3) government linked organizations. Each of the PMM will be compared and discussed against a list of common elements, components and requirements.

Understanding Project Management Methodology in Practice

Project management is a well-recognized discipline and the principal vehicle used by the majority of the world's leading organizations to deliver their work. Regardless of the industry sector or project sizes, utilizing an appropriate PMM is widely believed to enhance the probability of completing projects on time, within budget and to deliver the product to the satisfaction of all stakeholders (Charvat 2003, Josler & Burger 2005, Milosevic & Patanakul 2005, Munns & Bjermi 1996, Pitagorsky 2003). However, this condition only applies if the project manager understands the nature of the project and is able to 'reshape and scale' it to fit the project.

Effective PMM are those that can be tailored to the specific environment and that can be adapted to the dynamic nature of projects and stakeholder' demands. Thus, a methodology must be flexible; yet it should provide guidelines which leverage on both best practices and past experiences to ensure the project goals are achieved. It should help the project team to clearly understand the scope of their work, what to accomplish and how to accomplish it using the tools and techniques available within the methodology (Charvat 2003). It is impractical to develop a

new methodology for each new project within the organization. However, in the adoption and use of a methodology it should be easily customizable to any project within a given environment (Charvat 2003, Chemma & Shahid 2005, Cockburn 2000b).

Based on the literature discussed above and the research work (Chin & Spowage 2008a, 2010, Spowage & Chin 2009) done by the engineering management group at the University of Nottingham Malaysia Campus, we have defined a PMM as "a comprehensive set of best practices, tools and techniques that are dynamic, flexible, adaptive and customizable to suit different projects within a specific environment". The methodology should therefore consist of a set of processes, templates, techniques and tools to assist in planning and managing the project throughout its entire life cycle. The components of the methodology will cover (1) project management processes such as initiating, planning, executing and monitoring project progress with (2) a selection of tools and techniques to communicate the delivery to the satisfaction of all stakeholders; (3) consolidated and integrated set of appropriate best practices and values of project management and (4) a list of references and terminology to define a common language for the project environment.

Organization Specific Customized Methodologies

In the classification of PMM (Chin & Spowage 2010), L3 sector specific methodology are tailored to meet the strategy, structure, nature of projects and needs of an organization to effectively become a L2 methodology. An important step in implementing a L3 methodology within an organization is to integrate the project processes with the organization's business systems. Without this vital element the organization will encounter considerable difficulties in accessing information and will constantly have to duplicate administration. These two factors are also commonly cited as a cause of resistance to the adoption new methodologies.

There is a number of leading organization specific methodologies currently in the market. These include Microsoft's well-integrated methodology known as Microsoft Solution Framework (MSF) a successful design, deployment and operation methodology (MSF 2002). IBM similarly has its own effective PMM called the Rational Unified Process (RUP) (Kroll & Royce 2005). Another earlier user of PMM approach is a Swedish company, Ericsson, which introduced a common methodology for handling product development projects known as PROPS (Eskerod & Riis 2009, Mulder 1997).

L3 methodologies are also being adopted by academic institutions, for example, the University of Cornell's PMM (Cornell n.d.), which was adopted from Princeton University methodology and the University of Tasmania's methodology (University of Tasmania n.d.) which was adapted from the Tasmanian Government Project Management Guidelines (Tasmanian Government 2006). In other universities, PMM are mainly adopted for administrative, information and technology services (University Michigan 2005, University of South Carolina 2007, University of Sydney 2008). These will be discussed in the following sections.

Comparative Analysis of the Various Project Management Methodologies

In order to critically review and compare the various PMM available in the market, a total of 34 L3 organization specific customized methodologies have been identified, examined and categorized into (1) academic institutions methodologies; (2) industry methodologies and (3) governmental methodologies. Each of these methodologies was obtained from the organization's website and public folder which were accessible and downloadable. The majority of the PMM examined were created from the year 2000 to 2008 and all had access to a similar level of best practice. The analysis of each organization specific methodology will be discussed in the following sections. All the PMM identified were compared using the same list of elements to give a balanced discussion.

Academic Institution Project Management Methodologies

A total of 15 academic institutional methodologies were examined (Tables 1 & 2). The academic institutions were from several different countries and adopted different project management practices in the design of their methodologies. The majority of the PMM were aligned to Project Management Institute's Project Management Body Of Knowledge (PMBOK) guidelines (PMI 2008). However, UK academic institutions showed a stronger preference for alignment with the Association of Project Management Body Of Knowledge (APMBOK) (APM 2000) and Projects In Controlled Environments (PRINCE2) (PRINCE2 2005), mainly because PRINCE2 is the de factor standard in the UK (PRINCE2 2005).

A majority of academic institutions designed their PMM specifically for the management of information technology (IT) and information systems (IS) projects within their institutions. This is probably a reflection of the higher level of maturity of project management within the IT section compared to other sectors. Although many of these PMM were used primarily to manage IT projects they are also easily applicable to projects in other areas. The majority of PMM from academic institutions used a structured approach with unique project phases, processes, inputs or activities, deliverables, tools and techniques.

Though the PMM were adequate for facilitation, a handful of the methodologies are not complete, not having template samples, checklists nor hints and tips to guide project managers. Furthermore, a number of PMM do not include a common set of references on the terms and acronyms used by the methodology (Tables 1 & 2). These are important components to be included in a typical PMM since many academicians' and administrators lack project management knowledge and skill sets to effectively managing their research projects (Gist & Langley 2007). Further, we found there are a handful of PMM which were not updated in accordance to its adopted project management practices. Amongst the 15 PMM investigated in this category, it was found that only two academic institutions (U11 and U15) have near complete coverage of all the identified elements.

Table 1

Comparison between academic institutions' PMM

Comparison elements	U1	U2	U3	U4	U5	U6	U7	U8	U9	U10	U11	U12	U13	U14	U15
Project phases	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Project processes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
Project types	IT	IT		IT	IT	IT		IT		IT	IT		IS		IT
Inputs /Activities	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Outputs/ Deliverables		✓	✓	✓	✓		✓	✓			✓				✓
Tools & techniques	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Available templates	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓
Checklists	✓			✓						✓	✓	✓			✓
Hints and tips									✓					✓	
Terms & definition		✓	✓			✓	✓				✓	✓	✓	✓	
Frequent update	✓		✓	✓			✓								
Structured approach	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ease of application	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		✓
Flexible & scalable	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		✓

Table 2

Comparison elements (U – university)

Comparison elements	Country	PM practices
U1	Australia	PMBOK
U2	Australia	Thomsett Organization 3rd wave PM
U3	Australia	
U4	Australia	PMBOK
U5	US	
U6	UK	PRINCE2
U7	Australia	PMBOK
U8	US	PMBOK
U9	US	IPS
U10	US	
U11	US	PMBOK
U12	UK	APMBOK
U13	UK	PRINCE
U14	US	MSF
U15	US	Knapp & Moore

Industry Project Management Methodologies

The following organization specific customized methodologies reviewed in this category were all applied by well-established industry organizations (Tables 3 & 4). Analysis indicated that the majority of organizations developed the PMM for use in managing IT related projects as was the case for those methodologies applied in the academic institutions. Many of the PMM were designed internally by the organization's information service departments. The PMM were commonly considered to be mandatory guides that had to be followed when managing IT projects. These findings are apparently similar in academic institutions and government linked organizations perhaps due to the influences of project management in the IT sector (Betts & Lansley 1995, Crawford et al 2006, Themistocleous & Wearne 2000).

A review of these PMM found that some methodologies lacked the elements identified as essential to the management of projects. The most common missing elements included templates, checklists, hints and definitions. Furthermore, there are also questions raised of the PMM version, some had not been recently updated to integrate current best practice. Among all the PMMs, only one industry player (I10) adopted the PROPS approach that has been popularized for managing product development projects by Ericsson (Mulder 1997). Another industry player (I5) developed their PMM based upon the IBM RUP model which focused on agile methods. On the whole many industry players seem more comfortable with the adoption of PMI PMBOK, the industries de facto standard, when they designed their own PMM.

Table 3

Comparison between industrial PMM (I – industrial)

Comparison elements	I1	I2	I3	I4	I5	I6	I7	I8	I9	I10	I11
Project phases	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Project processes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Project types	All	All	All		IT	IT	IS	All	IS	All	All
Inputs /Activities	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Outputs/ Deliverables		✓	✓	✓		✓	✓	✓	✓	✓	✓
Tools & techniques	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Available templates	✓	✓			✓	✓				✓	✓
Checklists	✓		✓					✓		✓	
Hints and tips									✓		
Terms & definition	✓	✓				✓		✓		✓	✓
Frequent update		✓						✓	✓		✓
Structured approach	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ease of application	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Flexible & scalable	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Table 4

Comparison elements (I – industrial)

Comparison elements	Country	PM practices
I1	US	PMBOK
I2	US	
I3	US	PMBOK
I4		
I5	US	IBM RUP
I6	US	PMBOK
I7	US	
I8	US	PMBOK
I9	US	PMBOK
I10	Sweden	PROPS
I11	US	PMBOK

Governmental Project Management Methodologies

In reviewing PMM designed for implementation within the government sector it was found that the majority were designed in alignment with PMI PMBOK (Tables 5 & 6). Almost all of the PMM established could be applied to all types of projects inclusive of IT projects. Similarly, most methodologies consisted of unique project phases and processes. Each of the reviewed PMM was largely complete with appropriate activities, deliverables, tools, suggestions and techniques for project manager's guidance. The majority of the PMM in this category were well structured, organized and presented in a comprehensive guidebook.

Although these PMM were comprehensive, the lack of templates and necessary hints and tips to assist the project manager limit the value of these methodologies. This was also a concern identified from reviewing the academic and industry PMM. Another matter of concern was whether the PMM adopted were updated on a regular basis, it was common that the version of the PMI PMBOK guide (or similar) used to build the methodology was not cited. On the outlook, each PMM were uniquely established in different countries, standardized and regulated by an independent project management unit to guide, monitor, control and regulate the use of PMM in an organization.

Table 5

Comparison between governments' PMM (G – government)

Comparison elements	G1	G2	G3	G4	G5	G6	G7	G8
Project phases	✓	✓	✓	✓	✓	✓	✓	✓
Project processes	✓	✓	✓	✓	✓	✓	✓	✓
Project types	All	All	ITS		IT	All	All	All
Inputs /Activities	✓	✓	✓	✓	✓	✓	✓	✓
Outputs/ Deliverables			✓	✓	✓	✓	✓	✓
Tools & techniques	✓	✓	✓	✓	✓	✓	✓	✓
Available templates	✓	✓		✓		✓	✓	✓
Checklists	✓	✓	✓	✓	✓			
Hints and tips					✓	✓		
Terms & definition	✓	✓				✓	✓	✓
Frequent update			✓				✓	✓
Structured approach	✓	✓	✓	✓	✓	✓	✓	✓
Ease of application	✓	✓	✓	✓	✓	✓	✓	✓
Flexible & scalable	✓	✓	✓	✓	✓	✓	✓	✓

Table 6

Comparison elements (G – government)

Comparison elements	Country	PM practices
G1	US	PMBOK
G2	US	PMBOK
G3	US	
G4	Canada	PMBOK
G5	Australia	
G6	US	
G7	US	PMBOK
G8	Australia	PMBOK

Components of a Project Management Methodology

Globally there are over half a million published standards (Bredillet 2003, Garcia 2005), termed L1 methodologies in this work, which are recognized as guides to best practices and standards (Figure 1) (Chin & Spowage 2010). Analysis of the PMMs reviewed indicated that the most popular L1 best practice used to build the L3 organization specific customized methodologies was the PMI PMBOK followed by PRINCE2; while others L3 methodologies were based on APMBOK and PROPS.

It was evident that the use of project processes varies across organizations. Although the majority of processes integrated into a PMM are based upon the PMBOK guide, organizations recognize the importance of being unique in the market. Therefore it is common place to customize PMM process groups to suit their organization's practice. For example, Table 7 shows a list of the varied project management process group terms used across the three organizations

sector specific PMM. We found that the highest and most frequently used process groups in PMM were initiation, planning and closing processes.

Table 7

Process group occurrences across organization sectors

Process group	Number of occurrences
Initiation/definition	20
Planning	25
Executing/do it	16
Controlling/monitoring/track/manage	18
Closing/closeout/exit/finalise/completion/closedown/conclusion/finalise	25

Based on the review, only a few organizations integrate technology elements into their customized PMM. For example, U5 is outstanding in this regard as it embeds technical applications such as analysis tool, mathematical analysis, simulation, project management software, project management information system (PMIS), change control systems and a project tracking database into the methodology. In addition, with an increasing demand and accessibility of the information highway many organizations have set up a web based PMM for ease of use, especially when they are in a distributed project organizational environment. This popular technology tool was practiced by U11, U12, U15, G5 and I11.

Another component common to the majority of PMM examined was the various types of tools, techniques and templates embedded in the methodology. Table 8 shows the toolkits and templates utilized in the different process groups in all three organizational sectors reviewed. Across the PMM the project proposal was one of the most frequently used toolkits, and commonly placed in the initiation process. In the planning process, risk plans, communication plans and work breakdown structures were the three toolkits most frequently used in the majority of the PMM examined. In the execution and controlling process, change request plans seem to be a favorable toolkit. In the closing processes only a few organizations utilized the lesson learned reports and end project reports to finalize the end of the project.

Table 8

Usage of PMM toolkit and templates by organization sectors

Process group	PMM toolkit and templates	Number of occurrences
Initiation	Project proposal	5
	Project initiation document	3
	Kickoff meeting	3
Planning	Work breakdown structure	12
	Responsibility assignment matrix	3
	Scheduling	7
	Resource plan	7
	Budgetary plan	7
	Risk plan	19
	Risk log	8
	Stakeholder analysis	6
	Communication plan	18
	Quality plan	10
Execution & controlling	Change request plan	10
	Change request log	9
Closing	Lesson learned report	6
	End project report	7
	Acceptance signoff	5

Summary

The objective of this paper was to compare and discuss specific customized PMM across three sectors to elicit a common set of requirements. Although the organization specific PMMs reviewed differ; many have some commonality in terms of its processes, procedures, tools and deliverables. In concluding this study, these commonalities have been compiled and combined with the literature investigations and earlier studies (Chin & Spowage 2008a, 2008b) and the reviewed PMM discussed above:

1. It should facilitate the identification and management of risks and opportunities.
2. It should facilitate the clarification of goals and the scope of the project by incorporating the best practices of all project management group processes (Kroll & Royce 2005, MSF 2002), tools, techniques (Bolles 2002, Charvat 2003, Murch 2001) and templates to effectively plan and manage research projects.
3. It should create a project board to oversee, monitor and assess the research project progression.
4. It should be scalable and adaptable to project sizes; where it should be specific to the organization but customizable to individual projects (Charvat 2003, Chemma & Shahid 2005, Cockburn 2000a, MSF 2002).
5. It should leverage on the best practices of the specific environment/discipline to minimize obstacles and failure rate.
6. It must be in place to promote organizational learning (MSF 2002).
7. It should be based upon organization, governmental and sector specific standards and regulations (Charvat 2003, Josler & Burger 2005, Pitagorsky 2003, Turbit 2005, Wideman 2006).

8. It should model the work flow of typical project (Bolles 2002, Charvat 2003, Murch 2001, Turbit 2005).

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