The three roles of a project portfolio management office: Their impact on portfolio management execution and success

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Abstract

Project portfolio management offices (PPMOs) are a subset of project management offices (PMOs) that handle collections of multiple single projects and programmes, i.e. portfolios. PPMOs are centralised organisational units that cater to the demands of various stakeholders by performing specialised tasks. They are initiated by their organisation's leadership in response to increasing management challenges originating from project portfolios. Although there has been considerable research on PMOs in general, not only a clear understanding of multi-project PMOs' activity patterns set in specific contexts like project portfolio management, but also both existence and mode of multi-project PMOs' contribution to successful performance are still lacking. By quantitatively analysing PPMOs in 278 portfolios, we identify three different activity patterns, which are interpreted as distinctive roles. We show a significant positive effect of PPMOs' coordinating and controlling roles on performance in terms of project portfolio management quality, which is a predictor of portfolio success.
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1. Introduction

Managing multiple sets of projects simultaneously is a challenge organisations have to master today in order to implement their strategic objectives (Artto and Dietrich, 2004; Dietrich and Lehtonen, 2005). Although the project management literature still focuses primarily on single projects, research in the last 5 years has increasingly acknowledged that multi-project issues have become critical for all organisations regardless of delivering projects to external or internal customers. Multi-project PMOs have emerged within these multi-project management environments as a major device to develop competence in project management, manage single project performance and coordinate multiple projects and actors. Project portfolios that include multiple unrelated single projects and/or various programmes are focus of this study.

Recently, studies have furthered general knowledge on PMOs, including their description (Hobbs and Aubry, 2007) and their relationship to context and transition (Aubry et al., 2010a, 2010b). Other studies have addressed PMOs' part in organisational change (Pellegrinelli and Garagna, 2009) or as a value-realising function (Hurt and Thomas, 2009). Hobbs and Aubry (2007) show that PMOs' organisational characteristics and mandates vary significantly, highlighting the existence of a wide and diverse range of PMOs. These authors explain, *"The organizational reality surrounding PMOs is complex and varied … organizations establish a great variety of PMOs to deal with their reality"* (p. 85). To provide a clearer picture of the mandates of multi-project PMOs, these findings suggest that PMOs should be differentiated based on comparable realities such as project portfolios. In this paper, we consider project portfolio management offices (PPMOs), which are multi-project PMOs dedicated to project portfolio management

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(PPM). Operative PMOs that only handle a single project or one programme are disregarded.

Pellegrinelli and Garagna (2009) confirm that *"multi-project PMOs are organizations' responses to their needs and environments — unique structural arrangements designed to fulfil a specific purpose"* (p. 651). Continuing this notion of purpose specificity, we follow the task-oriented paradigm of organisational design and organisational theory, which states that tasks and sub-tasks should follow the requirements of the organisation (Burton et al., 2011; Mackenzie, 1986). Therefore, we posit that the *task environment* is critical for identifying and defining the appropriate tasks to be undertaken by PPMOs and for detailing the activities that enforce the objectives of these tasks. A major feature of the task environment of a PPMO is its organisation's first-tier senior management, who are typically the owners of all the firm's project portfolios. Fundamentally, the tasks of PPMOs may be derived from these key stakeholders' requirements and their need to delegate management obligations.

From a task delivery perspective that considers all participating personnel who contribute and collaborate in managing project portfolios (Gemünden et al., 2008), the *project portfolio manager* is a prominent participant (Blomquist and Müller, 2006; Jonas, 2010). In this vein Jonas (2010) proposes multi-project PMOs to take up being project portfolio manager *"as a central coordination unit that supports the senior management with its specialized knowledge about project portfolio practices"* (p. 823). Jonas (2010) contributes the attributes of role clarity and role significance to provide a *formal role definition* for the project portfolio manager. The present paper builds on this conceptual work, which fundamentally grasps what project portfolio managers are and how others perceive them, to characterise the day-to-day practise of PPMOs as project portfolio managers.

PPMOs' operational roles are based on the management demands of first-tier senior managers, which are linked to the typical PPM phases to determine the activity patterns that comprise PPMOs' involvement in PPM. We consider the *activity patterns* and actual contributions of PPMOs when performing assigned tasks *(role taking),* rather than their formally stated roles (role making), to outline the configuration of PPMOs in practice. Formal role statements often raise expectations that PPMOs cannot fulfil with their limited power and resources. Furthermore, these roles are formulated purposefully as generic statements because a more precise formulation would not reach consensus due to the high potential for conflict among the expectations of the stakeholder groups of a PMO. By examining activity patterns, which are translations of the required tasks into everyday work, while each pattern makes up a role, we clarify the action of PPMOs when managing project portfolios. Thus, we refrain from listing every individual task performed and use a higher level of abstraction to understand roles as dimensions of social behaviour (Morrison, 1994; Webster and Wong, 2008).

Research on roles in the governance of project management and PMOs is not new, but this research has been extremely sparse and varied. First, Turner and Keegan (2001) proposed two roles, the "broker" and the "steward", when discussing governance mechanisms in project-based organisations, confirming two separate activity patterns in interface and resource management, respectively. Second, Blomquist and Müller (2006) identified the role of middle managers in programme and portfolio management. Third, Hobbs and Aubry (2007) provided a fundamental understanding of the roles of PMOs through a framework that grouped five sets of tasks, potentially forming five general PMO roles. Recently, interest in the roles of PMOs has intensified, with Hobbs and Aubry (2011) and Müller et al. (2011) proposing typologies of PMOs. In general, however, the understanding of PMOs' roles and the impact of these roles on value contribution and creation remains unclear. Thus, the acceptance, existence and legitimacy of PMOs remain at stake (Pellegrinelli and Garagna, 2009).

Acknowledging that PMOs have a low life expectancy of four years, on average (Hobbs and Aubry, 2007), Pellegrinelli and Garagna (2009) illustrate the effects of changes in an organisation on PMOs: *"The PMO can be the battle ground between empowerments and control, between people and processes, and between political factions"* (p. 652). This observation suggests that the closure of PMOs may be a case of collateral damage rather than a natural death due to a lack of purpose or unnecessary activities. Thus, with the existence of PMOs in question, Pellegrinelli and Garagna (2009) point out the need for PMOs to battle for altered organisational needs and their stakeholders' changing preferences by acting as *"the fulcrum between forces for centralisation — the tendency for decision and policy making, executive powers and resources allocation to reside in a dedicated (line of) business unit or corporate function — and decentralisation — the tendency for decision and policy making, executive powers and resources allocation to be devolved throughout the organisation to individuals or operating unit"* (p. 652). Thus, in an attempt to outlive fads and fashion manoeuvres and to justify and sustain the existence of multi-project PMOs, Pellegrinelli and Garagna (2009) recommend that multi-project PMOs be re-shaped as an organisational construct, allowing PMOs to become agents, rather than reactionaries. In this paper, we respond to this call and conceptualise a PPMO that is in charge and operationally manages project portfolios to produce a clear value proposition. Hence, we identify the performance contribution of individual PPMOs' roles. We aim to extend the findings of a quantitative study in which the engagement of project portfolio managers, who are often the heads of PPMOs, has been shown to have a significant positive impact on the execution quality and success of PPM (Jonas et al., 2011a). Ultimately, these results should establish the fundamental legitimacy of PPMOs.

In showing the positive performance impact of PPMOs, we substantially extend the existing research. Previous attempts to provide evidence for a performance increase as a result of PMOs' involvement in project management or in overall organisational performance offered little empirical validation. Quantitative research on the impact of PMOs on single project management has failed to show a relationship between PMOs' involvement and improved performance (Dai and Wells, 2004; Kwak and Dai, 2000). In a qualitative study of 65 organisations, Thomas and Mullaly (2008) showed the near

impossibility of calculating the direct impact of single projects managed by PMOs for return on investment. In two other qualitative studies, Aubry and Hobbs (2011) and Aubry et al. (2011) suggested that the performance of a PMO should be assessed by its contribution to organisational performance. These studies proposed a multi-dimensional framework that acknowledged the coexistence of competing values in any organisation. From this perspective, assessing a PMO's performance is likely to be an organisational dialogic process involving criteria and indicators. More recently, Hobbs and Aubry (2010) used the concept of a PMO's embeddedness in its context to explain 48% of the variance in project performance, whereas the structural characteristics and functions of the same PMOs explained only 28% of the variance. These are encouraging findings, but they are based on exploratory data analysis, and the performance measures are broadly defined. Further research is needed to explain and validate these findings. We therefore posit the following: despite increasing research efforts, solid empirical evidence for the positive impact of multi-project PMOs on performance is still lacking.

In light of so many unsatisfactory attempts to answer the fundamental question of PMOs' contribution to performance, it is not surprising that consultants and academics increasingly focus on this topic (Aubry et al., 2010a). Of primary interest is to extent previous inconclusive research on the value of PMOs (Dai and Wells, 2004; Hurt and Thomas, 2009) and to answer the critical open question of PMOs' performance contribution, which, in principle, would justify the existence of a multi-project PMO. The popularity of this research area despite its failure to produce fundamental evidence has also generated criticism. Some academics dismiss the concept of PMOs as a temporary fashion (e.g., Crawford, 2010). It is argued that the academic community participates in constructing and nurturing an empty shell and that isomorphism may be at play, considering the high level of information flow (DiMaggio and Powell, 1983).

Against all odds, this study analyses PPMOs as a subset of PMOs that manage project portfolios. Departing from organisational theory, we aim to describe PPMOs' activity patterns as a way to cater to organisational and stakeholder needs, independent of individual preferences. Thus, we strictly focus on management requirements in connection with the project portfolio setting, and we disregard PMOs that are designed to manage single projects or programmes. We aim to present the roles derived from PPMOs' typical activity patterns by statistically integrating similar tasks to reduce complexity. Hence, our first research question is as follows: *What roles does a project portfolio management office perform?*

To adequately address the question of how PPMOs contribute to performance, relevant performance metrics must be applied. We use the execution quality of PPM (i.e., project portfolio management quality, or PPM quality) to incorporate the project portfolio setting. Furthermore, any relationship must be empirically shown. We quantitatively analyse how role fulfilment impacts on PPMOs' performance. Hence, our second research question is as follows: *What impact do PPMOs' roles have on performance in terms of project portfolio management quality?*

This study makes significant contributions. First, we empirically derive and characterise three distinct roles of PPMOs. We clarify the generic PPM tasks performed by PPMOs and we corroborate initial evidence on general groups of PMOs' tasks or roles. Second, we show the significant positive impact on performance of two roles assumed by PPMOs, the roles of coordinator and controller. Third, we provide evidence for the positive direct effect produced by PPMOs' supporting role on the success of project portfolios. This evidence points to the underlying principle of our model: the mediating effect of PPM quality on portfolio success.

2. Project portfolio management office: A new unit of analysis

The generic definition of a PMO, provided by Project Management Institute (2008), is largely accepted:

> "*An organizational body or entity assigned various responsibilities related to the centralized and coordinated management of those projects under its domain. The responsibilities of the PMO can range from providing project management support functions to actually being responsible for the direct management of a project*" (p. 443).

This broad definition includes a large range of possible organisational designs and a variety of tasks that can be performed by single and multi-project management offices. Thus, this definition is not helpful because it does not indicate which organisational arrangement or activity pattern affects which type of performance criterion. The definition merely reflects the lack of knowledge about the impact of PMOs and the lack of consensus on how to construct them. This condition justifies our research decision to focus on PPMOs, a specific type of multi-project PMO, and to explore the specific roles of PPMOs in driving PPM. One overarching question, such as, "What are the success factors of any kind of PMO for any mix of success criteria?", is too broad to allow scientific progress or to produce cumulative evidence from which future standards can be derived. Pellegrinelli (2011) and Kristian (1995) made similar observations about the labels "project" and "programme", stating that the undifferentiated use of these terms limited their implications for research and caused confusion for practitioners about the phenomena.

Of course, even the tasks of such specialised PPMOs will also vary considerably according to the nature of the collection of projects managed (Crawford et al., 2005), but we include this variance in our research.

3. Project portfolio management offices: Their governance mandate

PPMOs take the lead in managing and supervising project portfolios. Thus, they become responsible for the greater part of the temporary organisation of firms (Lundin and Söderholm, 1995; Lundin and Steinthorsson, 2003). In terms of "*corporate governance* [concerned with] *understanding*

and improving the way companies are managed and supervised … [i.e.,] designating the framework for managing and supervising the corporation" (v. Werder, 2011 p. 1345–1346), it is obvious that a PPMO must fit into the overall organisational management framework to become a decisive feature of the temporary organisation's governance. Müller (2009) suggests, "*governance, as it applies to portfolios, programs, projects, and project management, coexists within the corporate governance framework. It comprises the value system, responsibilities, processes and policies that allow projects to achieve organizational objectives and foster implementation that is in the best interests of all the stakeholders … and the corporation itself*" (p. 4). PPMOs have a strong governance mandate to guarantee the implementation of organisational goals and stakeholder interests. However, their configuration for effective PPM is addressed only so far as PPMOs' share in governance may be derived from the management demands extended from project portfolios and their key stakeholders.

PMOs have been assumed to be necessary to deal with multiple projects and to offer value by "[1] *some form of coordination and … by* [2] *facilitating control*" (Pellegrinelli and Garagna, 2009). In a PPM context, two primary activity patterns that echo these expectations can be identified:

- First, a demand for *project portfolio steering* arises from two considerations: (1) it is neither possible nor desirable to plan in detail, so planning is always incomplete; (2) from planning to implementation, the features of the plan may have increased in importance or may have become irrelevant; thus, any fixed plan becomes outdated very quickly. As a consequence of incomplete plans and information, steering the project portfolio is necessary. Considering the significance of PPM and its substantial impact on both the temporary and permanent organisation, management demands can be regarded as strategic and thus are part of the first-tier senior managers' responsibilities. Steering calls for close and frequent engagement, which requires time and effort that senior managers are not able (or motivated) to commit. Therefore, senior managers delegate associated activities to substitutes. In a PPM context, this project portfolio steering translates into *coordination* between the multiple projects in the portfolio by determining resource (re-)distribution based on the monitoring of the progress of individual projects toward agreed upon goals. A PPMO, as an entity, or its head, as the responsible person, are the customary proxies for masterminding and conducting the steering activities delegated to them by first-tier senior management, which has the ultimate responsibility as the owner of the project portfolio.
- Second, a demand for *facilitating control* arises from a (notorious) lack of necessary and relevant information for making decisions on project portfolios. This lack of transparency is a significant issue for the project portfolio decision makers, particularly because the first-tier senior managers, who own the project portfolio, and the middle managers of the line organisation, who supply the necessary resources, require a sound information base for their judgements (Blomquist and Müller, 2006; Jonas et al., 2011a). Because

this crucial information needs to be reliable, sufficiently specific, accurate and current, it is required to be collected and processed according to uniform criteria. Because information on the entire portfolio needs to be provided consistently and continuously, the PPMO, as a central unit, is in the best position to take on this duty.

PPMOs also respond to a number of other stakeholders, such as project managers, who claim support from PPMOs in terms of training, motivation, operative help and sponsorship (Crawford et al., 2008). A sound information base is also appreciated by project managers, who want decisions to be made in a fair and fact-based way. Their benefit is immediate and directed operative action for their single projects following the decisions made by first-tier senior managers. PPMOs may take on certain service functions in response to the customers or users of the solution delivered by the projects in the portfolio. In managing project portfolios, PPMOs deliver these additional services, which may be considered *supporting activities*.

In conclusion, PPMOs face explicit and distinguishable demands that form a governance mandate. Thus, their role taking is not arbitrary, but needs to be derived directly from the requirements of the prime decision makers and other stakeholders for coordination, decision-making, information and support during PPM.

Considering PPMOs' governance mandate from another angle, PPMOs are analogous to the *central function areas* that are part of the governance structure of any organisation. These organisational units are at an elevated level in the sphere of first-tier senior management and are delegated a number of senior managers' decision and steering responsibilities, depending on the first-tier senior management's delegation policy (Frese et al., 1993). PPMOs may thus adopt the organisational gestalt of an *executive department* or *shared service centre*, which are typical forms taken by these central function areas in practice, depending on the emphasis of the coordinating, controlling and supporting activities of the individual PPMO (Unger, 2012).

4. Conceptual model and hypotheses

4.1. Activity patterns of project portfolio management offices

When PPMOs act as project portfolio managers (Jonas, 2010), their activity patterns include handling the challenges of portfolio management and performing characteristic managerial tasks in PPM. Challenges arise from the nature of project portfolios, which are collections of single projects and programmes that run concurrently and compete for scarce resources (Archer and Ghasemzadeh, 1999; Dye and Pennypacker, 2002). Thus, the distinct management requirements of project portfolios differ from those of mega-projects and programmes (Müller et al., 2008). The principal challenge is to continuously *master the competition for the firm's limited resources* between the projects in the portfolio (Chao and Kavadias, 2008; Dye and Pennypacker, 1999). Another critical challenge is *to act in dynamic environments* (Petit and Hobbs, 2010) in which

the number, composition and interdependency of the projects within the portfolio change constantly, as does the organisational context of the portfolio (i.e., the corporate strategy, organisational structure and first-tier senior management). Thus, the PPM is not just about allocating resources; rather, it includes accepting projects into the portfolio, monitoring the progress of single projects and cyclically re-prioritising all of the projects in the portfolio to achieve balance, synergy and success while enforcing the firm's strategy via the project portfolio (Morris and Jamieson, 2005). To address this notion of iteration and concurrence in PPM, a process perspective is most useful for differentiating managerial tasks. Four chronological phases, which are highly interdependent but feature distinct managerial tasks, can be outlined (Jonas, 2010): (1) *portfolio structuring* includes all tasks involved in initially setting up a portfolio derived from an organisation's strategy, such as the evaluation of proposals and selection of projects (Platje et al., 1994); (2) *resource management* assumes the effective and efficient allocation of limited (mainly human) resources, including cross-project (re-)allocation and formal approval (Hendriks et al., 1999); (3) *portfolio steering* involves the continuous coordination of the portfolio, including monitoring strategic alignment and developing corrective measures (Müller et al., 2008); and (4) *organisational learning and portfolio exploitation* summarises tasks that cater to projects at the end of their life-cycle, which are concerned with post-project reviews and lessons learned. The latter focuses on the meta-level: how PM methodology can be improved to produce a better (P)PM culture. PPMOs' activity patterns will have to include and cover a wide range of these managerial tasks to establish themselves as a fulcrum in PPM.

4.2. Role taking in project portfolio management

Multiple actors in the temporary and permanent parts of the organisation share interests and participate in conducting project portfolios. Therefore, these actors perform managerial tasks and take roles in PPM (Jonas et al., 2011b). PPMOs, understood as units or persons (i.e., the head of the PPMO), compete with these other actors to a degree and must identify their role(s) in this array. The actors in the temporary organisation include multi-project managers and single-project managers (Blomquist and Müller, 2004), whereas the participants in the permanent organisation are department heads, division heads or the management board. First-tier senior management, as the owners of the project portfolios, make fundamental decisions, such as selecting and aborting single projects in the portfolio. Although these senior managers may delegate a number of their steering and controlling obligations to PPMOs, to keep the portfolio strategically focussed (especially regarding single-project termination) senior managers must act personally (Unger et al., 2012). Therefore, decision-making remains a residual activity among first-tier senior management. Multi-project managers and single-project managers take roles in tactical and operative project management (Martinsuo and Lehtonen, 2007) and both types of managers are crucial in guaranteeing a high level of single project success, which is a

dimension of portfolio success (Jonas, 2010). These actors may be considered slightly less important than first-tier senior managers or strategic PMOs. Line managers' involvement has been shown to be the third most frequent in PPM task execution. Line managers are crucial for releasing the resources required for PPM, an activity they successfully perform and maintain in practice. Thus, central resource provision typically does not exist (Jonas et al., 2011b).

Conflicts from role taking arise between these actors during PPM, when activities are contradictory or result in overlapping responsibilities. In practice, PPMOs, as project portfolio managers need to be aware of the other actors and their own roles. Generally, it is important what tasks are executed and which actors participate (Jonas et al., 2011a), but also what roles are taken when participating in PPM. In this paper, we focus exclusively on roles taken by PPMOs to shed light on the configuration of this entity as one actor in PPM.

4.3. Management execution and the success of project portfolios

To assess the effectiveness of the distinct roles of PPMOs, it is necessary to consider their respective performance impact on the portfolios under management. Performance may be modelled in two ways: (1) as the PPM quality and (2) as the outcome of portfolio management, considering the multiple dimensions of success of portfolios. Both sets of success metrics are outlined briefly below.

PPM quality is conceptualised in three complementary dimensions (Dammer and Gemünden, 2007; Dammer et al., 2006; Jonas et al., 2010). First, *information quality* is concerned with information availability, comprehensiveness and transparency. Second, *resource allocation quality* includes timely allocation, sincerity of commitment and conflict avoidance during resource endowment. Third, *cooperation quality* implies empathy and readiness in helping fellow project managers and other project teams (cross-project cooperation). The combination of these qualities takes into account the effectiveness of the process execution in portfolio management by taking the pulse of the existing processes directly when the projects are delivered. This immediate measurement of performance at the time of the actual management incident means that PPM quality assessment is less likely to be prone to bias because ex-post rationalisation is avoided. These metrics are powerful; they have been shown to predict subsequent portfolio success (Jonas et al., 2010). Therefore, this paper assumes an underlying principle according to which PPM quality has a positive effect on portfolio success. Consequently, if PPMOs' roles significantly impact on PPM quality, it can be assumed that these roles also significantly relate to project portfolio success. In this study, we primarily rely on PPM quality to assess the impact of PPMOs' roles.

The *success dimensions of PPM* are outlined briefly as they are only secondarily referenced. Success in a portfolio context is typically conceptualised on two management levels, single projects and project portfolios, making it a multi-dimensional construct (Cooper et al., 2002; Jonas, 2010; Meskendahl,

2010). PPMOs' roles may directly impact on single project management, which is represented by *average single project management success.* This assessment includes the Iron Triangle dimensions (Pinto and Slevin, 1988) of the project's achievements in terms of *budget, time* and *quality* objectives as well as *customer satisfaction* (Atkinson, 1999; Shenhar et al., 2001).

The three roles of PPMOs may affect PPM quality in several ways. The *coordinating role*, which handles resource allocation to projects across the portfolio, minimises failure in the allocation process by safeguarding the rapid allocation of resources to targeted recipients. When PPMOs assume this role, resource commitment is enforced more reliably. Thus, it is suggested that the coordinating role primarily has a positive impact on *resource allocation quality* within the dimensions of PPM quality. Furthermore, collective collaboration may be improved by a central conciliator, which helps to diffuse tensions and power struggles stemming from resource conflicts, thus additionally avoiding harm for subsequent relationships. So, it is suggested the coordinating role also positively relates to *cooperation quality.*

Hypothesis 1. The coordinating role positively impacts on PPM quality

The *controlling role* strives to establish and maintain a sound information base, thus increasing transparency. Activities included in the controlling role are proposed to positively impact on *information quality* as full information is readily made available. In contrast, a lack of transparency limits the allocation of resources and opportunities for cooperation because information on accurate guidelines and alternative directions is missing. Thus, an improved information base may also have indirect positive effects on *resource allocation quality* and *cooperation quality.*

Hypothesis 2. The controlling role positively impacts on PPM quality

The *supporting role,* which focuses on cultivating project management standards, facilitates single project management, improves knowledge transfer between projects and stimulates communication. Thus, a PPMO that assumes a supporting role is thought to positively impact on *information quality* and *cooperation quality.*

Hypothesis 3. The supporting role positively impacts on PPM quality

The hypothesised impacts of PPMOs' roles on PPM quality make up the conceptual model of this paper, depicted in Fig. 1.

5. Method

5.1. Data collection and sample

To test our hypotheses, we used a cross-industry sample of firms from Austria, Canada, Finland, Germany, South Korea and Switzerland. To achieve a high rate of participation and response in this multinational survey, project management researchers from the respective countries conducted data collection in their home countries. The generic approach in each survey was to invite companies by letter, providing them with general information on the study to allow them to register their interest in the subject matter. Questionnaires translated from German into the languages of the target countries were tested with local academics and practitioners in two rounds and were subsequently distributed to the accepted informants. The object of this analysis was the project portfolio of an organisation or business unit. To guarantee a meaningful assessment of PPM practices, we exclusively accepted as study participants organisations with portfolios of at least 20 projects managed in parallel. The project portfolio coordinator was the key informant. This person was typically in charge of the portfolio's tactical management and performs conceptual and advisory activities to shape the portfolio processes. Thus, the portfolio coordinator was an expert in portfolio management and applied procedures, methods and processes. Typical jobs held by coordinators included portfolio manager, head of PPM or project/multi-project management office, division manager, or department manager. Although project portfolio coordinators were considered the best source for the variables used in this study, the selected key informant approach bears the risk of bias due to common-method variance (Podsakoff et al., 2003). To reduce systematic bias, we guaranteed anonymity to the informants and assured them, in the introduction to the questionnaire, that there were no right or wrong answers. For each participating portfolio, the appropriateness of the registered coordinator was validated during a short interview. A total of 278 fully completed questionnaires
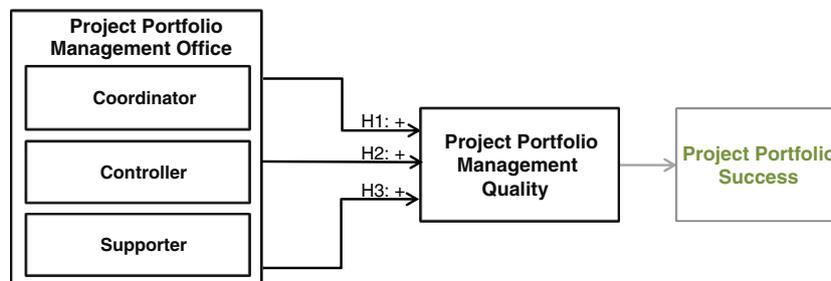

Fig. 1. Framework of the relationship between project portfolio management office's roles, project portfolio management quality and project portfolio success.

Table 1
Factor analysis of the roles of PPMOs.

	Factor 1 Coordinator	Factor 2 Controller	Factor 3 Supporter
1 The PMO is located rather high in the hierarchy of the unit.	**0.737**	0.267	−0.175
2 The PMO primarily supports cross-project coordination.	**0.786**	−0.130	0.304
3 The PMO is highly involved in and supports cross-department coordination with respect to project work.	**0.718**	−0.035	0.276
4 The PMO reports to the top management.	**0.618**	0.394	−0.261
5 We understand the PMO as a strategic controlling and steering unit.	**0.679**	0.277	0.030
6 The PMO provides governance support mainly to top management (e.g., project supervision, milestone controlling, monitoring, and standardisation).	0.047	**0.787**	0.316
7 The PMO is mainly in charge of controlling the collections of projects.	0.189	**0.750**	0.142
8 The PMO provides service support mainly to projects/project leaders (e.g., during project planning, in the production of reports for projects, software tools).	0.187	0.187	**0.825**
9 The PMO is in charge of cultivating project management standards within the firm.	−0.036	0.175	**0.706**

NOTE: Factor loadings > 0.50 appear in bold.

were received for further analysis. The sample consisted of firms from various industries: information and communication technologies (22%), manufacturing (21%), financial services (14%), health sector and pharmaceuticals (9%), services (9%), consumer goods (6%) and others (19%). Of these firms (or business units), 40% had fewer than 500 employees, 27% had between 500 and 2000 employees, and 33% had more than 2000 employees.

5.2. Measures

In this study, we used multi-item measurement scales with items drawn from the literature on PPM and related fields. Informants were asked to assess each item using a Likert-type scale, from 1 "strongly disagree" to 7 "strongly agree".

The constructs of *PPM quality* and *portfolio success* were adopted from studies on multi-project management. *PPM quality* included three dimensions: information quality (six items), allocation quality (five items) and cooperation quality (three items), based on Dammer and Gemünden (2007) and Jonas et al. (2010). The dimension of *average single project success* for portfolio success was measured by four items. The abovementioned constructs were validated in this study as follows: all dimensions had high and significant loadings, and the values for Cronbach's alpha were acceptable. All item wordings, including Cronbach's alpha, are listed in the Appendix A. The roles of *PPMOs* were generated by a factor analysis (compare Section 6.1 and Table 1). Generating PMO roles in this way is statistically appropriate because the complexity of the data (i.e., the list of tasks) is reduced to coherent groups. This is beneficial because these groups are closely associated within the group and are independent from the other categories. Furthermore, each of these content groups identifies one potential role a PPMO may perform. Hobbs and Aubry (2007) applied the same method to generate five general task groups for PMOs.

6. Results

6.1. Results of factor analysis

This section presents the results from an exploratory factor analysis on PPMOs' roles. Item scales were validated using a principle component factor analysis with varimax rotation. The unidimensionality of each scale was checked by its loading on one factor only. Using the Kaiser criterion, we identified three factors. All items loaded cleanly on their respective factors. The results are displayed in Table 1.

The first factor included five items concerned with different types of coordination performed by PPMOs, a PPMO's strategic location in the organisation and its reporting to management. This factor was called *coordinator*. Its Cronbach's alpha was 0.78. It can be interpreted as the strategic management role assumed by the PPMO. The task composition in this factor matches the coordinating activities outlined in Section 3. The second factor comprised two items related to the PPMO's supervision, the control and monitoring of single projects and a portfolio. Because the accordance with the pattern of activities identified for monitoring/controlling in Section 3 was high, the second factor was labelled *controller*. The Cronbach's alpha for the second factor was 0.63. This factor included most of the tactical managerial activities a PPMO performs on a project portfolio level. The third factor summarised supporting activities, including the cultivation of project management standards. Therefore, it was called *supporter,* and its Cronbach's alpha was 0.56. It is interpreted as a set of numerous operational activities facilitating the standardised management of single projects within the portfolio, very much like the service activities outlined in Section 3. Other items, such as interface activities with external customers and human resource management tasks (including recruiting project management personnel, administration of incentive systems and career support for project management personnel) also performed by PPMOs, did not load on these factors. In

contrast, the PPMO size did not correlate with the fulfilment of these three roles, and the PPMO size did not correlate with performance measures.

In conclusion, this analysis echoes the three roles of PPMOs that correspond to the activity patterns of PPMOs derived from demands of various stakeholders and from organisational task sharing (Section 3). Overall, these results are useful because the presumed but diffuse overall performance effects of PPMOs may be broken down into performance impacts related to these distinct and measurable roles. Consequently, the three roles of PPMOs are applied to assess PPMOs' performance impact on specific measures of portfolio management execution.

6.2. Results of regression analysis

Regression analysis was used to determine the effects of the three roles of PPMOs on PPM quality. The results are illustrated in Table 2.

Models 1 to 3 test the effects of the three roles of PPMOs on each of the three PPM qualities. The underlying principle is that PPM quality acts as a central mediator of the effects on portfolio success (compare Section 4.3).

Model 1 documents the impact on *cooperation quality* through the three roles of PPMOs. The coordinating role shows a significant positive impact (beta=0.122, p<0.1) on cooperation quality. However, neither of the other roles displays a significant relationship. Model 2 provides the results of the impact on *information quality*. Again, only one role, the controlling role, is significantly and positively associated (beta=0.307, p<0.01) with information quality. Model 3 shows the impact on *allocation quality*. Again, the coordinating role is positively associated with a significant impact on allocation quality (beta=0.265, p<0.01). However, none of the other roles shows a significant impact on allocation quality.

To sum up, Hypothesis 1, which suggests a positive impact of the coordinating role on PPM quality and is supported by Model 1 (cooperation quality) and 3 (allocation quality) is

Table 3
Summary of regression results.

Hypothesis		Portfolio performance			Portfolio success
		Cooperation quality	Information quality	Allocation quality	∅ single project success
1	Coordinator	✔	N/A	✔	N/A
2	Controller	X	✔	X	N/A
3	Supporter	X	X	N/A	✔

✔ = significant impact; X = no significant impact; N/A = no hypothesis.

accepted. Hypothesis 2, which suggests that the controlling role positively impacts PPM quality and is supported by Model 2 (information quality) is also accepted. The supporting role, however, does not impact on any of the PPM qualities. Therefore, Hypothesis 3 cannot be supported. Table 3 provides a summary of these results.

7. Framework for configuring a project portfolio management office

Based on our results, we propose a framework for configuring PPMOs based on their three activity patterns. By outlining and interpreting the relationship of the three roles of PPMOs (coordinating, controlling and supporting) and defining their individual effects on performance, we aim to facilitate role taking in practice.

To recap, this PPMO is an organisational entity that is typically located at elevated hierarchical levels, if not at the highest executive level in the organisation (depending on its membership in an organisation or business unit). PPMOs may be assigned multiple tasks depending on organisational needs, first-tier senior management requirements (delegation policies) and other stakeholders. For better practical understanding, we focussed on PPMOs activities and adopted a role-perspective standpoint. While "roles" can have different meanings, in this

Table 2
Regression results.

	Regression coefficient [a]	Standard error [a]	Beta	T	Sign.	R^2	Adjusted R^2	F
Model 1 — cooperation quality						0.03*	0.02	3.50
Coordinator	0.111	0.058	0.122	1.920	0.056*			
Controller	0.053	0.053	0.067	0.995	0.321			
Supporter	0.050	0.046	0.070	1.095	0.274			
Model 2 — information quality						0.15***	0.14	16.84
Coordinator	0.086	0.056	0.093	1.555	0.121			
Controller	0.249	0.051	0.307	4.900	0.000***			
Supporter	0.068	0.044	0.092	1.544	0.124			
Model 3 — allocation quality						0.07***	0.06	7.62
Coordinator	0.237	0.056	0.265	4.254	0.000***			
Controller	0.021	0.051	0.027	0.412	0.681			
Supporter	0.005	0.044	0.007	0.118	0.906			

n=278.
[a] Unstandardised regression coefficients.
  * p<0.1.
 ** *p*<0.05.
*** *p*<0.01.

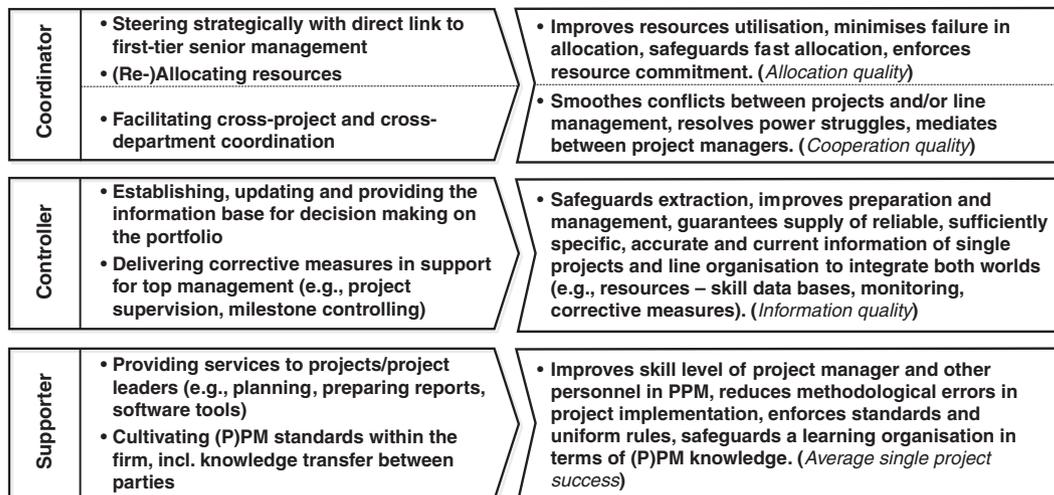|		
Coordinator	• **Steering strategically with direct link to first-tier senior management** • **(Re-)Allocating resources**	• **Improves resources utilisation, minimises failure in allocation, safeguards fast allocation, enforces resource commitment. (***Allocation quality***)**
	• **Facilitating cross-project and cross-department coordination**	• **Smoothes conflicts between projects and/or line management, resolves power struggles, mediates between project managers. (***Cooperation quality***)**
Controller	• **Establishing, updating and providing the information base for decision making on the portfolio** • **Delivering corrective measures in support for top management (e.g., project supervision, milestone controlling)**	• **Safeguards extraction, improves preparation and management, guarantees supply of reliable, sufficiently specific, accurate and current information of single projects and line organisation to integrate both worlds (e.g., resources – skill data bases, monitoring, corrective measures). (***Information quality***)**
Supporter	• **Providing services to projects/project leaders (e.g., planning, preparing reports, software tools)** • **Cultivating (P)PM standards within the firm, incl. knowledge transfer between parties**	• **Improves skill level of project manager and other personnel in PPM, reduces methodological errors in project implementation, enforces standards and uniform rules, safeguards a learning organisation in terms of (P)PM knowledge. (***Average single project success***)**

Fig. 2. Framework for project portfolio management office configuration.

paper, a *role* was defined as a social behaviour forming activity patterns and not as an individual task performed in a particular operation or process (Webster and Wong, 2008) (see Section 1). Three roles were distinguished that have multiple and varied effects on project portfolio performance. This framework is illustrated in Fig. 2.

Below, we detail the individual activity patterns for the three roles of PPMOs.

(a) *Coordinating role:* This role involves the twofold steering of the project portfolio, as mandated by first-tier senior management: (re-)allocating of limited resources iteratively across the portfolio and facilitating cooperation. Activities include project appraisal and selection, cross-project support and cross-department coordination. The latter involves managing and resolving conflicts over resource haggling, which requires a strong authority. Thus, the PPMO may take an authoritative style in resource management to improve the quality of resource allocation or a consolatory stance when mediating or coaching parties to improve collaboration between stakeholders, thus increasing the quality of cooperation.

(b) *Controlling role:* This role involves information management to deliver input in decision making, which is a prerequisite for project portfolio steering. Activities include gathering, preparing and providing information as well as suggesting corrective measures. An information base must be established with reliable, sufficiently specific, accurate and current content on the progress of the single projects derived from project supervision, milestone control and monitoring. The PPMO may take a firm and active style in generating necessary information and improving the quality and availability of information. However, the PPMO may also adopt a cooperative stance and handle the information responsibly to establish trust with the stakeholders and facilitate information sharing.

(c) *Supporting role:* This role involves providing services to projects/members and project leaders during project

implementation, including activities to train and motivate project management standards and operations within the organisation. This role may also involve developing and improving the standard methodology and promoting a (P)PM culture that includes organisational learning, thus improving the implementation and completion rates of single projects.

These activity patterns are in line with professional literature suggesting that the coordinating role is comparable to the "Deliver Now" position, while the controlling role can be recognised in the "Coach" position (Kendall and Rollins, 2003). Support activities are reminiscent of "Project Support Offices" (Dinsmore, 1999).

However, a caveat can be identified. At times, the *supporting* and *controlling/coordinating activities* conducted by PPMOs may exert conflicting effects on project managers. While the assistance offered by a PPMO is generally accepted by project managers, managers may be suspicious of accepting support from a unit that simultaneously monitors their projects' progress and may suggest punishment for the managers' failure to meet targets. When taking the controlling role, a PPMO should collect and handle information responsibly. Thus, PPMOs need to deal with project managers in a respectful way and refrain from exerting pressure to avoid tension.

8. Discussion

Revisiting our first research question, which asks what roles a PPMO performs, we note that this study succeeded in theoretically deriving three activity patterns that stem from organisational and stakeholder needs (Section 3). Empirically, the identified roles of coordinator, controller and supporter echo these activity patterns (Section 6.1). It may be puzzling that PMOs' general task lists, which enumerate up to 74 separate tasks (Crawford, 2004), are reduced in this study to three roles of PPMOs. The task lists may seem truncated rather than simplified. However, these findings are in line with the

results of Hobbs and Aubry (2007), in which a list of 27 tasks of general PMOs was reduced to five general roles of PMOs. Moreover, it is normal for fewer roles to exist when turning from all possible PMOs to roles that exist for a special type of multi-project PMO such as the PPMO. Thus, we can accept the number of PPMOs' roles as appropriate.

It is notable that two of those roles – coordinator and controller – showed a significant and positive impact on the performance of portfolio management. In addition to successfully answering the second research question, this study empirically showed, for the first time, a specific type of impact of PMOs on performance. These results confirm the benefits of conducting a PPMO for project portfolio success. We thus contribute to the value discussion in project management research (Thomas and Mullaly, 2008). These PPMO roles are instrumental in attaining value from an organisation's investment (compare, e.g., Hurt and Thomas, 2009). This result was made possible through PPMOs' managed objects, portfolios. The sum of the projects in such a collection embodies an organisation's investment strategy (Dye and Pennypacker, 1999). In particular, the integrative nature of these roles at different levels of project management is "valuable." The controlling role produces the fit of single projects to the portfolio, and the coordinating role mediates between projects and interfaces and between the project landscape and the permanent organisation. PPMOs' roles build and sustain an organisation's capacity for multi-project management, adding value to the entire organisation in a similar way that steering committees do (Lechler and Cohen, 2009). Consequently, the criticism that PPMOs exist to comply with fashion is no longer valid. From a "fashionable" perspective, PMOs would be implemented only to be trendy, regardless of their benefits. According to isomorphism theory, the objective is to apply only what is considered a best practice elsewhere and to be recognised by the external community as making use of these best practices (DiMaggio and Powell, 1983). Some isomorphism may exist at the field level. However, our results provide empirical evidence for the prerequisites needed to produce a real impact on PPM quality, thus proposing guiding principles for organisations striving to produce value.

It is interesting to note that only the coordinating role demonstrated the two hypothesised relationships with PPM quality (i.e., cooperation quality and resource allocation quality), whereas the controlling role failed to impact on cooperation or allocation quality despite the fact that the controlling role was suggested to positively influence these qualities indirectly (see Table 3). An interpretation of this shortfall could be that transparency, which is supposedly delivered by the controlling role, does not actively contribute to solving conflicts. However, transparency is required to improve cooperative quality, and it minimises the causes of conflicts that may arise. This indirect influence may simply be too weak to be identified statistically. Alternatively, excessive control may limit interaction and inhibit cooperation or partnering (Müller et al., 2011).

The finding that the supporting role does not impact PPM quality is quite odd because the literature emphasises that PMOs (nearly always) offer support activities (e.g., Marsh, 2001; Powell and Young, 2004). This result may have arisen from the supporting role's focus on the single-project level. Typical tasks support the planning of single projects, support project managers or even improve management routines by standardising single projects. This type of service by PPMOs does not directly improve the execution quality of PPM; rather, it contributes to portfolio value generation, thus improving the performance of a single project (management). To verify this conjecture, we analysed the positive direct impact of the supporting role on average single project success, the metric of single project performance within the success dimensions of the project portfolio. This analysis resulted in a strong positive and direct effect of the supporting role on average single project success (see Table 3). We concluded that the supporter role is also relevant and directly impacts on portfolio success.

In conclusion, the coordinating and controlling roles help to confirm that the appropriate projects are selected and prioritised, and the supporting role helps to ensure that projects are managed appropriately. These findings may be extended to other PMOs in multi-project contexts, such as those PMOs handling programmes (programme management offices).

9. Conclusion

These findings contribute to the academic literature on multi-project PMOs in general and the roles and performance of PPMOs in specific. PPMOs' impact on performance and success is especially relevant from a theoretical standpoint.

First, three distinct roles of PPMOs were theoretically identified, and the activity patterns characterising their social behaviour were outlined. This analysis reduced and integrated the vast number of tasks currently proposed for PMOs to a comprehensive set at a multi-project management level. Thus, the gestalt of the PPMO as a coordinating, controlling and supporting unit at the portfolio management level was established. By clarifying PPMOs' behaviour, we furthered understanding of PMOs' distinct roles at a multi-project management level compared to a single project management level.

Second, two of these roles – the coordinating and controlling roles - were shown to impact on PPM quality, which predicts project portfolio success. Hence, this paper introduced the first quantitative empirical evidence showing that PMOs are instrumental in attaining project success, as exemplified in the three roles of PPMOs' and their positive impact on PPM quality and portfolio success.

Third, the coordinating role was shown to have a twofold impact, positively influencing both cooperation and resource allocation in the portfolio management process. Thus, we may assume a graded impact scale of the three roles of PPMOs. The controlling role only impacts on information quality, and the supporting role only shows a direct effect on the average single project success. Thus, both of these roles have a lesser impact range than the coordinating role.

9.1. Implications for management

Practitioners may benefit from these findings. The implications of this study are mainly tied to the understanding and

differentiation of the various roles assumed by a PPMO, which condition its power and threshold of action in a multi-project environment. Some suggestions are provided on the potential capacity of PPMOs.

First, when establishing a new PPMO, the three roles of coordinator, controller and supporter provide insight into how a PPMO can participate in a PPM. From a behavioural point of view, in addition to implementing the fit of patterns of activities, PPMOs help to instil a certain attitude (or root a distinct culture). Relying on these roles facilitates the shaping and designing of each PPMO's activity pattern, intensity, size and structure and suggests how the PPMO should relate to other PMOs and stakeholders in the PPM context. What is at stake in relying on these roles is the objective that a PPMO should appropriately correspond to the organisational demand. Thus, depending on the intended effect of the PPMO, a particular role may be emphasised to facilitate a specific PPM quality. However, from the perspective of project managers, creating these types of PPMOs can be seen as removing substantial degrees of autonomy, creativity and ownership. As project managers typically value self-determination and loathe formal processes and documentation (Pellegrinelli and Garagna, 2009), they are likely to resist imposed authority by PPMOs that, prima facie, fall short to state value to project managers. Project managers' lack of trust in PPMOs may spark disagreement. In this case, the organisations' leaders may delegate minimally and not very truthfully. In a worst-case scenario, the PPMO will become the common enemy of both groups, leading to collective action to dismantle the PPMO. All in all, a new PPMO without a convincing value proposition in terms of its *supporting, controlling* and *coordinating roles* in PPM, including positive performance contributions, may find itself challenged by its own community.

Second, when assessing an existing PPMO, these roles provide a self-assessment tool to diagnose and chart the existing activity patterns. PPMOs' leaders can thus understand the PPMOs' current involvement in PPM. However, roles also allow for easy mapping of the desired future situation. Thus, new value may easily be generated by re-defining the PMO's purpose and activities (Pellegrinelli and Garagna, 2009). Presenting roles as activity patterns that mirror social behaviour rather than as lists of tasks should be especially beneficial for practitioners in designing, assessing and reshaping their respective PPMOs by offering abstract descriptions. To aid in configuring PPMOs, we summarise the results in a comprehensive framework, contributing a detailed description of the three roles of PPMOs as coordinators, controllers and supporters and their effects on performance (see Fig. 2). A positive consequence of understanding the roles of PPMOs and their effect is to prevent overlapping responsibilities among actors, which can pose conflicts of competencies. This role clarity helps to better position the PPMO as a PPM actor, and the PPMO unit can be assumed to perform more effectively when it is clear what needs to be done (Hall, 2008; Tubre and Collins, 2000).

Third, with the trend of multiple PMOs in organisations that perform specialised tasks or distinct roles, the design and integration of each PMO within such a multi-project environment becomes crucial. The three roles help to manage the interconnectedness of multiple PPMOs. In a typical scenario, if one PMO only fulfils one out of the three proposed roles and another PMO fulfils the other two roles, both parties need to be aware of their foci to avoid conflicts of competence (Müller et al., 2011).

Finally, by differentiating three roles, this study reminds practitioners of the need for the embeddedness of PPMOs. By considering embeddedness the transparency of PPMOs' mission and action is augmented (Hobbs and Aubry, 2010).

9.2. Limitations and future research

Some limitations need to be addressed. Two often-cited activities of PPMOs, "human resource management tasks" and "customer interface", failed to load in our analysis. These items were dropped, and are not included in the model. Therefore, it is unclear who performs human resource-related tasks, such as recruiting and selecting personnel for PPM, as well as motivational tasks or the execution of a performance incentive system. Moreover, PPMOs' interface activities with internal and external stakeholders, such as customers, are unclear.

The sample for this analysis is comprised of six national subsamples. The German and Swiss samples were generated from fewer items (7 items) compared to the Austrian, Canadian, Finnish and South Korean samples (15 items). This variation in items means that missing values had to be complemented for four items, two in the coordinating role and one in the controlling and supporting roles, respectively, in part of the database.

Future research should follow up on the effort to make sense of the proposed PMO tasks, such as "customer interface" and "human resources". These tasks echo typical activities adopted in practice by PPMOs but have not been successfully included in analyses thus far (compare, e.g., Hobbs and Aubry, 2007). It may be necessary to attempt a re-conceptualisation of these items to accurately measure them.

Moreover, the supporting role of PPMOs requires more attention because of its critical relationship to success, at least from a theoretical standpoint. The impact on PPM quality has not been significant, but a direct effect exists on average single project success. These mixed findings may serve as a starting point for future research.

The theme of this study may be extended to further research into PMOs' various and varied roles depending on their location in the hierarchy and within the multi-project environment. Future research should analyse the process beyond project management maturity (Pinto et al., 2010), which relies heavily on the notion of progression and transition and fails to establish a link to performance.

Acknowledgement

Appendix A

Project portfolio management quality

Information quality (6 items, alpha=0.89)

1. The transparency of our project portfolio is very good.
2. We can access all relevant information on a project's status easily and quickly.
3. The presentation of information on the project portfolio is standardised at the top management level.
4. Project and line managers are continuously provided with relevant information on the entire project portfolio.
5. Project status and resource information can be interpreted easily and quickly.
6. Exactly those status and resource information are delivered that are necessary for decision making.

Allocation quality (5 items, alpha=0.81)

1. We allocate human resources to projects quickly and reliably.
2. Resource allocation is carried out consistent with the agreed prioritisation.
3. Line managers always adhere to their resource commitments.
4. We are able to adapt our portfolio quickly to changing goals.
5. Overall, we allocate resources smoothly and without problems.

Cooperation quality (3 items, alpha=0.78)

1. Our project teams support each other (in cases of bottlenecks or content-related problems).
2. In cases of problems, project managers try to solve them directly among each other.
3. Overall, there is very good cooperation among our projects.

Project portfolio success

Average single project success (4 items, alpha=0.75)

1. On average, our projects have high schedule adherence.
2. On average, our projects have high budget adherence.
3. On average, our projects have high quality adherence.
4. On average, our projects are completed with high customer satisfaction.

References

Archer, N.P., Ghasemzadeh, F., 1999. An integrated framework for project portfolio selection. International Journal of Project Management 17 (4), 207–216.

Artto, K.A., Dietrich, P.H., 2004. Strategic business management through multiple projects. In: Morris, P.W.G., Pinto, J.K. (Eds.), The Wiley Guide to Managing Projects. John Wiley & Sons, Hoboken, NJ, pp. 144–176.

Atkinson, R., 1999. Project management: cost, time and quality, two best guesses and a phenomenon, it's time to accept other success criteria. International Journal of Project Management 17 (6), 337–342.

Aubry, M., Hobbs, B., 2011. A fresh look at the contribution of project management to organizational performance. Project Management Journal 42 (1), 3–16.

Aubry, M., Hobbs, B., Müller, R., Blomquist, T., 2010a. Identifying forces driving PMO changes. Project Management Journal 41 (4), 30–45.Aubry, M., Müller, R., Hobbs, B., Blomquist, T., 2010b. Project management offices in transition. International Journal of Project Management 28 (8), 766–778.

Aubry, M., Richer, M.-C., Lavoie-Tremblay, M., Cyr, G., 2011. Pluralism in PMO performance: the case of a PMO dedicated to a major organisational transformation. Project Management Journal 42 (6), 60–77.

Blomquist, T., Müller, R., 2004. Program and portfolio managers: analysis of roles and responsibilities. In: Slevin, D.P., Cleland, D.I., Pinto, J.K. (Eds.), Innovations. Project Management Research 2004, Newtown Square, PA, pp. 229–242.

Blomquist, T., Müller, R., 2006. Practices, roles, and responsibilities of middle managers in program and portfolio management. Project Management Journal 37 (1), 52–66.

Burton, R.M., Obel, B., DeSanctis, G., 2011. Organizational Design: A Step-by-step Approach, 2nd ed. Cambridge University Press, New York, NY.

Chao, R.O., Kavadias, S., 2008. A theoretical framework for managing the new product development portfolio: when and how to use strategic buckets. Management Science 54 (5), 907–921.

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. Wiley, New York, pp. 331–364.

Crawford, L., 2004. Patterns of support for corporate delivery capability. PMISA Conference, 2004, Johannesburg, South Africa.

Crawford, L., 2010. Deconstructing the PMO. EURAM, 2010, Rome, Italy.

Crawford, L., Hobbs, B., Turner, R., 2005. Project Categorization Systems: Aligning Capability with Strategy for Better Results. Project Management Institute, Inc., Newtown Square, PA.

Crawford, L., Cooke-Davies, T., Hobbs, B., Labuschagne, L., Remington, K., Chen, Ping, 2008. Governance and support in the sponsoring of projects and programs. Project Management Journal 39, 43–55.

Dai, C.X., Wells, W.G., 2004. An exploration of project management office features and their relationship to project performance. International Journal of Project Management 22 (7), 523–532.

Dammer, H., Gemünden, H.G., 2007. Improving resource allocation quality in multi-project environments: evaluating the effects of coordination mechanisms. EURAM, 2007, Paris, France.

Dammer, H., Gemünden, H.G., Lettl, C., 2006. Qualitätsdimensionen des Multiprojekt-Managements. Eine konzeptionelle Analyse. Zeitschrift für Führung und Organisation 75, 148–155.

Dietrich, P., Lehtonen, P., 2005. Successful management of strategic intentions through multiple projects — reflections from empirical study: selected papers from the Sixth Biennial Conference of the International Research Network for Organizing by Projects. International Journal of Project Management 23 (5), 386–391.

DiMaggio, P.J., Powell, W.W., 1983. The iron cage revisited: institutional isomorphism and collective rationality in organizational fields. American Sociological Review 48 (2), 147–160.

Dinsmore, P.C., 1999. Winning in Business with Enterprise Project Management. AMACOM, New York, NY.

Dye, L.D., Pennypacker, J.S. (Eds.), 1999. Project Portfolio Management: Selecting and Prioritizing Projects for Competitive Advantage. Center for Business Practices, West Chester, PA.

Dye, L.D., Pennypacker, J.S., 2002. Project portfolio management and managing multiple projects: two sides of the same coin? In: Dye, L.D., Pennypacker, J.S. (Eds.), Managing Multiple Projects: Planning, Scheduling, and Allocating Resources for Competitive Advantage. Dekker, New York, USA, pp. 1–10.

Frese, E., von Werder, A., Maly, W. (Eds.), 1993. Zentralbereiche: Theoretische Grundlagen und praktische Erfahrungen. Schäffer-Poeschel Verlag, Stuttgart.

Gemünden, H.G., Dammer, H., Jonas, D., 2008. Die Zusammenarbeit der Akteure im Multiprojektmanagement. In: Steinle, C., Eßeling, V., Eichenberg, T. (Eds.), Handbuch Multiprojektmanagement und -controlling. Projekte erfolgreich strukturieren und steuern, Schmidt, Berlin, pp. 31–47.

Hall, M., 2008. The effect of comprehensive performance measurement systems on role clarity, psychological empowerment and managerial performance. Accounting, Organizations and Society 33 (2–3), 141–163.

Hendriks, M.H., Voeten, B., Kroep, L., 1999. Human resource allocation in a multi-project R&D environment: resource capacity allocation and project

portfolio planning in practice. International Journal of Project Management 17 (3), 181–188.

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.

Hobbs, B., Aubry, M., 2010. What really effects the performance of PMOs. EURAM, 2010, Rome, Italy.

Hobbs, B., Aubry, M., 2011. A typology of PMOs derived using cluster analysis and the relationship with performance. IRNOP X, 2011, Montreal, Canada.

Hurt, M., Thomas, J.L., 2009. Building value through sustainable project management offices. Project Management Journal 40 (1), 55–72.

Jonas, D., 2010. Empowering project portfolio managers: how management involvement impacts project portfolio management performance. International Journal of Project Management 28 (8), 818–831.

Jonas, D., Kock, A., Gemünden, H.G., 2010. The impact of portfolio management quality on project portfolio success. EURAM, 2010, Rome, Italy.

Jonas, D., Meskendahl, S., Kock, A., Gemünden, H.G., 2011a. Projektportfoliomanagement — Jenseits der Prozessmodelle. In: Gessler, M. (Ed.), Projekte erfolgreich managen. TÜV Media, Köln, pp. 1–20.

Jonas, D., Kock, A., Schulz, C., Gemünden, H.G., 2011b. Keeping organizational control: the role of middle management in project portfolio management. 71st Annual Meeting of Academy of Management, 2011, San Antonio, USA.

Kendall, G.I., Rollins, S.C., 2003. Advanced Project Portfolio Management and the PMO: Multiplying ROI at Warp Speed. J. Ross Publishing, Boca Raton.

Kristian, K., 1995. In search of relevance: project management in drifting environments: project management and temporary organizations. Scandinavian Journal of Management 11 (4), 335–346.

Kwak, Y.H., Dai, C.X., 2000. Assessing the value of project management offices (PMO). PMI Research Conference (Paris, France).

Lechler, T., Cohen, M., 2009. Exploring the role of steering committees in realizing value from project management. Project Management Journal 40 (1), 42–54.

Lundin, R.A., Söderholm, A., 1995. A theory of the temporary organization: project management and temporary organizations. Scandinavian Journal of Management 11 (4), 437–455.

Lundin, R.A., Steinthorsson, R.S., 2003. Studying organizations as temporary. Scandinavian Journal of Management 19 (2), 233–250.

Mackenzie, K.D., 1986. Organizational Design: the Organizational Audit and Analysis Technology. Ablex Publishing Corporation, Norwood, NJ.

Marsh, D., 2001. The Project and Programme Support Office Handbook. Project Manager Today Publications, UK.

Martinsuo, M., Lehtonen, P., 2007. Role of single-project management in achieving portfolio management efficiency. International Journal of Project Management 25 (1), 56–65.

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.

Morris, P.W.G., Jamieson, A., 2005. Moving from corporate strategy to project strategy. Project Management Journal 36 (4), 5–18.

Morrison, E.W., 1994. Role definitions and organizational citizenship behavior: the importance of the employee's perspective. Academy of Management Journal 37 (6), 1543–1567.

Müller, R., 2009. Project Governance. Gower Publishing Limited, London, UK.

Müller, R., Martinsuo, M., Blomquist, T., 2008. Project portfolio control and portfolio management performance in different contexts. Project Management Journal 39 (3), 28–42.

Müller, R., Aubry, M., Glückler, J., 2011. A relational typology of project management offices. IRNOP X, 2011, Montreal, Canada.

Pellegrinelli, S., 2011. What's in a name: project or programme? International Journal of Project Management 29 (2), 232–240.

Pellegrinelli, S., Garagna, L., 2009. Towards a conceptualisation of PMOs as agents and subjects of change and renewal. International Journal of Project Management 27 (7), 649–656.

Petit, Y., Hobbs, B., 2010. Project portfolios in dynamic environments: sources of uncertainty and sensing mechanisms. Project Management Journal 41 (4), 46–58.

Pinto, J.K., Slevin, D.P., 1988. Critical success factors across the project life cycle. Project Management Journal 19 (3), 67–75.

Pinto, A., Cota, M., Levin, G., 2010. The PMO maturity cube, a project management office maturity model. PMI Research Conference, 2010, Washington, DC. USA.

Platje, A., Seidel, H., Wadman, S., 1994. Project and portfolio planning cycle: project-based management for the multiproject challenge. International Journal of Project Management 12 (2), 100–106.

Podsakoff, P.M., MacKenzie, S.B., Lee, J.-Y., Podsakoff, N.P., 2003. Common method biases in behavioral research: a critical review of the literature and recommended remedies. Journal of Applied Psychology 88 (5), 879–903.

Powell, M., Young, J., 2004. The project management support office. In: Morris, P.W.G., Pinto, J.K. (Eds.), The Wiley Guide to Managing Projects. John Wiley & Sons, Hoboken, NJ, pp. 937–969.

Project Management Institute (PMI), 2008. A Guide to the Project Management Body of Knowledge, 4th ed. Project Management Institute, Inc, Newtown Square, PA.

Shenhar, A.J., Dvir, D., Levy, O., Maltz, A.C., 2001. Project success: a multi-dimensional strategic concept. Long Range Planning 34 (6), 699–725.

Thomas, J.L., Mullaly, M.E., 2008. Researching the Value of Project Management. Project Management Institute, Inc, Newtown Square, PA.

Tubre, T.C., Collins, J.M., 2000. Jackson and Schuler (1985) revisited: a meta-analysis of the relationships between role ambiguity, role conflict, and job performance. Journal of Management 26 (1), 155–169.

Turner, R., Keegan, A., 2001. Mechanisms of governance in the project-based organization: roles of the broker and steward. European Management Journal 19 (3), 254–267.

Unger, B.N., 2012. Das Project Management Office: strategische PMOs erfolgreich in komplexen Projektlandschaften einsetzen. Zeitschrift für Führung + Organisation (zfo) 81 (1), 11–16.

Unger, B.N., Kock, A., Gemünden, H.G., Jonas, D., 2012. Enforcing strategic fit of project portfolios by project termination: an empirical study on senior management involvement. International Journal of Project Management 30 (4).

Webster, J., Wong, W.K.P., 2008. Comparing traditional and virtual group forms: identity, communication and trust in naturally occurring project teams. International Journal of Human Resource Management 19 (1), 41–62.

Werder, A.v., 2011. Corporate governance and stakeholder opportunism. Organization Science 22 (5), 1345–1358.