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CONFERENCE PAPER

The study of association between organisational portfolios and project portfolio management practices

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Synopsis

Project portfolio management (PPM) strives to provide a holistic approach to organisational investment, strategic growth and the management of benefits realisation. Nevertheless, many organisations struggle to adopt PPM and efficiently manage different sizes of projects and portfolios as they only recognise the project types for associating the PPM practices. This study investigates the relationships of portfolio sizes to PPM practices within the Australian context.

Research design

In this research, quantitative data were collected from 64 portfolio managers in Australia using a survey. The data collected was classified into five categories of portfolios containing 26 variables of identified PPM practices. A nonlinear canonical correlation analysis was conducted to graphically illustrate the relationships between the 26 studied variables and their categories.

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Relevance for practice/education

The adoption of PPM for the holistic management of organisational investment, strategic growth and the management of benefits realisation can be explored for educational purposes.

Main findings

The analysis results indicated that the formation of PPM practices around the portfolio sizes was diverse. The medium-low to medium-high levels of several PPM practices were performed in the portfolios valued from AU$1 million to AU$100 million. On the other hand, the disintegration of PPM practices was evident in the portfolios greater than AU$ 1 billion.

Research implications

This study provides a further understanding of the association between portfolio sizes and practices of PPM in assisting organisations select practices suitable for the size of the portfolio.

Keywords

Project Portfolio Management (PPM), PPM Practices, Organizational Portfolios, Project Management

Introduction

Project portfolio management (PPM), as defined by Project Mangement Institute (PMI 2013b), is the coordinated management of projects and programs to achieve organisational strategies and objectives. According to AXELOS (2011), management of portfolios (MoP) is "a coordinated collection of strategic processes and decisions that together enable the most effective balance of organizational change and business as usual." Despite the PPM knowledge and standards that have been published to provide a greater understanding of effective PPM practices, the implementation of PPM practices remains a challenge to manage diverse sizes and types of their projects and portfolios (Costantino, Di Gravio & Nonino 2015). This is due to the complex nature of PPM, which aims to contribute to the holistic management of organizational investment, strategic growth and the management of benefits realisation (Patanakul 2015). The factors related to PPM implementation are numerous and should be all be taken into consideration in the planning stages. Although project types have been taken into consideration prior to the selection of PPM practices (Blomquist & Müller 2006), the relations of portfolio sizes to PPM practices and selection have not been evidently discussed. Furthermore, it was suggested that practising PPM should be appropriately customised to individual situations, as different practices are required in different contexts (Martinsuo 2013). To have a broader understanding of PPM performance in a specific context, this study was undertaken to highlight the relationships between sets of PPM practices and the portfolio sizes, using the Australian industry sectors as the research target.

This research paper is constructed in five sections. The next section, the literature review, demonstrates an overview of the fundamental concepts and industry practices of PPM. The third section summarises the research methodology. The fourth section presents the analysis of the quantitative data collected from 64 portfolio managers within the Australian context. Within this section, categories under each variable of PPM practices were further examined to determine the correlations between the levels of PPM performance that may associate to different sizes of organisational portfolios. A nonlinear canonical correlation analysis was

conducted to graphically illustrate the relationships between the 26 studied variables and their categories. The last section discusses the implications of this research and concludes the study objectives with some directions for future research.

Project portfolio management concepts and practices

Project portfolio management (PPM) is defined as "a component collection of programs, projects, or operations managed as a group to achieve strategic objectives" (PMI 2013b, p. 3). From the given definition, it can be seen that effective PPM relies on effective management of its components to deliver outputs that align with the organisational objectives. The study of Thomas et al. (2002) confirmed the need to align project delivery capability with corporate strategy. According to Crawford, Hobbs & Turner (2006), the decision-making processes for project portfolio selection, as well as tools and capability to carefully select the projects that achieve the desired benefits, can impact project success. Furthermore, the organisational management must aim to optimise available resources and manage the level of project and portfolio risks, as well as provide strategic alignment in the governance of projects.

Acknowledging the significance of aligning projects with the corporate strategies, *PMI's Pulse of the Profession In-Depth Report: Success Rates Rise* (PMI 2017) highlighted the project failure rates of projects that did not meet the organisational goals and business intent. The report stated that the rates continue, with 17% of projects failing outright. Furthermore, it was estimated that for every US$1 billion spent on a failed project, $97 million is lost forever. The concept of project portfolio management (PPM) is based on theories of portfolio selection and originates from the area of finance and investment in *The Standard Portfolio Management* for portfolio management. The third edition of PMI's portfolio management standard includes portfolio management process groups (defining, aligning and authorizing controlling groups) and five knowledge areas (strategic management, governance management, performance management, communication management and risk management) (PMI 2013b), which aims to cover a wide range of practices for any organizational type and portfolio size. Despite the existence of PPM standards and practices, the PPM delivery remains a challenge. This could result in failing business alignment, monetary losses, unmet productivity and decreased morale of project stakeholders (Patanakul 2015). Martinsuo (2013) pointed out that the lack of awareness of practices and context could be one of the key explanations why organisations still struggle with resource sharing and constant changes in their portfolios. As a result, the success of portfolio management falls behind expectation. According to Voss and Kock (2013), the success of PPM can be evaluated from overall business success, average project success, future preparedness, use of synergies, strategic fit and portfolio balance. It was further suggested that portfolio value should be monetarily and non-monetarily taken into consideration. The larger a portfolio becomes, the more that better alignments with organisational objectives and PPM practices are required. The recent *PMI's Pulse of the Profession* (PMI 2017) reveals that only 62% of strategic initiatives (organisation's projects) met their goals. The report further states the most important factors for strategic initiative failure:

- Lack of clearly defined and/or achievable milestones and objectives to measure progress
- Poor communication
- Lack of communication by senior management
- Employee resistance
- Insufficient funding

It was noticed that the report only demonstrates the worldwide results, not those of individual countries.

Research methodology

Using literature as a foundation, the study was conducted to investigate the relationship between the four sets of PPM practices containing overall 26 related factors. Sixty-four respondents from different Australian sectors participated in the survey conducted in this research. The percentage of research respondents per sector is displayed in Figure 1.

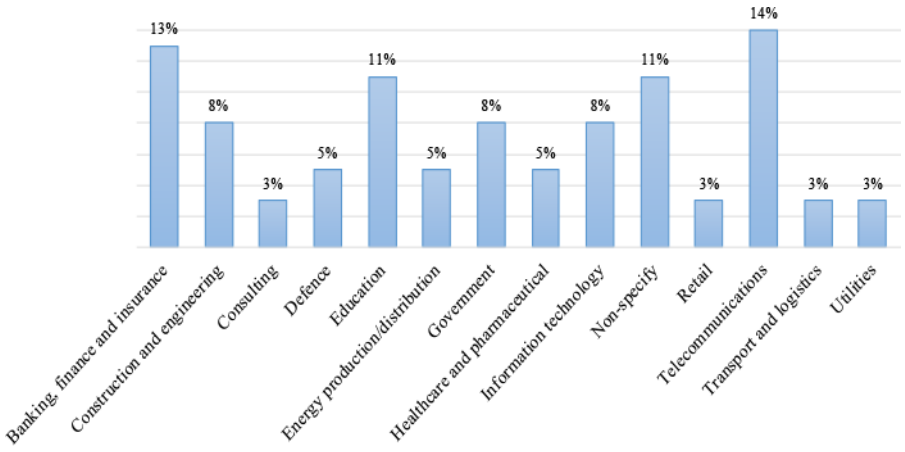

Figure 1 Percentage of respondents per Australian industry sector (in alphabetical order)

The respondents in this research have differing years of experience managing organisational project portfolios, ranging from less than one year to greater than 10 years, as seen in Figure 2.

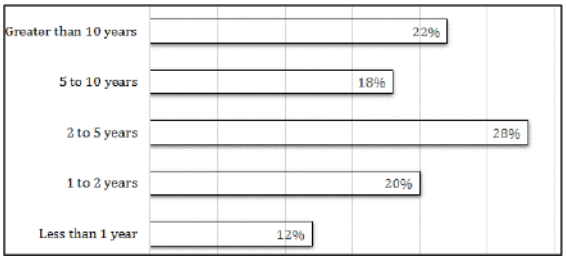

Figure 2 Years of experience in project portfolio management

The collected data were categorical data, which allowed a nonlinear canonical correlation analysis to be performed; this form of analysis is named as OVERALS which represents a short name for more than two sets of variables. The use of OVERALS analysis is suitable for evaluating the associations between two or more sets of categorical variables (nominal or ordinal scaling level) (Meulman & Heiser 2012). The analysis aimed to reveal the complex relationships among the studied organization portfolio sizes that were believed to be contributing to practising PPM. The formulation of OVERALS was conducted using the Statistical Package for Social Sciences (SPSS) toolset.

To perform OVERALS, the data collected were categorised into five sets, with an aim to identify and simplify the practices for the implementation of PPM within an organisation, as presented in Table 1, in which 26 variables were analysed. The five sets of practices identified were as follows:

- Portfolio size
- Project portfolio inventory
- Project portfolio analysis

- Portfolio planning and prioritisation
- Portfolio management and control in an ongoing cycle

The results obtained from OVERALS included the loss index, eigenvalues, fit index and component loading index. The component loadings were demonstrated within a two-dimensional graph for each plotted variable. The plot of centroids was generated to view categories under each variable.

Table 1 Variable coding

Set	Variable	Number of Categories	Variable Type	Category Symbol
1. Organizational Portfolio Size	Portfolio size	7	Nominal	P1
2. Project Portfolio Inventory	List current project status	4	Ordinal	P21
	Organize projects in categories	4	Ordinal	P22
	Document information about available resources, roles, costs and skills required	4	Ordinal	P23
	Calculate expected business value of projects (e.g. NPV, IRR)	4	Ordinal	P24
	Calculate project risk levels	4	Ordinal	P25
	Identify inter-project dependencies and conflicts	4	Ordinal	P26
	Establish a central repository to capture all project information	4	Ordinal	P27
3. Project Portfolio Analysis	Map projects to business strategy	4	Ordinal	P31
	Model alternative project portfolios	4	Ordinal	P32
	Establish a process for optimising the project portfolio	4	Ordinal	P33
	Analyse and present projects that are above criteria for approval before commencing the projects	4	Ordinal	P34
	Establish a quality process to verify information presented in business cases	4	Ordinal	P35

Table 1 continued

4. Project Portfolio Planning and Prioritization	Provide enough resources to make project portfolio achievable	4	Ordinal	P41
	Create plans from a portfolio perspective	4	Ordinal	P42
	Validate project estimates with detailed task plans and budgets	4	Ordinal	P43
	Review and validate project and portfolio	4	Ordinal	P44
	Assess dependencies with other projects in the portfolio	4	Ordinal	P45
5. Project portfolio management and control	Monitor project performance	4	Ordinal	P51
	Summarise and present project performance data to senior management in an executive dashboard	4	Ordinal	P52
	Balance resources capacity and demand actively	4	Ordinal	P53
	Undertake portfolio review and replanning	4	Ordinal	P54
	Review project alignment with strategy periodically	4	Ordinal	P55
	Check project portfolio against shifting business, technology and market conditions	4	Ordinal	P56
	Optimise project portfolio to lead changes	4	Ordinal	P57
	Use a tool that easily accessible to assess the quality of portfolio status in real time	4	Ordinal	P58

Research analysis

The results of the survey analysis produced by OVERALS are demonstrated in Table 2. The fit and loss values show how well this form of analysis fits the optimally quantified data with respect to the association between sets (Meulman & Heiser 2012). Loss values indicated the percentage of variation in object scores that were not explained by the current model (Garson 2012). Whereas the average loss values of the two dimensions are 0.178 and 0.201, respectively, the average loss over sets is 0.379. This indicated the average loss or the difference between the perfect and the modelled relationship.

Table 2 The compliance values of the analysis

		Dimension		Sum
		1	2	
Loss	Set 1	0.178	0.452	0.630
	Set 2	0.047	0.064	0.111
	Set 3	0.531	0.274	0.804
	Set 4	0.067	0.116	0.183
	Set 5	0.066	0.100	0.166
	Mean	0.178	0.201	0.379
Eigenvalue		0.822	0.799	
Fit				1.621

The eigenvalue in each dimension represents the value of 1 minus the average loss of the dimension, as shown in Table 2. The percentage of actual fit of the dimension can be determined by the value of eigenvalue over the fit value in the "Sum" column, that is, the actual fit among the sets of variables in the first dimension is 0.822/1.621 = 50.7%. The maximum potential relationship over sets associated with the current model can be calculated by dividing the fit value by the total dimensions. The analysis shows that the maximum potential relationship of the current model is 1.621/2 = 81.05%. Canonical correlations of the first and second dimensions were calculated as 0.78 and 0.75, respectively. The correlation values suggest strong relationships between the portfolio size and PPM practices. These correlations (ρ) of more than two data sets per dimension were obtained from the given formula below:

$$\rho d = [(K \times E_d) - 1/(K-1)]$$

where d is the dimension number, E is the eigenvalue, and K is the number of sets.

The loading of all variables is displayed in Table 3.

Table 3 OVERALS component loadings

Set		Dimension	
		1	2
1	P1: Portfolio size	0.246	**0.514**
2	P21: List current project status	0.159	0.058
	P22: Organize projects in categories	0.208	0.448
	P23: Document information about available resources, roles, costs and skills required	0.558	**0.664**
	P24: Calculate expected business value of projects (e.g. NPV, IRR)	–0.011	0.290
	P25: Calculate project risk levels	**0.961**	0.111
	P26: Identify inter-project dependencies and conflicts	0.902	–0.355
	P27: Establish a central repository to capture all project information	0.334	0.292

Table 3 continued

3	P31: Map projects to business strategy	0.398	**0.734**
	P32: Model alternative project portfolios	0.565	0.517
	P33: Establish a process for optimising the project portfolio	**0.667**	–0.065
	P34: Analyse and present projects that are above criteria for approval before commencing the projects	.232	.493
	P35: Establish a quality process to verify information presented in business cases	0.551	0.643
4	P41: Provide enough resources to make project portfolio achievable	0.196	0.038
	P42: Create plans from a portfolio perspective	0.207	0.032
	P43: Validate project estimates with detailed task plans and budgets	0.244	0.363
	P44: Review and validate project and portfolio	0.567	**0.759**
	P45: Assess dependencies with other projects in the portfolio	**1.092**	–0.551
5	P51: Monitor project performance	0.275	0.384
	P52: Summarize and present project performance data to senior management in an executive dashboard	0.090	0.196
	P53: Balance resources capacity and demand actively	0.286	0.578
	P54: Undertake portfolio review and replanning	0.348	0.505
	P55: Review project alignment with strategy periodically	**0.384**	0.335
	P56: Check project portfolio against shifting business, technology and market conditions	0.246	0.448
	P57: Optimize project portfolio to lead changes	0.375	**0.693**
	P58: Use a tool that is easily accessible to assess the quality of portfolio status in real time	0.328	0.290

As seen in Table 3, the values listed in each dimension indicate correlations between object scores and optimal scaled variables. The two-dimensional component loadings are plotted in Figure 3. The ratio of distances from the origin to each variable in the component loadings is the ratio of importance of the variables (Garson 2012). When there is no lost data, the component loadings perform closely to Pearson correlations. As seen in Figure 3, the component loadings indicated that *Calculate project risk levels (P25)*, *Identify inter-project dependencies and conflicts (P26)*, *Map projects to business strategy (P31)*, *Review and validate project and portfolio (P44)*, and *Assess dependencies with other projects in the portfolio (P45)* were the most effective variables in relationship among variable sets as they were plotted in the distance from the origin. On the other hand, *List current project status (P21)*, *Calculate expected business value of projects (P24)*, *Provide enough resources to make project portfolio achievable (P41)*, *Create plans from a portfolio perspective (P42)* and *Summarize and Present project performance data to senior management in an executive dashboard (P52)*, which clustered around the origin, were the least effective variables.

The examination of the relationships between the organisational portfolio sizes and PPM practices found that Analyse and present projects that are above criteria for approval before commencing the projects (P34) and Balance resources capacity and demand actively (P53) were positioned in proximity to Portfolio size (P1). The Portfolio size (P1) was also surrounded by

Organize projects in categories (P22), Undertake portfolio review and replanning (P54), and Use a tool that is easily accessible to assess the quality of portfolio status in real time (P56).

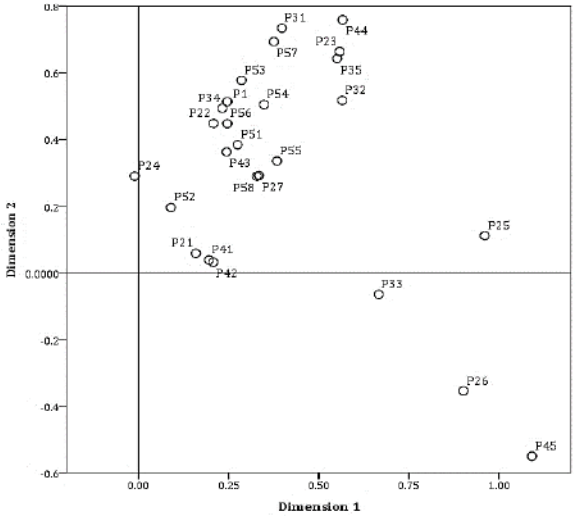

Figure 3 Two-dimensional component loadings

A plot of centroids was labelled according to the categories of the variables. The plot allows a close examination of the relationships between variables through clusters of categories, as shown in Figure 4.

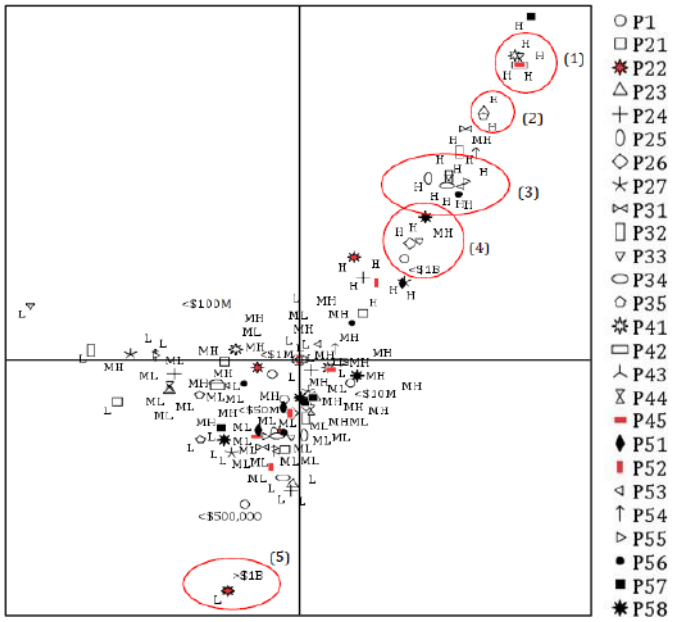

Figure 4 Centroids plot

It is evident in Figure 4 that the first group of association (1) presents an effective formation of relationships at the high level of PPM practices between *Establish a process for optimizing the project portfolio (P33)*, *Provide enough resources to make project portfolio achievable (P41)*, *Create plans from a portfolio perspective (P42)* and *Assess dependencies with other projects in the portfolio (P45)*. These relationships are also intimately connected to the high level of *Optimize project portfolio to lead changes (P57)*. The second effective formation (2) of PPM practices was between the high level of *Document information about available resources, roles,*

costs and skills required (P23) and *Establish a quality process to verify information presented in business cases (P35)*. The third group (3) contained high PPM practices of *Calculate project risk levels (P25)*, *Model alternative project portfolios (P32)*, *Establish a process for optimizing the project portfolio (P33)*, *Analyse and present projects that are above criteria for approval before commencing the projects (P34)*, *Balance resources capacity and demand actively (P53)*, *Review project alignment with strategy periodically (P55)* and *Check project portfolio against shifting business, technology and market conditions (P56)*. They were firmly positioned next to the high level of *Undertake portfolio review and replanning (P54)*. The last effective group (4) within the top right corner was formed between high practices of *Identify inter-project dependencies and conflicts (P26)* and *Establish a process for optimising the project portfolio (P33)*, which closely positioned to the organisation portfolio with AU$100 million to AU$1 billion.

The study also found that the centroids plot demonstrates the relationship between low performance in *Organize projects in categories (P22)* commonly occurred to the portfolio size greater than AU$ 1 billion. The portfolio sizes less than AU$500,000, positioned in the lower left quadrant, and less than AU$100 million had no close relationship to any specific categories of PPM practice variables. On the other hand, the portfolio sizes greater than AU$10 million and AU$50 million strongly formed relationships with several medium-low to medium-high performance in PPM practices.

Conclusion

This research provides significant findings for the implementation of portfolio management to assist organisations with the adoption of PPM for the holistic management of organisational investment, strategic growth and the management of benefits realisation. It provides a further understanding of the association between portfolio sizes and practices of PPM to assisting organisations select practices suitable for the size of the portfolio. The research findings were carefully analysed and briefly explained, with supporting graphs presented. This paper applied the nonlinear canonical analysis or OVERALS to visualise and examine the relationships between the PPM practice variables and the formation of the variable categories using graphical presentations. Twenty-six variables of identified industry practices were grouped into five phases of PPM implementation. Each dataset was treated for any missing data and coded into the SPSS OVERALS tool. The results showed an association between different sizes of portfolio and levels of PPM practices. However, the formation of PPM practices around the portfolio sizes was found to be diverse. The medium-low to medium-high levels of several PPM practices were performed in the portfolios valued from AU$1 million to AU$100 million. On the other hand, the disintegration of PPM practices was evident in the portfolios from AU$ 1 billion and greater. These results may align with the findings published in the *PMI's Pulse of the Profession* 2017 that PPM implementation is still facing a challenge of bridging the gap between strategy formulation and day-to-day implementation. A recommendation for future research is to investigate the causes and effects of disintegration between portfolio sizes and PPM practices from holistic and industry-specific perspectives.

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