ISSN: 2278-3369

International Journal of Advances in Management and Economics
Available online at: www.managementjournal.info

REVIEW ARTICLE

Organisational Capability, Resilience and the Principles of Portfolio Management: An Overview

Nick Hadjinicolaou[1*], Mohamad Kader[2], Ibrahim Abdallah

Torrens University Australia.

***Corresponding Author: Nick Hadjinicolaou**

Abstract : This paper examines the traditional and contemporary views of organisational capability and resilience by comparing it with the approaches undertaken in project portfolio management. The definition and application of project portfolio management principles are reviewed and compared with managerial decision-making including decisions of strategy or those that impact organisational resilience. The paper proposes that organisational capability and resilience can be enhanced by applying concepts from the management of project portfolios and it presents concepts that can be further researched to develop a holistic strategy model for organisations.

Keywords: *Organisational capability, organisational resilience, project portfolio management, strategy and portfolio management.*

Article Received: 10 June 2021 **Revised: 22 July 2021** **Accepted: 19 August 2021**

Introduction

The area of project portfolio management (PPM) has increased in popularity over the last decade in both organisations and academia. PPM is generally considered as the best improvement in project management since the development of methods in the 1950s [1]. Several recent studies, including the work of Guo and Yu [2], have investigated the necessity of PPM. Other disciplines, including financial portfolio management, research and development (R&D), and product portfolio management have influenced project portfolio management.

A large body of research exists that examines the mechanisms by which project portfolio management principles may be applied in a business setting. There also exist a number of challenges which include unforeseen disruption and the need for adaptability to uncertainty and changes in environmental conditions for organisations that have arisen post COVID-19. These challenges have created a need for a holistic view to identify ways in which organisations can re-create or enhance capability and improve resilience through PPM.

Concepts in Project Portfolio Management and Organisational Capability

Financial portfolio management is a discipline that has significantly influenced PPM and is frequently referenced by PPM literature. More specifically, modern portfolio theory (MPT), developed by Markowitz [3, 4] and refined in the context of the Capital Asset Pricing Model (CAPM) by Sharpe [5], created the basis for modern financial portfolio management.

Research and development (R&D) and product portfolio management have provided a foundation for both the product life cycle and the techniques applied in project portfolio management and the prioritisation and selection of projects. The work of Cooper, Edgett and Kleinschmidt [6] on product portfolio management has frequently been cited in the PPM literature [6, 7, 8]. Many of the principles applied to product portfolio management have also been applied and advanced project portfolio management (PPM).

These include R & D project selection approaches [9], introduced in the 1960s, that include mathematical programming, benefits measurement and contribution methods, as well as ad hoc approaches used for the assessment of feasibility and risk which are now part of PMI's [10-15] standard for project portfolio management. PPM and the development of standard approaches has been influenced by several other disciplines, including financial portfolio management, R&D and product portfolio management. The development and adoption of a standard approach to managing project portfolios continues to grow as organisations see the value of project portfolio management [16-18].

Over more than half a century, the project management profession globally has matured considerably [19, 20] and has been recognised as a component of macroeconomic relevance [21]. In the past 15-20 years, the development of standards, industry certifications and research in PPM have also become significant areas. Standards bodies involved with industry certifications and the revision of editions of PPM standards include the Project Management Institute (PMI), AXELOS and the Association for Project Management (APM), the International Project Management Association (IPMA) and the International Organization for Standardization (ISO). Each of these standards bodies have multiple standards in areas of project, program, and portfolio management each with their own certifications. There are commercial interests for these standards bodies at stake as they complete globally for training and industry certifications. Organisations are often confused on how to best implement project portfolio management and some of the differences between the standards. In the following sections some of the differences in definitions used and aspects of their standards to deliver a PPM framework that can be used to implement PPM are explored.

Project Portfolio and PPM Defined

Artto, Martinsuo and Aalto [22] define 'a project portfolio' as a collection of projects carried out in the same business unit and sharing the same strategic objectives and the same resource pool. PMI's *Standard for Portfolio Management* (4th edition) shows the composition of a portfolio [14] comprising sub-portfolios, programs, projects and operations. The context of this paper is at the portfolio level rather than projects, programs and operations.

Many definitions can be found for the terms 'project portfolio and project portfolio management (PPM)' with several authors concluding that no uniform understanding or scope currently exists [23-25].This definitional inconsistency is further extended with the term 'portfolio of projects' meaning something different to the PPM process and life cycle. The term "portfolio of projects" can often be interpreted as being the same as a general term like the "portfolio of investments" causing further confusion to the term PPM. Table 1 summarises the *Standard for Portfolio Management* by PMI [26-29] defines a 'project portfolio' as 'A collection of projects or programs and other (operational) work that are grouped together to facilitate effective management of that work to meet strategic business objectives. The APM, IPMA and AXELOS do not make reference to operational work with each of the standard bodies having a broad guideline of the work needed to meet strategic goals.

Table 1: Summary of definitions of a project portfolio

Standards Body	Definition of a Project Portfolio
PMI [10]	A collection of projects, programs, subsidiary portfolios, and operations managed as a group to achieve strategic objectives.
PMI [28]	A collection of projects or programs and other work that are grouped together to facilitate effective management of that work to meet strategic business objectives. The projects or programs of the portfolio may not necessarily be interdependent or directly related.
APM [30]	A grouping of an organisation's projects and programs. Portfolios can be managed at an organisational or functional level.

IPMA [31,32]	A set of projects and/or programs that are not necessarily related, brought together for use of the organisation's resources and to achieve the organisation's strategic goals while minimising portfolio risk.
AXELOS [33-36]	The totality of an organisation's investment (or segment thereof) in the changes required to achieve its strategic objectives.
ISO ISO 21504 [37,38]	A collection of portfolio components grouped together to facilitate their management to meet, in whole or in part, an organisation's strategic objectives. The components could be projects, programs, (sub-) portfolios and other related work.

When looking deeper into the definitions of PPM, The *Standard for Portfolio Management* by PMI [28] defines 'project portfolio management' as 'the management and coordination of one or more organisational portfolios (i.e. component collections of programs, projects or operations) to achieve strategic objectives. Other definitions of the term 'project portfolio management' are summarised in Table 2.

Table 2: PPM definitions

Standards Body	Definition of PPM
PMI	Refers to the centralised management of one or more portfolios to achieve strategic objectives. Portfolio management focuses on ensuring that projects and programs are reviewed to prioritise resource allocation, and that the management of the portfolio is consistent with and aligned to organisational strategies
APM	"[T]he selection, prioritisation, and control of an organisation's projects and programmes in line with its strategic objectives and capacity to deliver. The goal is to balance change initiatives and business as usual while optimising return on investment".
IPMA	Coordinating the projects and programs of an organisation to optimise throughput, balance the risk profile of the portfolio and manage the alignment of projects in relation to the organisational strategy and their delivery within budgetary constraints
AXELOS	"A coordinated collection of strategic processes and decisions that together enable the most effective balance of organizational change and business as usual".
ISO	A set of interrelated organisational processes and methods by which an organisation allocates resources to implement its strategic objectives. It aligns the portfolio components with an organisation's strategic objectives, stakeholder priorities and values such as sustainable practices and ethical principles.

Portfolio components should be continuously identified, evaluated, selected and authorised, with the portfolio's status and performance regularly reported to effectively manage the portfolio. The definitions above are reasonably consistent with APM and AXELOS, also making reference to balancing operational or business-as-usual activities.

It is through the application of this PPM process and a holistic approach with a continuous feedback loop that organisational agility and resilience can be enhanced and project success rates improved.

The adoption and agreement on how project success and project portfolio management is defined, is an important consideration for this paper. The definition of project success requires not only how this will be measured by when this will be measured in the context of agility and adaptation to unforeseen threats.

Project success can defined in several ways and can be judged over different time-scales, has been outlined below and adopted from Shenhar and Dvir [39]:

- Project efficiency (end of project)
- Team satisfaction (end of project)
- Impact on the customer (months following the project)
- Business success (years following the project)

- Preparing for the future (years following the project)

The definitions of project and portfolio management to be used in this paper are those of the PMI:

Project management is the application of knowledge, skills, tools and techniques to project activities to meet the project requirements [26].

Portfolio management refers to the centralised management of one or more portfolios to achieve strategic objectives. Portfolio management focuses on ensuring that projects and programs are reviewed to prioritise resource allocation, and that the management of the portfolio is consistent with and aligned to organisational strategies (PMI, [26,14].

Also of relevance to the current study are the following project and portfolio management office definitions:

- A **project management office** (PMO) is a management structure that standardises the **project**-related governance processes and facilitates the sharing of resources, methodologies, tools and techniques. It is a group within an organisation set up to perform functions to assist the management and support of projects [28].
- A **portfolio management office** (PfMO) is a management structure that standardises the **portfolio**-related governance processes and facilitates the sharing of resources, methodologies, tools and techniques. A group within an organisation is set up to perform functions to assist the management and support of portfolios [28].

Portfolio managers are responsible for executing the PPM process. Their responsibilities include, but are not limited to: establishing and maintaining the methodology and processes; selecting, prioritising and managing portfolio components; establishing and maintaining portfolio infrastructure and systems; reviewing, reprioritising and optimising the portfolio; measuring and monitoring portfolio performance and value; supporting management decision making; and influencing sponsorship engagement [28].

The role of PPM is crucial not only at the organisational level but also at the project level. According to Killen et al. [25], the processes of PPM aim to improve the project success rate through creating a holistic and responsive decision-making environment to maximise the long-term value of the project portfolio. Pajaresa and López [40] describe the influence of the forward and backward interrelationships between projects and PPM especially on the aspects of cost and risk management. It is this decision making process that improves organisational agility and resilience.

Project Portfolio Change Management and Organisational Capability

Project and organisational change management is a large component of organisational agility and the adaptation to uncertainty as it is concerned with changes that will impact on an organisation as a result of project, programs and portfolios. Organisations can only change if people embrace the change [29]. Not only does one need to understand the "as is" and "to be" states but also "how one person makes the change" [29]. At the portfolio level, consideration of the alignment of strategy and ways in which the "to be state" will be achieved for the successful outcomes of a portfolio and benefits realisation.

There are several organisational change models that can be applied which include Lewin's change management model; McKinsey's 7-S model; Kotter's theory; Nudge theory; the ADKAR model (awareness, desire, knowledge, ability, reinforcement) [41].

Bridges' transition model; Kübler-Ross' change curve; and the Satir change management model [42]. Todnem By [42], after conducting a critical review of organisational change management, stated that organisational change cannot be separated from organisational strategy and as PPM involves the implementation of strategy, it becomes an important component of project success.

The ADKAR model outlines the following five building blocks to achieve successful change management: 1) awareness – employees must be made aware of the need for change; 2) desire-employees must have the desire to participate and fully support the change; 3)

knowledge-by gathering knowledge about the change process, the goal of the change will become clear for employees; 4) ability-the ability to learn new skills and bring about acceptance of the change by managing behaviour; and 5) reinforcement-to sustain the change and make it clear for all employees that there is no turning back.

From and organisational perspective change occurs in two dimensions: the organisation and the employees. It can only be successful if the change takes place simultaneously in both dimensions. Furthermore, any implementation of PPM and development of a framework will require consideration of change management and use of the appropriate change management model and tools to support project success.

Project portfolio risk management includes considerations for key dependencies, such as resources, technical complexity, market opportunity, legal/regulatory risks and investment thresholds. These should be identified and monitored closely due to their possible impact on portfolio performance. Project portfolio stakeholder management includes components of governance and the management of key stakeholders for the success of the portfolio. Both portfolio risk and stakeholder management are key elements of improving organisational agility and resilience for project success, Table 3 shows the search conducted as part of this paper to identify project portfolio management definitions and evaluations pertinent to organisational capability and project success.

Table 3: Literature review search results

Search Criteria	Google Scholar Initial search (2007–2014)	Google Scholar Subsequent search (2007–2018)
"project portfolio management"	361	513
"project portfolio management" + "project success"	9	14
"project portfolio management" + "project success" + "portfolio management office"	1	1

The fourteen articles that explored PPM and project success are listed in Table 4 below.

Table 4: Literature search key focus areas

Author	Title	Key Focus Areas
1. Unger, Gemünden, & Aubry [43] (Article retrieved using all three criteria and included in total of 14 in date range of 2007-2018)	The three roles of a project portfolio management office: Their impact on portfolio management execution and success.	• PfMO roles • PPM execution and success
2. Meskendahl [44] (14 articles retrieved using two criteria of "project portfolio management" + "project success" which include #1)	The influence of business strategy on project portfolio management and its success—A conceptual framework.	• Business strategy • PPM success
3. Heising [45]	The integration of ideation and project portfolio management-A key factor for sustainable success.	Ideation and PPM success
4. Voss [46], Voss & Kock [47]	Impact of customer integration on project portfolio management and its success-Developing a conceptual framework.	PPM success

5. Beringer, Jonas & Kock [48]	Behaviour of internal stakeholders in project portfolio management and its impact on success.	. PPM stakeholders
6. Teller & Kock [49], Teller et al. [50]	An empirical investigation on how portfolio risk management influences project portfolio success.	. Portfolio risk management and PPM success
7. Teller [51]	Portfolio risk management and its contribution to project portfolio success: An investigation of organisation, process, and culture.	. Portfolio risk management and PPM success
8. Jonas [52], 53. Jonas, D., Kock, A., & Gemünden [53]	Predicting project portfolio success by measuring management quality—a longitudinal study.	. PPM success and quality measurement
9. Doloi & Baradari [54]	Impact of applying project portfolio management on project success.	. PPM project success
10. Hadjinicolaou & Dumrak, [55]	Investigating association of benefits and barriers in project portfolio management to project success.	. Association on benefits and barriers of PPM to project success
11. Hadjinicolaou, Dumrak & Mostafa [56]	Improving project success with project portfolio management practices.	. PPM practices and project success

One area that had not been extensively explored and a gap in research was the relationships between portfolio management practices, portfolio management offices (PfMOs) and project success.

Papers were subsequently published in 2015 by Costantino, Di Gravio & Nonino [57] on PPM and critical success factors which proposes an artificial neural network model to assess projects during the selection phase. It describes the design, development and testing of a decision support system to predict project performance by classifying the level of readiness using the project manager's experience of past projects [57, 10-14]. The selection phase is one phase of the PPM lifecycle and the focus of this paper was on a decision support system rather than PPM practices and project success.

The above publications have focussed on PPM, PPM practices have identified results that may possibly be used in an organisational capability context. The literature review indicates that the use of PPM practices varies and needs to be adapted to organisational situations, according to the types and size of pipeline of projects and environmental complexities. Elonen and Artto [58] identified managerial problems associated with PPM which include: inadequate project activities; lack of resources, competencies and methods; lack of management support; unclear roles and responsibilities; inadequate portfolio level of activities; inadequate communication with management regarding projects; and inadequate management of the project orientation. Some organisations have used portfolio and project management offices (PfMOs and PMOs) to overcome some of the challenges identified by Elonen and Artto [58]. Several definitions and names are used for PMOs, these organisational structures that provide support; standardise project-related governance and processes, and facilitate the sharing of resources, methodologies, tools and techniques for projects [28].

Some PMOs are also program and portfolio management offices (PgMOs and PfMOs) and are used to support PPM functions. Several papers have been published that relate to PMO models [59-62] frequent transformations

(Aubry et al., [63], PMO typologies [61]; governance and communities of PMOs (Cooper et al., [64]; Killen et al., [25]; PMI, 2012); PMO patterns of change [65-68]; PMOs and organisational performance [65]; and

PMOs and change [69-70]. Table 5 presents the nine capabilities of a portfolio management office (PfMO) identified by the *PMO Quick Tip Guide* (PMI, n.d.).

The significance of each capability to the PfMO is indicated, ranging from 'critically required' to 'moderately important', as described in Table 5.

Table 5: Capabilities of the PfMO and their significance

Capabilities	Significance to PfMO
C1 Standards, Methodologies & Processes	Critically Required
C2 Project/Program Delivery Management	Moderately Important
C3 Portfolio Management	Critically Required
C4 Talent Management	Critically Required
C5 Governance/Performance/Benefits Realisation Management	Critically Required
C6 Organisation Change Management	Critically Required
C7 Administration and Support	Moderately Important
C8 Knowledge Management	Critically Required
C9 Strategic Planning	Critically Required

Source: PMI (n.d.)

Each capability and its level are dependent on the level of project and portfolio management maturity. The capabilities of project and program delivery management, as well as administration and support, are seen as moderately important at the portfolio level (however, they are critically important at the project level). Other functions within a PfMO might also include [71-73].

Conclusion

This paper has examined the traditional and contemporary views of organisational capability and resilience by comparing it with the approaches undertaken in project portfolio management. It is proposed that applying project portfolio management principles and practices supports managerial decision making to improve organisational agility and resilience.

Further to this project portfolio management supports strategy formation, execution, stakeholder engagement and governance. This will be further researched to develop a holistic strategic model for the application of project portfolio management in organisations to improve the likelihood of project success and overall organisational success.

References

1. Petrinska-Labudovikj, R. (2014) Project portfolio management in theory and practice. MEST Journal, 2(2):192-203.
2. Guo, N., Yu, S. (2013) The necessity of project portfolio management in the construction industry of China mainland. Applied Mechanics and Materials, 357-360:2238-2241.
3. Markowitz, H. (1952) Portfolio selection. The Journal of Finance, 7(1):77-91.
4. Markowitz, H. M. (Ed.) (1959) Portfolio selection: Efficient diversification of investments. New Haven, CT: Yale University Press.
5. Sharpe, W. F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. Journal of Finance, 19(3), 452-442.
6. Cooper, R. G., Edgett, S. J., Kleinschmidt, E. J. (2004) Benchmarking best NPD practices-II. Research Technology Management, 47(3):50-59.
7. Cooper, R. G. (2005). Winning at new products: Pathways to profitable innovation (pp. 125). Redmond, WA: Microsoft Corp.
8. Cooper, R. G., Edgett, S. J., Kleinschmidt, E. J. (2001a) Portfolio management for new products. Cambridge, MA: Basic Books.

9. Hall, D. L., Nauda, A. (1990) An interactive approach for selecting IR&D projects. IEEE Transactions on Engineering Management, 37(2):126-133.
10. Project Management Institute (PMI) (2017a). A guide to the project management body of knowledge (PMBOK® Guide) (6th edn). Newtown Square, PA: Project Management Institute.
11. Project Management Institute (PMI) (2017b) Pulse of the profession®: In-depth report: Success rates rise. Newtown Square, PA: Project Management Institute.
12. Project Management Institute (PMI) (2017c) The drivers of agility: Engaging people and building processes to accelerate results. Newtown Square, PA: Project Management Institute.
13. Project Management Institute (PMI) (2017d) Pulse of the profession®: Achieving greater agility – the people and process drivers that accelerate the results. Newtown Square, PA: Project Management Institute.
14. Project Management Institute (PMI) (2017e) The standard for portfolio management (4th edn). Newtown Square, PA: Project Management Institute.
15. Project Management Institute (PMI) (2018) The standard for organisational project management (OPM). Newtown Square, PA: Project Management Institute.
16. Kerzner, H. (2001) Strategic planning for project management using a project management maturity model. New York, NY: John Wiley & Sons.
17. Kerzner, H. (2009) Project management-A systems approach to planning, scheduling and controlling. Hoboken, NJ: John Wiley & Sons.
18. Cermak, T., Dochtermann, D., & Jesus-Olhausen, A. L. (2011) Introduction to a project portfolio management maturity model. PMI® Global Congress 2011, North America, Dallas, TX. Newtown Square, PA: Project Management Institute.
19. Pellegrinelli, S. (1997). Programme management: Organising project-based change. International Journal of Project Management, 15(3), 141-149.
20. Artto, K., Martinsuo, M., Gemünden, H. G., & Murtoaro, J. (2009). Foundations of program management: A bibliometric view. International Journal of Project Management, 27(1), 1-18.
21. Cleland, D. (1999). The strategic context of projects. In Dye, L. D., & Pennypacker, J. S. Project portfolio management: selecting and prioritizing projects for competitive advantage. West Chester, PA: Center for Business Practices.
22. Artto, K. A., Martinsuo, M., & Aalto, T. (2001). Project portfolio management: Strategic management through projects. Helsinki: Project Management Association Finland.
23. Morris, P. W. G., & Jamieson, A. (2005). Moving from corporate strategy to project strategy. Project Management Journal, 36(4), 5-18.
24. Milosevic, D. Z., & Srivannaboon, S. (2006). A theoretical framework for aligning project management with business strategy. Project Management Journal, 37(3): 98-110.
25. Killen, C. P., Hunt, R. A., & Kleinschmidt, E. J. (2008). Project portfolio management for product innovation. International Journal of Quality & Reliability Management, 25(1), 2438.
26. Project Management Institute (PMI) (2013a). A guide to the project management body of knowledge (PMBOK® Guide) (5th edn). Newtown Square, PA: Project Management Institute.
27. Project Management Institute (PMI) (2013b). Pulse of the profession®: In-depth report: The impact of PMOs on strategy implementation. Newtown Square, PA: Project Management Institute.
28. Project Management Institute (PMI) (2013c). The standard for portfolio management (3rd edn). Newtown Square, PA: Project Management Institute.
29. Project Management Institute (PMI) (2013d). Organisational project management maturity (OPM3) (3rd edn). Newtown Square, PA: Project Management Institute.
30. APM (2012) APM Body of Knowledge (6th Edition). High Wycombe, England: APM
31. IPMA Competence Baseline. International Project Management Association, & Caupin, G. (2015). IPMA competence baseline: ICB; Version 4.0. Internat. Project Management Association.

32. IPMA (International Project Management Association) website https://www.ipma.world/about-us/. Accessed 26 Feb 2020
33. AXELOS. (2011). Management of portfolios (MoP®). London, UK: AXELOS.
34. Axelos, P. (2013). Programme and Project Management Maturity Model (P3M3®): Introduction and Guide to P3M3. Axelos Ltd., London.
35. AXELOS website. <https://www.axelos.com/about-axelos> Accessed 26 November 2020
36. AXELOS. AXELOS. (2017). Managing Successful Projects with PRINCE2. Stationery Office Limited.
37. ISO (International Organization for Standardization) website. https://www.iso.org/aboutus.html. Accessed 26 November 2018.
38. ISO (International Organization for Standardization) (2015), Project, programme and portfolio management -- Guidance on portfolio management, (ISO/DIS Standard No. 21504) Retrieved from https://www.iso.org/standard/61518.html
39. Shenhar, A., & Dvir, D. (2007). Reinventing project management: The diamond approach to successful growth and innovation. Harvard Business Press.
40. Pajaresa, J., & López, A. (2014). New methodological approaches to project portfolio management: The role of interactions within projects and portfolios. Procedia – Social and Behavioral Sciences, 119: 645-652. doi: 10.1016/j.sbspro.2014.03.072.
41. Hiatt, J. M. (2006). ADKAR: A model for change in business, government and our community. Prosci Learning Center.
42. Todnem By, R. (2005). Organisational change management: A critical review. Journal of Change Management, 5(4), 369-380.
43. Unger, B. N., Gemünden, H. G., & Aubry, M. (2012). The three roles of a project portfolio management office: Their impact on portfolio management execution and success. International Journal of Project Management, 30(5), 608-620.
44. Meskendahl, S. (2010) The influence of business strategy on project portfolio management and its success-A conceptual framework. International Journal of Project Management, 28(8), 807-817.
45. Heising, W. (2012). The integration of ideation and project portfolio management-A key factor for sustainable success. International Journal of Project Management, 30(5), 582595.
46. Voss, M. (2012). Impact of customer integration on project portfolio management and its success-Developing a conceptual framework. International Journal of Project Management, 30(5), 567-581.
47. Voss, M., & Kock, A. (2013). Impact of relationship value on project portfolio success – Investigating the moderating effects of portfolio characteristics and external turbulence. International Journal of Project Management, 31(6), 847-861.
48. Beringer, C., Jonas, D., & Kock, A. (2013). Behavior of internal stakeholders in project portfolio management and its impact on success. International Journal of Project Management, 31(6), 830-846.
49. Teller, J. (2013). Portfolio risk management and its contribution to project portfolio success: An investigation of organization, process, and culture. Project Management Journal, 44(2), 36-51.
50. Teller, J., Unger, B. N., Kock, A., & Gemünden, H. G. (2012). Formalization of project portfolio management: The moderating role of project portfolio complexity. International Journal of Project Management, 30(5), 596-607.
51. Teller, J., & Kock, A. (2013). An empirical investigation on how portfolio risk management influences project portfolio success. International Journal of Project Management, 31(6), 817-829.
52. Jonas, D. (2010). Empowering project portfolio managers: How management involvement impacts project portfolio management performance. International Journal of Project Management, 28(8), 818-831.
53. Jonas, D., Kock, A., & Gemünden, H. G. (2013). Predicting project portfolio success by measuring management quality-A longitudinal study. IEEE Transactions on Engineering Management, 60(2), 215-226.

54. Doloi, H. K., & Baradari, I. (2013). Impact of applying project portfolio management on project success. The Journal of Modern Project Management, 1(2).

55. Hadjinicolaou, N., Dumrak, J., & Mostafa, S. (2017a). The study of association between organisational portfolios and project portfolio management practices. Project Management Research and Practice Journal, UTS ePRESS (2017 PMI National Conference, Sydney, Australia).

56. Hadjinicolaou, N., & Dumrak, J. (2017b). Investigating the functions and capabilities of project portfolio management offices. Proceedings of Australian Institute of Project Management (AIPM) Inaugural Conference 2017, 22-24 October 2017, Melbourne, Australia.

57. Costantino, F., Di Gravio, G., & Nonino, F. (2015). Project selection in project portfolio management: An artificial neural network model based on critical success factors. International Journal of Project Management, 33(8), 1744-1754.

58. Elonen, S., & Artto, K. A. (2003). Problems in managing internal development projects in multi-project environments. International Journal of Project Management, 21(6), 395402.

59. Royce, W. (1970, August). The software lifecycle model (Waterfall Model). In Proc. WESTCON (Vol. 314).

60. Hobbs, B., & Aubry, M. (2007). A multi-phase research program investigating project management offices (PMOs): The results of phase 1. Project Management Journal, 38(1), 74-86.

61. Hobbs, B., & Aubry, M. (2008). An empirically grounded search for a typology of project management offices [Special issue]. Project Management Journal, 39(S1), S69-S82.

62. Hobbs, B., & Aubry, M. (2010). The project management office or PMO: A quest for understanding. Newtown Square, PA: Project Management Institute.

63. Aubry, M., Müller, R., Hobbs, B., & Blomquist, T. (2009). Project management offices in transition. Paper presented at the International Research Network on Organizing by Projects (IRNOP), Berlin, Germany.

64. Cooper, R. G. (2005). Winning at new products: Pathways to profitable innovation (pp. 125). Redmond, WA: Microsoft Corp.

65. Aubry, M., Hobbs, B., & Thuillier, D. (2007). A new framework for understanding organisational project management through the PMO. International Journal of Project Management, 25(4), 328-336.

66. Aubry, M., Hobbs, B., Müller, R., & Blomquist, T. (2010). Identifying forces driving PMO changes. Project Management Journal, 41(4), 30-45.

67. Aubry, M., Müller, R., & Glückler, J. (2010b). Exploring PMOs through community of practice theory. Project Management Institute, 26(1), 38-43.

68. Aubry, M., Müller, R., & Gluckler, J. (2012, February). Governance and communities of PMOs. Project Management Institute.

69. Karkukly, W. (2011). An investigation into outsourcing of PMO functions for improved organizational performance: A quantitative and qualitative study. Trafford Publishing.

70. Karkukly, W. (2012). Managing the PMO lifecycle: A step-by-step guide to PMO set-up, build-out, and sustainability. Trafford Publishing.

71. Cooper, R. G., Edgett, S. J., & Kleinschmidt, E. J. (2001b). Portfolio management for new product development: Results of an industry practice study. R&D Management, 31(4), 361-380.

72. Cooper, R.G., Edgett, S.J., Kleinschmidt, E.J., (2002). Portfolio Management: Fundamental to New Product Success. In: Belliveau, P., Griffin, A., Somermeyer, S. (Eds.), The PDMA Toolbook for New Product Development. John Wiley & Sons, New York, USA.

73. Project Management Institute (PMI) (n.d.). PMO Quick Tip Guide. Newtown Square, PA: Project Management Institute.

