Please cite this article as: *T. Laine, T. Korhonen and P. Suomala, The dynamics of repairing multi-project control practice: a project governance viewpoint, International Journal of Project Management, https://doi.org/10.1016/j.ijproman.2020.06.010*

The dynamics of repairing multi-project control practice: a project governance viewpoint

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Abstract

This paper examines the development of enabling control practice, within flexible project governance. Enabling control would interactively help reach the objectives set for multi-project new product development (NPD) management and, especially support the different managerial actors involved. Previous research does not adequately cover the dynamics and interplay between different managerial actors in developing management control for multi-project NPD. This paper responds to the question: How can actors interactively repair multi-project control practice within project governance? The paper takes advantage of a longitudinal action research endeavor (2009-2014), featuring research interventions on developing project control in subsequent NPD projects. The researchers collected empirical data from 130 documented project meetings, workshops, and interactions, and the data were qualitatively analyzed to identify critical steps in multi-project control practice repair. First, as a contribution to the project management literature, we show how the repair effort, as organizational interplay, may effectively, and temporarily or permanently repair inoperative NPD control practice in subsequent projects. Second, we contribute to the literature on enabling control by showing how repairing multi-project control system can be a starting point for centralized control repair, requiring commitment from different management levels. Third, by bridging the two research areas, we identify possibilities for further research.

Keywords

Multi-project management; Project Governance; Control; Enabling Control; Repair; New product development; Action research; Interventionist research; Management Accounting.

1 Introduction

Project governance can traditionally be seen to support attaining project outcomes, in line with the strategy of an organization (e.g., Müller and Turner, 2007; Müller, 2009). It would be critical that management – towards that strategy – is purposeful for each individual project with interdependencies and synergies between projects (Cooke-Davies, 2002; Verma and Sinha, 2002; Aubry et al., 2007; Meskendahl, 2010; Martinsuo, 2013; Teller et al., 2012; Unger et al., 2014; Martinsuo and Hoverfält, 2018). This way, it would be easier to align subunit goals with the goals of the whole organization (Gerdin et al., 2019). However, changes in complex multi-project environments challenge the project governance and control

practice, as existing governance might not match the evolving requirements for managing operations (Brown and Eisenhardt, 1997; Korhonen et al., 2013) – thereby flexibility is required from project governance (Müller et al., 2014; Müller et al., 2016). Otherwise, inoperative governance and control practice may be noticed, possibly leading to hampered performance. In this case, (management) control[1] means both using accounting information for planning, budgeting and performance measurement, and enacting organizational structures, rewards or even culture (Malmi and Brown, 2008).

Control also in projects needs to be dynamic to continuously fit the strategy and dynamic business context of an organization (Korhonen et al., 2013). This aspect has been underemphasized in the current project governance literature – and would benefit from more detailed examination (Müller and Turner, 2007; Ahola et al., 2014; Müller et al., 2014) to allow project-to-project learning (Newell et al., 2006). Currently, there is too little knowledge on management control practice within multi-project management (Clegg et al., 2018; Vuorinen and Martinsuo, 2018) to control the interdependencies and synergies between projects. Research is needed to understand how multi-project management and governance could be developed through interaction among actors, and more precisely we need to understand better how actors interactively provide flexibility into multi-project management (knowledge gap 1) (Clegg et al., 2018; Breese et al., 2020; Martinsuo and Geraldi, In press). Here, by actors we mean managers and other individuals involved in multi-project management.

To more thoroughly understand continuously supportive governance for project-based organizations (Thiry and Deguire, 2007), this paper uniquely mobilizes the concept of *enabling control* (Adler and Borys, 1996; Ahrens and Chapman, 2004). While enablers for project governance have already been studied (see, Müller et al., 2014; Müller et al., 2016), and governance itself can be seen as an enabler for collaboration and reflection (Biesenthal and Wilden, 2014), the element of improving project controls within project governance has received less detailed attention.

This paper examines multi-project management practice that features interplay between different-level actors within organizations (Biesenthal and Wilden, 2014). The enabling management control practice (Adler and Borys, 1996; Ahrens and Chapman, 2004) means management control practice that has certain characteristics that help managers to understand their overall business context and management control practice (*transparency*), take initiative in an adaptive manner (*flexibility*), and finally develop the practice together with other actors (*repair*). Essentially, repair means error-proofing management control practice, featuring the willingness and ability of different actors to take actions regarding the inoperative management control practice. (Wouters and Roijmans 2011; Ahrens and Chapman, 2004).

Thus, the unit of observation in the paper is the development of enabling new product development (NPD) control[2] practice. More particularly, within the idea of enabling control, this paper focuses on *the process of repairing management control practice in the multi-project* (NPD) context, by analyzing NPD projects from multiple related perspectives. In so doing, the paper provides new understanding on "micro-level issues dealing with multi-project management in a dynamic context" (the Special Issue call's text) and unveils the interlinkages between micro-level, local inoperative controls and the need for repairing broader multi-project management control that enables strategy enactment (Müller and

[1] "Management control" and "control" have been used as synonyms in the paper.
[2] "Management control for NPD" and "NPD control" are used as synonyms in the paper.

Turner, 2007; Müller, 2009). Previous research does not adequately cover the detailed dynamics and interplay between different managerial actors in repairing inoperative control practice within project governance for multi-project NPD (knowledge gap 2) (Ahrens and Chapman, 2004; Müller et al., 2014; Englund and Gerdin, 2015; Müller et al., 2016).

As a response, *the paper examines enabling management control practice* (Adler and Borys, 1996; Ahrens and Chapman, 2004)*, within flexible project governance*[3] (Müller et al., 2014; Müller et al., 2016)*, that would interactively support the realization of the objectives set for multi-project NPD management* (Carbonell and Rodriguez-Escudero, 2013) *and, especially support the different actors involved* (Wouters and Roijmans, 2011; Clegg et al., 2018).

Altogether, to address the need for further research (knowledge gaps 1-2), this paper responds to the question: *How can actors interactively repair multi-project control practice within project governance?* We answer this research question by using data from an action research project that featured research interventions in a multinational machinery manufacturing company, "OEM" (2009-2014) (e.g., Suomala et al. 2014; Lyly-Yrjänäinen et al. 2017). The repair process of multi-project control practice at different levels was witnessed, as the researchers were engaged with the development of OEM's NPD project management process. Empirical data were collected from 130 documented project meetings, workshops, and other interactions, with interventionist researchers participating actively. The data were qualitatively analyzed to identify critical steps in repairing control practice. The interventionist action research setting is not to promote the efforts taken by the researchers, but more readily it enabled in-depth access to the development of the NPD control practice. This way this paper reports the empirical findings of the uniquely in-depth case narrative and lay the foundation for the embedded contributions of this paper.

Indeed, first, we contribute to the literature on multi-project management (e.g., Martinsuo, 2013; Laine et al., 2016a; Clegg et al., 2018; Martinsuo and Hoverfält, 2018; Martinsuo and Geraldi, In press) by building on project governance and control (Müller and Turner, 2007; Müller, 2009; Ahola et al., 2014; Müller et al., 2014; Müller et al., 2016; Müller et al., 2017). In particular, we show how the repair effort, as organizational interplay, may effectively, and temporarily or permanently repair and thus develop NPD control practice for subsequent projects. The paper identifies the mechanisms of a repair process, including the prerequisites, actors involved, process phases and consequences (Vuorinen and Martinsuo, 2018) as a result of collective sensemaking (Laine et al., 2016a; Martinsuo and Geraldi, In press).

Second, we contribute to the literatures on enabling control in multi-project NPD (e.g., Jørgensen and Messner, 2009; Jordan and Messner, 2012; Englund and Gerdin, 2015) and enablers for project governance (Müller et al., 2014; Müller et al., 2016) by showing how repairing a multi-project control system can be a starting point for centralized (i.e. encompasses all units and is managed top-down) control system repair, requiring commitment from different management levels.

Finally, we bridge the separate two literatures: (a) the literature of enablers of project governance (Müller et al., 2014; Müller et al., 2016) and (b) that of enabling control (Adler and Borys, 1996; Ahrens and Chapman, 2004; Wouters and Wilderom, 2008; Chapman and Kihn, 2009; Wouters and Roijmans, 2011; Jordan and Messner, 2012; Englund and Gerdin, 2015), thereby *suggesting a possibly fruitful area for future research*.

[3] In this paper, flexible project governance is defined "as flexibility in the idiosyncrasy of governance approaches and authority to implement these" (Müller et al., 2014, p. 1317).

The paper is organized as follows: our literature review addresses multi-project management in NPD, with focus on governance and control as well as enabling and coercive modes of management control and the dynamics of repair within. The action-research part of our work presents our methods of data analysis and the findings from the OEM. The discussion focuses on multi-project NPD control practice and the dynamics of repair as the interplay between different level managers, featuring local accounting and control development. The paper ends with concluding remarks.

2. Literature review

In this paper, we use project governance as our domain theory, and we use theory of enabling control as our method theory (Lukka and Vinnari, 2014). This way we use the theory of enabling control to understand how NPD project controls can be developed across projects, in the multi-project management context. To make this possible, first, we review the literature on the flexibility of project governance showing an important knowledge gap therein. Then we review the literature on governance of multi-project NPD. Finally, we review the literature of enabling control, identifying another knowledge gap.

2.1 Flexibility of project governance

With the lack of unified definition to *project governance* (Ahola et al., 2014), we resort to the distinction that project governance is characterized by use of *principles, structures and processes* (Crawford and Cooke-Davies, in Ahola et al., 2014), to achieve workable "goals means and ends" (Müller, 2009, p. 64) and monitor project performance (Turner, 2006), to ultimately guide projects towards contribution to organizational success (Müller, 2009; Müller et al., 2014; 2016; 2017). However, purposeful governance needs to be applied to match individual projects, programs and portfolios (Müller and Turner, 2007). Consequently, purposeful types of control need to take place on a project-basis: "to control the appropriate use of the resources provided; the application of appropriate processes, tools, techniques and quality standards to create the organization's products or services, as well as checking the need or marketability of the organization's products and services over time" (Müller, 2009, p. 3).

To continuously match governance to the requirements of each project, project governance requires flexibility (Müller et al., 2014; Müller et al., 2016). Indeed, there is a need for flexibility in project governance because of strategic changes (Miller and Hobbs, 2005) and the overall wish to be more responsive to customer requirements than a hierarchical line organization (Turner and Keegan, 1999). Project-based organizations need to make sure that they "are able to pursue different models of operational control and governance, which enable them to achieve some of the benefits of classical management while giving them customer focus and flexibility" (Turner and Keegan, 1999, p. 309). But where do the pressures for being flexible stem from? Prior research has shown that changes to alter project governance have been more significant in terms of leadership (CEO decisions) than contextual changes such as market situations (Müller et al., 2016). Also, uncertainties regarding the project portfolio have been identified as drivers for reaction from management controls in multi-project management (Korhonen et al., 2014; Martinsuo et al., 2014). However, (*knowledge gap 1*) in the wider context of multi-project management, there is too little knowledge on practices and actors' roles in multi-project management to control uncertainties, interdependencies and synergies, to provide such flexibility in an interactive manner (Clegg et al., 2018).

2.2 Governance for multi-project NPD

Due to inherent uncertainties about how to achieve innovations, NPD projects constitute a basis for governance much different from the control of strictly pre-defined projects e.g. in the construction industry (Dinsmore and Rocha, 2012). Control in multi-project NPD can manifest itself in discursive practices – and the change (or stability) of control stems from often-political discourses and practices (Martinsuo, 2013). Clegg et al. (2018) claim that discursive practices among actors influence multi-project management, to answer questions related to prioritizing, resourcing, adjusting or terminating projects, which would be an important area for academic researchers to examine. Vuorinen and Martinsuo (2018, p. 584), noticed that multi-project (e.g. program) management research needs to "understand program actors as agents whose interests, needs and actions shape the way in which the program integration takes place and how the program performs its change task for the parent organization". Indeed, it would be highly valuable for multi-project NPD management research to understand the intersection of agency and control. In practice, to understand this intersection, researchers should possibly "complement the program manager centric studies with research about the other actors in the core and extended program team, and their actions in program" (Martinsuo and Hoverfält, 2018, p. 144). This is a clear further research area pinpointed by earlier research.

Also, the NPD management literature acknowledges that cooperation among actors is fundamental for performance in multi-project NPD. The literature on NPD control has focused on strategies, uncertainties, and other contextual variables underlying the adoption or non-adoption of management control tools and devices (Davila, 2000; Davila et al., 2009a). Studies have emphasized the active, dynamic and supportive role of NPD control (Brown and Eisenhardt, 1997; Davila et al., 2009b; Mouritsen et al., 2009; Jørgensen and Messner, 2010; Moll, 2015; Curtis and Sweeney, 2017). Such role is desired to overcome ambiguities related to strategic NPD activities (Laine et al. 2016a), to provide both clear rules and flexibility for cooperative NPD activities (Van der Meer-Kooistra and Scapens, 2015), and to sustain dynamic tensions enabling performance (Curtis and Sweeney, 2017).

Innovation and creativity can take place by building a "strong social structure", i.e. a "cohesive team of people who bring the necessary skills and experience to the project and are mutually committed to its successful completion" (van der Meer-Kooistra and Scapens, 2015, p. 88). Project participants can be used as providers of financial information and set boundaries, e.g., project budgets and target prices/costs (such as "project leaders" and "cost engineers" in, van der Meer-Kooistra and Scapens, 2015). However, more research is needed on inter-functional cooperation in R&D (Müller-Stewens and Möller, 2017), to understand how centralized control systems work locally in multi-project NPD organizations. This is an area for further inquiry. It is yet to be thoroughly understood how multi-level interaction shapes local project control between projects and changes the understanding and use of global control systems in subsequent multi-project NPD activities. We do already know that different-level managers can put forward, for example, new control prototypes in NPD projects and shape and direct the development of a control system in an interactive manner (Laine et al., 2016b). Such managers can also focus discussions on certain impacts within multi-project management, to reach organizational objectives on a wider scale (Laine et al., 2016a). Still, studies are needed to "try to understand the dynamics of rules in product development better, uncover the implications of having different types of rules, and comprehend how the sensemaking of these influences decision making in projects and at portfolio and gate meetings" (Christiansen and Varnes, 2009, pp. 516-517). Such studies could benefit from bridging the literatures of enablers for project governance and enabling control, as is the case in this paper.

Altogether, multi-project management in NPD requires efforts from actors involved in the project management office (Aubry et al., 2007) and in the financial control department (Laine et al., 2016a; 2016b). The interplay between and the complementary nature of the centralized and local management control could result in a well-functioning practice of management control. However, we do not know enough about the dynamics of such interplay between different managerial levels in creating well-functioning management controls for multi-project management.

2.3 Enabling and coercive controls and the dynamics of repair

By its very nature, management control sets boundaries and guide action, but those being controlled or held accountable by calculative practices retain some freedom of action (Miller, 2001). As the concepts of both *control* and *facilitation* are simultaneously present in management control, the balance between these two opposing processes must be carefully deliberated. The research inquiry on enabling/coercive formalization initiated by Adler and Borys' (1996) seminal work has been extended to research on accounting, with a focus on enabling control (Ahrens and Chapman, 2004; Chapman and Kihn, 2009; Jordan and Messner, 2012) and enabling accounting information (Englund and Gerdin, 2015; Wouters and Roijmans, 2011; Wouters and Wilderom, 2008). These studies examine the enabling control practice that supports employee motivation and performance and, eventually, the effectiveness of the organization.

Largely in line with interpretations already developed in the management control literature, we interpret the following (italicized) characteristics of an enabling control (Adler and Borys, 1996). The characteristics of enabling control can be seen as a way to connect project control to timely internal and external influences on project governance, in order to result in organizations performance (Müller and Turner, 2007; Müller, 2009). The first of these characteristics, *global transparency*, represents the visibility of the overall organizational context from the perspective of a particular manager (Ahrens and Chapman, 2004). Therefore, global transparency for this local manager controlled by a centralized system is the visibility of company-level business objectives and the local targets that the manager must achieve. The manager does not have to agree with (for example) budget targets as long as the rationality of the goal is visible. Moreover, targets set for other functions and for other local managers may also be visible to that manager, to a certain extent, to enhance his/her understanding of the overall business context (see also Hall, 2010).

Internal transparency refers to a manager's understanding of the internal functioning of a local unit and the visibility of its current status (cf. Wouters and Roijmans, 2011). If introduced properly, internal transparency enables managers to respond locally to the limitations of a centralized system and to find the best possible ways to develop control.

Flexibility refers to the ability to make decisions based on the understanding of a function, or the status of the overall system, without direction from top management (cf. Wouters and Roijmans, 2011). At its most extreme, flexibility may even mean switching off centralized control if that is required (Ahrens and Chapman, 2004). Such actions may indicate a clear need for repairing the centralized system.

Repair, as noted, refers to the possibility that a control system may be error-proofed, with the help of different actors' willingness and ability to take action (Wouters and Roijmans, 2011). Repair may be performed by individual users (decentralized repair) or resources for developing control may be allocated at the functional/company level (centralized repair) (Ahrens and Chapman, 2004). Sometimes, top management intervention may be needed to

ensure effective repair of a management control (Jørgensen and Messner, 2009). We follow Wouters and Roijmans (2011) by primarily focusing on the local response to limitations of a centralized control system. Wouters and Roijmans (2011) adopted a perspective illuminating repair at different organizational levels in their study of the local development of enabling accounting information. However, the significant influence of top management commitment and intervention(s) on repairing the centralized system was identified by Jørgensen and Messner (2009).

It is important to understand repair as one dimension of the enabling control practice, taking different forms at different levels of an organization. It is important to understand, how managers at different roles and levels within the organizations identify, make sense of and overcome the challenges of controlling operations (see e.g., Laine et al., 2016a). Earlier studies have shown that control systems can be dynamically kept up-to-date either by systematic revision (Kennerley and Neely, 2003) or by ad hoc supplementation of static systems with more dynamic measures or informal changes (Lukka, 2007; Korhonen et al., 2013). However, (*knowledge gap 2*) the interplay between local employee and top management repair efforts remains under-researched. While it is established that certain repair efforts can help improve an inadequate control practice and these repair efforts could take place at different levels of an organization (Mundy, 2010; Carbonell and Rodriguez-Escudero, 2013; Englund and Gerdin, 2015), much less is known about the mechanism of the actual repair processes as a joint effort, initiated locally, but jointly taken by local, middle, and top managers.

Englund and Gerdin (2015) pointed out that the centralized metrics can be transformed into supportive tools through middle (or local) manager initiatives (see also Dossi and Patelli, 2008). However, we do not sufficiently know how multi-level management control practice could be repaired to enable such transformation, i.e., what kind of interplay by managers at multiple levels is required to attain supportive control practice (Wouters and Roijmans, 2011).

Altogether, despite the potential value of management control practice for multi-project NPD, the process of repairing management control at multiple levels has not been adequately examined, inside and outside project management offices (Aubry et al., 2007; Martinsuo and Hoverfält, 2018). Multi-project management in NPD represents a challenging, yet potentially fruitful context for unveiling the repair process.

3. Methodology

The empirical part of this paper is based on action research (Lewin, 1946) featuring research interventions (Suomala et al., 2014; Lyly-Yrjänäinen et al., 2017) in a multinational machinery manufacturing company (2009-2014) in [a country]. The company is an original equipment manufacturer (OEM), with a turnover of more than 1 billion euros, providing a range of high-tech equipment and after sales. The company is a part of a larger corporation that has several other product areas, but the present study is focused primarily on one division of this corporation.

Our longitudinal action research data were collected in three phases: during the execution of a major NPD project (2009–2011); during the subsequent production ramp-up (2011–2012); and in follow-up interviews covering subsequent NPD projects (2012–2014). In the first NPD project, a new product, pseudonymously termed “New Alpha,” was designed by a local NPD organization. Research interventions were undertaken primarily 2009–2012 as new business impact analysis, and thereby financial information were made available to NPD personnel by

two researchers (two of the authors) that worked with the OEM's representatives (see Figure 1).

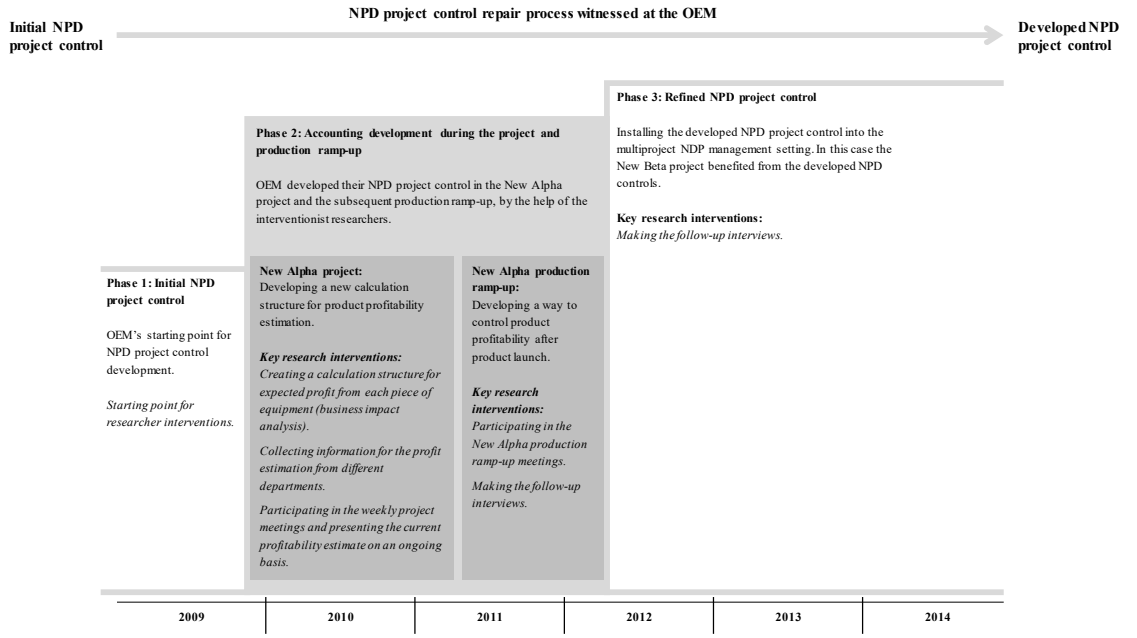

Figure 1. *The timeline of OEM's NPD project control development and researchers' interventions therein.*

Regarding control in the subsequent NPD projects, we focus on another project, "New Beta", that took place in the same organization. New Beta featured repaired control elements that indicated the flexibility of project governance (Müller et al., 2014; Müller et al., 2016).

Empirical data were collected from 130 documented project meetings, workshops, and other interactions, and were qualitatively analyzed to identify critical steps in multi-project control practice repair (Table 1). At least one of the researchers was present in every one of those 130 occasions, with a role ranging from a participant observer to interviewer. These roles are conveyed in Table 1 more specifically. In addition to these occasions, the empirical data also included documentation on the newly developed project controls, over 70 emails, phone discussions, and dozens of other items (e.g., bills of material, ERP system documents, and project planning documents), that provided additional information about the NPD control practice and its development.

Table 1. *Overview of documented meetings.*

Characteristics of the meetings	*Number of meetings witnessed*	*Interventionist researchers' role*	*Key intervention*
Weekly project meeting	52	Participant observer	Providing cost estimate calculations
Steering group meeting	8	Participant observer	Facilitation
Ramp-up meetings	7	Participant observer	Live observation
Interviews	4	Interviewer	Facilitation
Follow-up interviews	12	Interviewer	Facilitation
Others: Primarily informal meetings	47	Participant observer	Collection of cost data
Total	130		

Roles present in the meetings	*Present in how many meetings*	*Different people*
Project manager	68	4
Product manager	21	2
R&D director	23	2
Purchasing manager	34	3
Production manager	27	3
Design manager & Research manager	38	4
Senior designer & Designer	59	18
Proto assembly worker	22	2
Sales director	10	2
Warranty & After sales managers	3	4
Business controller	13	3
Total		47

As shown in Table 1, up to 47 individuals were involved in the meetings; these formed a highly representative sample of different organizational voices within multi-project NPD management. Data were gathered e.g. from interactions with the *R&D director*, who is responsible for the NPD organization ("*portfolio management"*, in Müller, 2009), the *product manager*, who is responsible for the performance of the product under development (i.e. "*project sponsor"*, ibid.), and the *project manager*, who is responsible for meeting the project targets (as in, ibid.). Additionally, we met with *controllers* ("*project control" for the steering group*, ibid.) more than 10 times. Other project participants ("*stakeholders"*, ibid.) are outlined in Table 1; data were also obtained from interactions with these individuals. Our empirical data are composed largely of detailed notes of the weekly project meetings of the studied project, supplemented by those of *steering group* meetings (as in, ibid.) conducted during the NPD project and later during formal *production ramp-up meetings ("implementation of major deliverables"*, ibid., p. 71*)*. Later, when subsequent NPD projects had started, *two controllers*, *an R&D director*, *a product manager*, *a project manager*, and *purchasing* and *production* representatives ("*stakeholders"*, ibid.) were formally interviewed.

The unit of observation in the paper is the development of enabling NPD control practice. Furthermore, NPD projects are the primary unit of analysis of the paper, featuring analyses on

single NPD project phases, interlinkages between the projects as well as portfolio level implications. These units of analysis are examined at the OEM, and more specifically the multi-level managers' actions, control tools in use, and related interpretations (e.g., enabling/coercive control) during the repair of NPD control at the OEM.

The 114 meetings (weekly meetings, ramp-up meetings and informal meetings) and 4 interviews serve as the basis of our narrative of the OEM's initial project control and the project control development in the New Alpha project. The 12 follow-up interviews serve as the source of understanding how project controls were developed in subsequent projects (in this case the New Beta project). Hence, we could understand the consequences of project control development at the OEM.

Indeed, our interventionist research project, that took place longitudinally, and benefited from several different types of interactions with the OEM, is a source of strong *descriptive validity*, i.e. whether the researchers are able to provide a truthful account of what actually happened (Maxwell, 1992). In line with Gioia et al. (2012), we build on the informants' account on what has happed (1st order codes and analyses), continuously reflected upon our direct observations, and increasingly reflected upon the gradually sharpening theoretical lenses (2nd order codes and analyses), thus increasing the qualitative rigor of the paper. In this paper, the numerous field notes and earlier reports of the circumstances (in total 130 meetings, 2009-2014, see Table 1) have helped going back to the data when needed, to make sure the account of the OEM's case is truthful (reference omitted for double-blind review). Thereby, the descriptive validity of our narrative is particularly high.

The analysis of qualitative data took place in different rounds, already during the longitudinal research process (in line with Gioia et al., 2012). In the beginning, until spring 2012, the focus was on identifying the challenges in the NPD project control practice, as observed, for example by the R&D director, product manager, project manager and business controller. These findings were analyzed primarily in light of the account provided by the informants (1st-order coded and analyses). As the research project proceeded, the findings seemed to increasingly become related to the notion of enabling and coercive control practice, and thus the coding and analyses were focused accordingly (2nd-order coded and analyses).

Since then, one of the authors was in charge of interpreting the field notes and transcriptions of recorded interactions in the light of our theoretical lenses. The other authors commented and supplemented the analysis whenever needed. Our data from the field notes and interview transcriptions was categorized as different meeting types and according to participants. All findings were accompanied with timestamps and they were connected to New Alpha and New Beta projects in order to unveil the development of the NPD control practice across projects.

We categorize our data by distinguishing "top management" (division management), "middle management" (R&D management, product management, business control) and "local" (project management, cost control) viewpoints. We interpret different parties' expressions regarding management control of NPD as "enabling" or "coercive." Altogether, the data can be labeled and categorized as: 1) the organizational levels and managerial roles of the NPD control, 2) the perceptions of the enabling and coercive characteristics of NPD control, 3) the longitudinal development of the NPD control practice (action, reaction, interaction), and 4) the project governance considerations.

Regarding the coding of the data during the analysis, the used codes included the following control aspects: Centralized, Local, Coercive, Enabling, Flexibility, Global transparency, Internal transparency, Repair, [Control]_Portfolio-level, and [Control]_Project-level.

Furthermore, regarding actions, reactions and interactions, we combined different documents, cross-checked the time stamps and sought for triangulation in order to build an extensive, yet detailed narrative on the development of the NPD control practice. This was further confirmed by analyzing the follow-up interviews, after the interventionist action research.

Altogether, these codes were operationalized so that they are, in the current paper, used to illustrate the unit of analysis in this paper: i.e. the development of the NPD control, and help understand how actors at different organizational levels interactively provide flexibility into multi-project management.

As an example of the operationalization of our data analysis, let us take an example:

> *"In fact, at the moment, there is a new project that did not pass Gate 2 because the steering group [very carefully] reviewed the cost target and concluded that it is not a realistic one."* (R&D director 2, 2/2012)

In this case, after repair efforts, internal transparency was increased (i.e. project control became more enabling), but control of passing gates got tighter (i.e. project control for single project became less flexible and more coercive). The multi-project control instead increased in flexibility and global transparency, as more transparent gate decisions and the possibility of making no-go decisions. For another example, if the project model was considered to be restricting the choices made by the R&D director, we interpret this datapoint as coercive, despite all the possible positive aspects of the project model. Or, if the role of the project manager was changed to the second project under examination, we can interpret this as flexibility as perceived by the project manager.

Altogether, our interventionist research access that was exceptionally in depth, made it possible for us to draw these conclusions based on various data points with the R&D Director and other informants. All this enable us to construct Table 2 (in Section 4.6) as synthesis of the empirical findings, and thus summarize the findings according to the different phases of the empirical study. Importantly, we examine the findings in the light of project governance literature: we use organizational levels, characteristics of the enabling control and the existing understanding about project governance to interpret the case findings.

Contributing to the *interpretive validity* of the paper, i.e. that we give meanings to certain phenomena according to what these phenomena mean for people in the studied context (Maxwell, 1992), our interventionist case study is again a source of strength. Indeed, the interventionist research setting, and our in-depth access to OEM's practice, make it possible for us to assess and reassess the meanings given to phenomena and hence continually test the interpretations made – and therefore, the interpretations of the circumstances in this paper have been continually tested and reassessed (reference omitted for double-blind review). The follow-up interviews serve as a validation to our interpretations about how project controls were repaired.

In sum, our evidence from the longitudinal development of the NPD control practice at the OEM and our data analysis was inductive in its way to let the data talk about the development towards more enabling NPD control practice. The iterative nature of our analysis also enabled revisiting the initial interpretations of the enabling characteristics of control along with the analysis. As a result, the aim of the analysis is to provide as rich account as possible regarding the development of the NPD control practice, instead of calculating the number of people or citations bringing up certain issues and perspectives per se. However, the number of occasions, the presence of an extensive number of people and the possibility to witness the

longitudinal development process, with several interventions, reactions and interplay, serves as a possibility for triangulation in this case, strengthening our descriptive and interpretive validity (Maxwell, 1992).

Next, the empirical findings of the paper are presented in the following way. We first describe the initiation of the action-research endeavor and the initial NPD project management challenge (Section 4.1). After that, we focus on the local interpretations on the centralized control system through the NPD project model (4.2). The process of repairing NPD project control is discussed in three phases: accounting development for the studied NPD project (4.3), repair efforts supporting the production ramp-up (4.4), and management control repair for subsequent NPD projects (4.5). This section closes with a summary of the findings (4.6).

4. Findings

4.1 Initial NPD project management challenge at the OEM

At the beginning of the research project in 2009, a stage-gate model for managing NPD projects had only recently been adopted in the OEM to be used for NPD project portfolio selection and management. In general, the adoption of the project model was intended to provide more systematic NPD management for the OEM. In particular, the R&D director identified a clear need for adapting the centralized model to the requirements of the OEM's NPD activities and developing accounting and control to better support the NPD project execution within the centralized model.

Because the OEM had multiple local organizations focusing on different types of products and technologies, there was a need for a local translation of management control for NPD. There was a small number of large-scale projects on innovative high-technology products that should be suitable for a low-volume batch production, and an increased price sensitivity of certain customer groups. These aspects constituted timely challenges for NPD project management.

According to the project model of the OEM, an NPD project typically commenced with a business impact analysis (BIA) proposed by a product manager (*middle management)*. The project was then accepted (or rejected) by a steering group from the division *top management* (Gate 1). The execution of the project began after acceptance (Gate 2). At Gate 3, the design was to be complete and prototype manufacturing would begin. At Gate 4, the product was to be ready for production. The project was to be closed at Gate 5, and responsibility for the product was to be handed back to the product manager.

Accepted projects (i.e., given a "pass" at Gate 2) had exact timeframes, resource allocations, and project-specific objectives. Moreover, objectives set for a project usually included a production cost target derived from the expected sales price and actual costs of existing closely related products, and the desired gross margin.

Following the project model adoption in the OEM, there were newly defined roles and responsibilities set for NPD project execution. The *R&D directors (middle management)*[4] supervised NPD personnel and administered the R&D resource pool. In fact, R&D directors 1

[4] The R&D director changed during execution of the project. R&D director 1 was present in 2009–2010, and he initiated the research project and was present mainly during the NPD project execution, whereas R&D director 2 was responsible for NPD during the later stages of the NPD project, during the production ramp-up of the new product, and during the subsequent NPD projects (commencing in 2011).

and 2 were the conduits between centralized NPD control and local NPD organization; they were in charge of executing the NPD project portfolio within the division under analysis. The *product manager* was part of a wider organization serving a specific customer segment, thus representing an internal customer of NPD outcomes and expected benefits. This product manager participated in the setting of project targets and monitored project execution. The *project manager (local management)* was responsible for execution of the project according to the objectives. The *business controller (middle management)* provided financial information for various purposes, whereas the *cost controller* operated at the level of the single projects *(local management)*. A schematic organizational chart is shown in Figure 2.

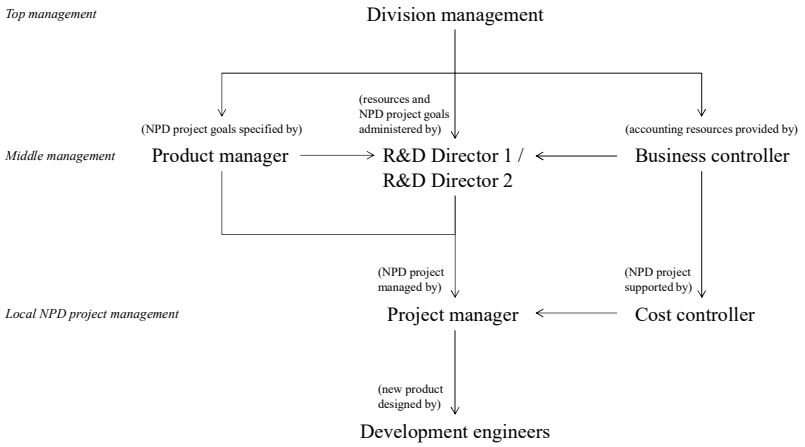

Figure 2. *A schematic organizational chart of NPD personnel in the company.*

The project that intended to design a "New Alpha" product and had multiple objectives, including a production cost target. The researchers were supposed to act as informal NPD cost controllers in the studied project, supporting the organization (see Figure 2 above).

Another unique feature of the studied project was that "New Alpha" was relatively new to the NPD organization as it was previously developed and produced in another, distant unit. The cost target for the product presented by the product manager was based on the other unit's cost information and featured higher relative uncertainty for the people involved in the project (according to R&D director 1). Altogether, the starting point of the New Alpha project was challenging for the OEM.

The examination of the New Alpha project revealed inadequacies related to the NPD project model and its enabling characteristics, due to related uncertainties and ambiguities, thereby making it possible for the action researchers to examine the flexibility of project governance.

4.2 Local interpretations of the centralized NPD project model in the New Alpha project

In the New Alpha project, product and project managers lacked experience with the mechanisms of the recently implemented project model. Moreover, the project had already commenced in another unit. In summer 2009, production was relocated to the business unit in [one country], and the NPD organization took over the project. At this time, the project, which earlier had been viewed as a minor upgrade of the previous generation of product, was now transformed into a large-scale NPD project. Relocation of production was driven by economic reasons—it was necessary to manufacture more products. The NPD project was initiated because the previous product generation had not been sufficiently profitable. Moreover, the previous model did not fit well with the modular assembly system of the OEM's local unit.

The new product was also expected to be a better fit with the modern picture of the product family and to yield higher profit. Consequently, the production cost target was set, among other targets set for the project, in comparison to the previous model ("minus XX % in comparison with the previous product generation") by the steering group and accepted by the middle management of the studied business unit.

The relocation and extension of the New Alpha project revealed some coercive characteristics in the recently implemented NPD project model. In principle, the NPD project was under the control of the project steering group. After relocation, the refined (extended) aims were accepted by this steering group. However, the major changes in scope and content (i.e., relocation of NPD and a morph from an upgrade into a new product) were not accompanied by any significant change in formal project controls or quantitative targets. The BIA was not revisited. The ambitious NPD project objectives were not prioritized, and the project was not rescheduled. Rather, the target production cost remained unaltered, even though new project features would increase some costs and maybe affect target sales prices also. Indeed, project relocation took time, and, as the scale of the project increased, the initial schedule began to seem very ambitious. Project targets were pragmatically prioritized to fulfill timely operational needs (e.g., to launch the product at a specific international exhibition for which the date was already set). In a meeting with the product and project managers, the product manager described the situation (11/2009):

> *"The success [of New Alpha] is based on cost reductions [or] on giving the customer more value. The technology risk estimates depend on whom you are asking, but there may be delays of course… some things are designed in the very last moment due to the workload of some mechanical engineers."*

The product manager had also faced the problem of transparency in product costing within the previous production unit; this made the cost target appear unrealistic. As a result, neither the initial cost target, the achievements of the current project, nor project execution could be rationally evaluated by the product manager (11/2009):

> *"The cost accounting got stuck as there was no [comparable] cost information from [the previous production unit]."*

When assuming responsibility for the new product, the product manager had to accept a strict cost target and other project objectives, such as modularity, although the rationales of the target cost calculation and other objectives were obscure. The absence of reliable cost information and the need to deal with a fixed cost target created a situation in which the product manager had little control over the cost target but was nonetheless responsible for meeting that target. Importantly, project costs were not considered a major issue (cf. the iron triangle of project management) – rather the opportunity costs of not being able to deliver more profitable products were the key focus in terms of costs.

In all, the NPD project model lacked the flexibility needed to enable modifications to the BIA after the scope of the NPD project changed. Thus, controls on the product and project managers were relatively coercive. Moreover, the project manager also had only limited cost for estimating the evolving business impacts of the project. As a response, the action researchers' work was to review the actual profitability of the previous product and provide an initial estimate of whether New Alpha would meet the cost target.

4.3 Responding to the challenges with accounting development in New Alpha

By the end of 2009, the project and product managers had recognized the necessity of improving accounting and control for the NPD organization in general and for the New Alpha product in particular. The organization had also accepted the researchers as "the informal cost controllers" of the studied project (as described by the project manager).

During the studied project execution, *two streams* of development took place. *First*, a more comprehensive understanding about the project business impacts was desired to show each project's benefits for the organization. Thus, with the help of company representatives, the researchers designed a new costing tool that allowed for more comprehensive estimation of the *BIA of the new product* for a weekly revision (2010–2011). The tool included expected product revenues (price estimates), expected product costs (production cost estimates/cost targets and overhead cost estimates), and expected after-sales revenues and costs (spare parts and maintenance). The tool was designed by reviewing the costing of the previous product(s) and the targets set for New Alpha, to reveal the opportunity cost (what could be "won" if more profitable products were sold). The tool was continually revised and updated during the NPD project as new information was acquired and new perspectives attained. *Second*, in order to more actively manage the projects towards the market launch and production ramp-up, there was a need for a tool that would allow a detailed estimation of *production costs* to steer such estimates toward the target. In developing this tool (2010–2012), the action researchers' role was to integrate cost estimates made by the designers, the purchasing manager, the production manager, controllers, and other parties from the enterprise resource planning system. The purchasing manager, for example, personally e-mailed tenders to suppliers, and the replies (the costs) were updated in the tool.

Because of all the extra attention being now paid to the product cost target, cost and profitability information were given a bigger role than in earlier NPD projects. This information was now supplementing formal project controls and bringing increasing awareness of the business impact of the New Alpha product. In the weekly project meetings and on other occasions, the new items of accounting information helped the parties involved in the NPD project to discuss the ambitiousness of the cost target, to clearly define certain product specifications related to the target cost, to discuss the time at which the target cost should be met during batch production, and to define separate cost targets for material, labor, and overheads. The refinements of cost targeting using new accounting information represented a local response to the inertia of the coercive centralized control system. Later, a common feature of future projects was agreed upon at a meeting of the R&D director 2, a design manager, a production manager and a business controller: it was agreed that cost targets would be based on clear project specifications. Realistic cost estimates would be required at the first two gates of forthcoming projects (representing project-to-project learning).

A more comprehensive understanding about the business impacts of the project enabled bringing up more advanced questions about control for this and other NPD projects. One of the key questions was the timing of meeting the cost targets set for new products. Both the researchers and company representatives accepted that the prototypes and some of the first New Alpha products would naturally exceed the target but agreed that the target should be met sufficiently early to ensure the positive business impact expected. Such "when on target" type of considerations had not previously been a feature of planning. Therefore, at a relatively late phase of the project, the product manager proposed:

"Why don't we just divide the cost target into two parts, a [long-term] target and a realistic target for the first phase [after the market launch]?"

Also, the specification of the product cost targets was brought up. The lack of specific cost targets for different elements (material, labor, and overheads) triggered additional discussions. Because material costs constituted the majority of production costs, the purchasing department was accustomed to providing cost estimates for new products. However, the new, more comprehensive BIA tool allowed estimates to be acquired from production representatives, warranty and distribution personnel, and after-sales representatives as well. Also, the need to set cost targets separately for different modules was recognized, which was supposedly a future development path for NPD project management. The cost controller proposed:

"The cost target should be set for each produced module, and it should be written down in euros." (3/2011)

Moreover, the project manager highlighted that production costs (with the help of the expected assembly hours) would be estimated in a detailed manner to allow the costs to be reduced in the future. As a response, the new calculation tool allowed cost estimates to evolve, and stimulated discussion on relevant aspects of cost targets and estimations. These discussions constituted employee repair as mentioned above and held future potential for wider project control repair at the OEM.

4.4 Repair efforts for managing production ramp-up of New Alpha

The prototyping phase may be viewed as a turning point in the execution of an NPD project. New Alpha's design was successful, and the team solved most technical challenges that arose. However, as production ramp-up became closer, estimates of required assembly hours of New Alpha increased significantly because production representatives had to provide figures which they could commit to. Product costs had to be estimated during production ramp-up as well.

R&D director 1 obtained a new position in the company, and R&D director 2 took charge of the NPD project in early 2011, in the middle of the prototyping phase, prior to the production ramp-up stage. As a turning point in accounting information provision, the cost controller was given the responsibility of providing cost estimates. At this point, the demand for cost information had grown rapidly because the cost estimate exceeded the target, and the actual costs of the first prototypes had (at least partially, understandably) dramatically exceeded cost estimates. In fact, R&D director 2 asked the business controller for ramp-up analyses regarding expected revenues, costs and profits (3/2011), to analyze potential points for cost reduction (assembly learning curve and specific actions taken by purchasing and production). The cost controller was active in discussions seeking a more detailed understanding of the costs of the new product. He now became a formal cost controller and continued to formally perform cost estimations, building on the work previously done by the interventionist researchers (informally). The cost controller was asked to further develop the ramp-up tool and to mine the required cost data from OEM's information systems. Recruitment of a cost controller can be interpreted as a repair effort made by R&D director 2 to formalize project support for NPD.

To finish NPD in time for the market launch (thus, to pass Gate 4), the R&D director 2 established "ramp-up" meetings every second week to review current product costs and to form a common understanding between the production, purchasing, and engineering departments in terms of realistic target levels as well as the actions needed to reach these levels (11/2011). Ramp-up meetings are one type of middle management repair of NPD

control that was possible due to flexibility in project governance: the governance model allowed tightening control, which took place by establishing these ramp-up meetings to support the project. Moreover, the ramp-up meetings reflected flexibility afforded by the OEM's centralized control system; new features or types of control could be added when needed. In all, the ramp-up meetings represented a formal response to the challenges identified during the New Alpha project (unrealistic target-setting, multiple targets, lack of comparable cost data).

In the ramp-up meetings, the features of cost targeting identified in the earlier phase of the project were now used in communication between the NPD organization and the project steering group. For example, the project manager developed a product cost reduction plan during ramp-up; the plan featured sub-targets (materials and assembly costs) that contributed toward meeting the actual cost target – to ultimately acquire the organizational benefits expected. Still, the steering group did not change the initial cost target (a reduction in cost vs. the previous model) and was surprised to learn from the product manager that a relatively long time would be needed to meet that target.

The provision of cost information by the cost controller in the ramp-up meetings represented a new form of accounting for NPD project management. However, the ramp-up meetings were a relatively late repair effort. Major changes to New Alpha or the New Alpha project were no longer possible; many decisions could not be unmade. Many participants highlighted the need to understand and control the financial impacts of new products at earlier stages. However, the multiple targets and the cost data challenges of the project meant that the required set of new accounting tools and practices could have been developed and piloted only *during* such a project.

4.5 Repairing management control for New Beta (and other forthcoming NPD projects)

As ramp-up meetings were still ongoing, the researchers began to conduct interviews with key employees, such as the R&D directors, product manager, and business controllers, to discuss NPD control in forthcoming projects (autumn 2011–2012). Additional check-ups were made in spring 2013 and in autumn 2013 in interviews with the cost controller; a new project manager with responsibility for development of another new product, "New Beta,"; a person formerly in charge of processing product structures from engineering to production (he worked in a minor role in the New Alpha project); his successor and a sourcing manager. Based on the interviews, it is fair to say that the lessons learned from the studied project were translated into guidelines for conduct of new projects, such as New Beta. The improved control practice represented flexibility of project governance at the OEM. Overall, the situation was summarized by R&D director 2 (2/2012):

> *"Our first aim was to understand [the product], then we would like to understand the forthcoming new product and, eventually, we would like to control the business consequences… In fact, at the moment, there is a new project that did not pass Gate 2 because the steering group [very carefully] reviewed the cost target and concluded that it is not a realistic one."*

To establish such control practice, remarkably, the cost controller was announced to be a team member of each new NPD project, whereas the business controller would be a member of the NPD project steering group. A new governance structure for projects thus emerged at the OEM. As a further example of repairing NPD project control, the cost controller mentioned that, for the first time in the unit, and from now on, the product manager had to undertake detailed analyses of new product costs prior to initial acceptance of the project. The idea was

that accounting and cost control would play greater roles in NPD project planning at relatively early stages, when it was not too late to change the plans.

Moreover, overall targets were translated into subassembly-level targets addressing materials costs, cost-saving potential within sub-assemblies, labor costs, and other cost elements to be managed by the project manager. Such calculations were made for New Beta even before mechanical drawings were completed. These calculations were very similar to those made in the New Alpha project, only during the *ramp-up* phase then.

The challenges faced during the development of New Alpha and the lessons learned during the project control development directed the execution of subsequent NPD projects. Indeed, discussing the New Beta project, the project manager stated that time-to-market had been their initial target when starting to develop New Beta. Soon, however, they realized that the second priority, the cost target, was once again unrealistic. Again, the production cost estimate had been calculated in the absence of reliable information. The fact that the cost target was unrealistic caused New Beta to be put on hold for two months, and a specific cost reference group was created to tackle the issue. The cost reference group was somewhat similar to the group created for the ramp-up meetings earlier, but it was created already at the design phase, enabling major impacts on the project target setting. The cost reference group was initiated by the local project manager, but it was supported by the R&D director and product manager as well as the cost controller and senior designers who were involved.

The establishment of the cost reference group triggered new ideas regarding the design of New Beta and thus new subassembly-related cost estimations, which were now realistic ones. These new subassembly-related cost estimates were not coercive in their form; rather, the material costs of each subassembly were calculated via discussion with all responsible engineers. As expressed by the project manager of the New Beta project (4/2013):

> *". . . [calculations were] very much designed by individual engineers; we did not frame strictly how they should estimate [the costs]."*

Indeed, the aim was to encourage individual engineers to actively estimate product costs and to learn from cost estimates, enabling lower-level employee repair in forthcoming NPD projects. After the hold period and the enactment of the cost reference groups, when subassembly costs had been examined, the project manager could commit to the revised target. The New Beta project steering group gave the project manager a situation in which he could achieve what he promised to achieve. There was now a cost target that was clearly connected to a certain specification of a product and considered to be realistic by the project manager. While such basic planning seems self-evident from the viewpoint of many industries, in R&D operations the starting point for target setting can be very ambiguous. In this case, the NPD project model enactment allowed a critical re-examination of project target setting, which provided much more flexibility from the project manager's viewpoint and also increased the internal transparency from the viewpoints of the R&D director and top management.

In addition, the New Beta project manager created a project breakdown document featuring a critical path toward project execution. This was also a new departure. As so many departments were involved in New Beta, further coordination was required. The New Beta product manager now deliberately established that he was to communicate only through the project manager. This element of self-coercion was imposed to ensure that all project participants were aware of the current status of the project as information flowed through the project manager. The product manager also committed to not altering the project scope after

this had been frozen in planning. Instead, some optional features for the product were to be designed after the New Beta project execution in a separate minor project.

Altogether, it is noteworthy that coercive controls are not always undesired. The coercive acts made the project more directed in the view of the New Beta project manager and made the project schedule and execution more transparent to the middle/top management in the steering group. It was also learned that the development of management control and governance for NPD projects is an ongoing process. Cost controller summarized the lessons learned as follows (4/2013):

> *"This work undertaken [in the New Beta project] is neither the absolute truth nor excellent work as such, but is a clear step taken by us in our learning process. We have a clear idea where we are going… and it is in the right direction."*

The new forms of financial information used in the target setting of New Beta and the cost reference group as a new forum for revisiting the project target setting do not necessarily have to be adopted in forthcoming projects (i.e. they were ad hoc control alterations). These new features of accounting and control can more readily be seen as new alternatives, which represents the overall learning process in the NPD organization. As the New Beta project manager stated (10/2013):

> *"These cost reference groups are not necessarily needed in forthcoming projects. We just want the target setting to be built on a solid basis… After that the [NPD] project execution is a lot simpler."*

4.6 Summary and reflection of the findings: witnessed multi-level interplay

In Table 2, the witnessed interplay in repairing accounting and control for NPD management is summarized as the management challenges and repair efforts made at different levels of the organization, which are top management, middle management, and local management.

Table 2. The evolving interpretations and interplay in the process of repairing accounting and control for the NPD projects.

	Phase 1: Initial NPD project control (2009)	**Phase 2: Accounting development during the project and production ramp-up (2009–2012)**	**Phase 3: Refined NPD project control (2012-2014)**
Top management viewpoint			
Challenge	Managing NPD in different units effectively with a common tool.		Lack of visibility of specific NPD projects.
Repair	Implementation of management control for NPD.		Active reporting of the challenges and their repair to the top management.
Middle management viewpoint			
Challenge	Adapting management control for NPD according to local needs (*lack of flexibility*) (R&D director). Supporting NPD project target setting and execution with accounting information *(lack of transparency)* (R&D director, Product manager).	Inability to react to the challenges during the case NPD project due to the multiple targets, such as tight schedule *(lack of flexibility)*. Inability of the cost estimates to warn about exceeding the cost target *(lack of internal transparency)*.	The challenge of meeting the objectives set for the NPD projects. The need for proactive management of problematic projects.
Repair	Identifying the need for local accounting development supporting NPD organization.	New estimation tools and procedures to support the wider process of accounting development. A new fortnightly ramp-up meeting as a taskforce for cost reductions.	A cost reference group for New Beta to solve emerging problems (Product manager, R&D director). Extending the toolbox for managing problems in NPD project execution (R&D director).
Local management viewpoint			
Challenge	Lack of *transparency* in target setting. Lack of cost controller resources.	Lack of *flexibility* in coping with coercive target setting. Lack of possibility for *employee repairing* of NPD target setting.	Too ambitious cost target among other targets in an NPD project (visible due to the *increased transparency).*
Repair	Specific resources allocated for reviewing local accounting and control and conducting cost estimates.	Development of more detailed cost estimates (researchers). Development of a tool enabling ramp-up meetings to understand product cost learning curve effects (a newly appointed cost controller).	An early identification of unrealistic target setting due to the *increased transparency* (Project manager, Product manager). Possibility of *employee repairing* of NPD project execution with a specific cost reference group in New Beta (Project manager, Cost controller).

As conveyed in Table 2, the initial management challenge was related to the overall NPD project management in the company and was transformed into local NPD management challenges related to the lack of transparency and flexibility (top-down). In response to those challenges, as repair efforts, the R&D director(s) initiated local accounting and control development that resulted in three "accounting prototypes" for NPD management. These were designed by the interventionist researchers and the key actors of the OEM (see also Figure 1 on the timeline and researchers' interventions):

- Revision of OEM's initial NPD project control: Previous NPD control practices were reviewed and the development of a more comprehensive BIA tool for NPD portfolio and project management (2009–2011) was initiated by the action researchers.

- A calculation structure for the expected profit from each piece of machinery: A more detailed product cost estimation tool (2010–2012) for individual projects was designed by the action researchers.

- A way to control product profitability after the launch of the product: A tool for managing and controlling the effect of product costs on learning curve effects during production ramp-up (2011–2012) was provided by the cost controller.

All the prototypes contributed to understanding the benefits that are the outcome of the OEM's NPD projects, not project costs. Designing the accounting prototypes did not serve merely as technical repair efforts. Instead, they served the different purposes of building a shared understanding about the potential NPD project business impacts. As enablers of project governance, the accounting prototypes also clarified the desired roles and contents of accounting and control for NPD projects at the OEM.

Work on the accounting prototypes also revealed the unrealistic nature of initial cost targets and the lack of transparency in the initial target setting process, hampering overall multi-project management at the actor's level. The "surprises" did not really change project execution. The target-setting process was over, and the schedule and other project objectives forced the parties involved to focus on practical issues. During production ramp-up, however, cost estimates significantly exceeded target costs, and fortnightly meetings to steer and manage product cost were launched. These meetings represented a joint repair effort by R&D Director 2, product managers, local NPD personnel, and purchasing and production representatives, that based on learnings from a single project, would eventually contribute to multi-project management as well.

The interaction between actors was both allowed by and a representation of flexible project governance, but not in terms of strategic changes, top-management decisions or market change. Rather, the project governance changes stemmed from uncertainties within single projects, and the temporary or permanent NPD project control repairs they required. In later projects, such as New Beta, much more attention would be paid to product cost targets. As roles and responsibilities were refined, the project manager of New Beta also assumed the *de facto* responsibility for project success, which was seen as the active process of defining the scope, schedule and the governance structure of the project.

5. Discussion

In this section, we provide a reflection of the findings from OEM's action research and the identified two knowledge gaps that could now be addressed. By now bridging the proposed literatures of enablers of project governance and enabling control, the paper finds two literatures that make it possible to understand control as a part of multi-project management in

a novel way. In the following, we first outline our contribution to the literature on multi-project management (knowledge gap 1). Then we present our contribution to the literature on enabling control in multi-project NPD (knowledge gap 2). Finally, through the bridging of the literatures made, we suggest a fruitful area for future research in this intersection.

5.1 Repairing multi-project NPD control within project governance

This paper seeks to answer the question: *How can actors interactively repair multi-project control practice within project governance?* A repair process of this kind was witnessed during the action research endeavor of this paper, as the local accounting development led to a broad repair of the centralized NPD project control system.

Flexible project governance (Müller et al., 2014; Müller et al., 2016) would interactively support the realization of the objectives of multi-project management in NPD (Carbonell and Rodriguez-Escudero, 2013). Attaining such flexibility interactively has not, however, been addressed in the multi-project NPD context (Clegg et al., 2018). In response to the identified knowledge gap 1, our first contribution is that we show how different parties involved can make sense of current management control; and how they jointly and individually can identify shortcomings and ambiguities related to it and attempt to repair the multi-project control system via discursive practices (Laine et al. 2016a; Clegg et al., 2018; Martinsuo and Geraldi, In press). The action research endeavor also revealed that there can be many actors involved in realizing flexible governance in an interactive manner (Martinsuo and Hoverfält, 2018). Indeed, in addition to the top management interventions, also the middle and local managers (R&D managers, project managers, product managers and controllers) significantly influenced the use of certain metrics in control systems, and the development of the future roles of these metrics in multi-project management.

The paper identifies the mechanisms of the repair process, including the prerequisites, actors involved, process phases and consequences (Vuorinen and Martinsuo, 2018) of a joint repair effort. The roles of individual actors were seen to span over the traditional boundaries of multi-project manager's tasks, to a variety of organizational domains (Martinsuo and Hoverfält, 2018, p. 144). Our findings show that, the repair process towards more supportive multi-project NPD project control (within flexible project governance) takes the form of interplay between the managers involved, with interventions, actions and reactions taken by the managers at multiple levels (Figure 3).

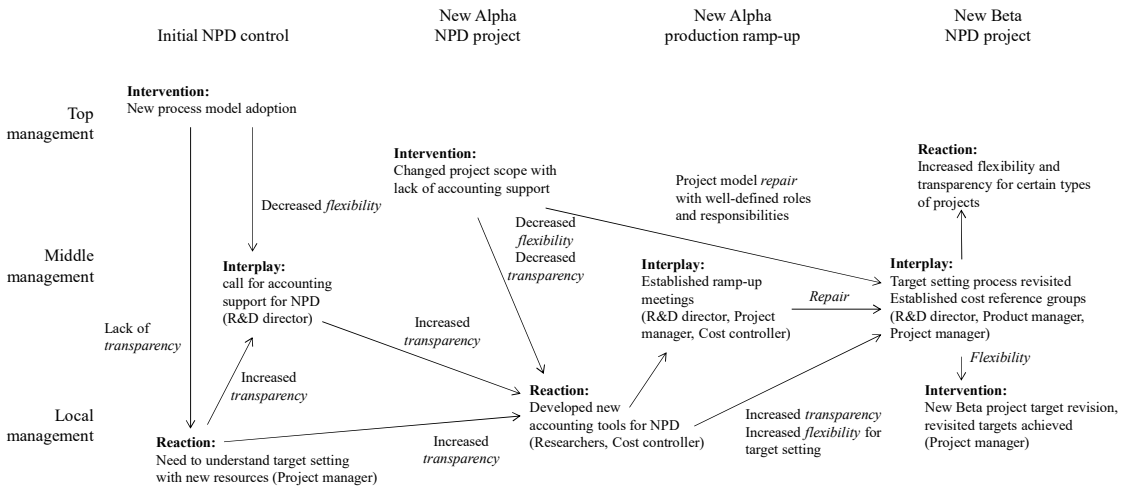

Figure 3. *Interplay between the centralized and local NPD project control system development.*

Building on the idea of organizational interplay, we argue that the repair effort may rather effectively, temporarily or permanently repair and thus develop NPD control practice for subsequent projects or provide more temporary changes if needed (Korhonen et al., 2013). At the OEM, as top management introduced the NPD project model, relocated projects and changed priorities, middle management was actively involved in the process of communicating new strategic priorities to the local NPD organization. During this process, also local managers were active in the interplay. They identified and elaborated on the coercive features of the centralized system and provided new accounting information for the OEM's projects and production ramp-up. The R&D directors, as middle managers, played a central facilitating role in the process. Based on the experiences of the New Alpha project and ramp-up, the repaired NPD controls would be used in New Beta and subsequent NPD projects. These findings increase understanding on how the centralized control systems work (Müller-Stewens and Möller, 2017) and can be rather permanently, yet interactively, developed to work towards strategic priorities. As a result, this paper suggests that *the roles and significances of the different level managers tend to vary and evolve over time during the interactive project control system repair process.* Moreover, our findings indicate that *middle managers have a central role in facilitating the repair process towards flexible project governance with temporary or permanent consequences in the multi-project control system* (Korhonen et al., 2013).

Our findings show also that uncertainties in one project rippled effects upon multi-project management as well (Korhonen et al., 2014; Martinsuo et al., 2014). These findings are in line with those by Laine et al. (2016a), who examined actors identifying and overcoming ambiguities and uncertainties within an NPD organization. However, the interplay reported in this paper is longitudinal in nature and thus the consequences of such interplay were also witnessed and examined. The choice to use action researchers, as external resources, to facilitate the early stages of project control development was probably a reasonable choice, given the lack of controller resources available in NPD, at the OEM. However, in order to attain more permanent consequences for NPD project management, it was again a reasonable choice to gradually shift the responsibility for accounting development (back) to the NPD personnel.

5.2 Refining enabling control: bridging enabling control and flexible project governance

The paper uniquely reports a longitudinal management control repair towards more enabling control, in response to the need for empirical evidence on such a longitudinal, interactive process (knowledge gap 2). The idea of interplay between organizational levels driven by mutual interventions and reactions is only implicitly present in the previously published studies on enabling control (e.g., by Ahrens and Chapman, 2004; Jørgensen and Messner, 2009). In response to this literature gap 2, and as our second contribution, the paper identifies the *interplay* within the development process of enabling control for NPD projects and uniquely unveils how the repair process shapes management control practice. Indeed, this paper responds to the need for understanding what kind of interplay by managers at multiple levels is required to attain supportive control practice (Wouters and Roijmans, 2011). Unlike Jørgensen and Messner (2009), who emphasized the need for top management commitment and intervention(s) in enabling control, we place our emphasis on local accounting development as a potentially valuable mechanism for creating enabling control practice at different organizational levels. Discussions on the different aspects of cost targeting, among different actors during the studied project execution indicated that employee awareness of the centralized control system (global and internal transparency) increased during the project and created more demand for accounting and enhanced ramp-up control in New Beta. Thus, building on Wouters and Roijmans (2011) we conclude that *local accounting development, as interplay within local control system repair, holds significant value in integrating different functional viewpoints and represent a starting point for centralized control system repair as well.*

In this paper, we build on the existing knowledge on locally repairing the control systems and place the lessons learned into a new context—namely that of NPD project management. In line with Wouters and Roijmans (2011), Englund and Gerdin (2015), and Laine et al. (2016b) we found that knowledge integration and user participation in accounting development helps balance the needs of the centralized system and those of the local NPD organization.

By refining the notion of enabling control, especially by unveiling the process of repairing multi-project NPD control, this paper brings the streams of project governance (Carbonell and Rodriguez-Escudero, 2013; Müller et al., 2014; Müller et al., 2016) and enabling control (Adler and Borys, 1996; Ahrens and Chapman, 2004; Wouters and Roijmans, 2011; Englund and Gerdin, 2015) a bit closer to each other. Indeed, realizing strategic priorities in multi-project NPD requires supportive actions to be taken interactively among different managers (Carbonell and Rodriguez-Escudero, 2013; Martinsuo and Geraldi, In press). However, balancing the competing viewpoints of different levels and business functions does not need an establishment of a static NPD control system, but the balance between clear rules and flexibility is desired (Miller, 2001; Van der Meer-Kooistra and Scapens, 2015). In line with observations by Curtis and Sweeney (2017) as well as Christiansen and Varnes (2009), sustaining dynamic tensions in management control require sometimes the presence of contradictory controls (see also van der Kolk et al., In press). In our study, informal local accounting development, in response to the inadequacies of the initial NPD control, was a result of such dynamic tension, thus mitigating the need for repairing the centralized control system.

6. Conclusion

Overall, our findings suggest that, *NPD control system repair, driven by dynamic tensions and flexibility, require commitment and active participation of top, middle and local management*. Our findings showed a development process of the NPD control practice, in

which the increased flexibility allowed to the project manager (and earlier to the ramp-up team) led to possibilities for temporarily switching off the centralized controls (Ahrens and Chapman, 2004). In the OEM's action research, we found that the existence of the interplay among the different levels of management (Martinsuo and Hoverfält, 2018), and a suitable level of flexibility intentionally given to the local management, leads to enhanced validity, reliability and commitment regarding the controls in use.

Altogether, this paper unveils the dynamics of repair in the management control for NPD management. We identified the interplay between top, middle, and local management to support the development towards enabling NPD control practice. This paper provides ideas for further research in order to bring flexible project governance and enabling control closer to each other as synergic literature streams. Future research on project governance could benefit from the notion of enabling control to find the right balance between clear rules and flexibility as well as between meeting (coercive) strategic objectives and allowing dynamic tensions (that empower different level managers) repair the control system and make it become more supportive (cf. van der Kolk et al., In press). Furthermore, further research could address the question whether and how a repair of a control system is related to organizational success (Ahrens and Chapman, 2004; Jørgensen and Messner, 2009; Wouters and Roijmans, 2011; Müller et al., 2014; Englund and Gerdin, 2015; Müller et al., 2016; Müller et al., 2017). A practical managerial implication follows the idea of repairing project control: this paper now suggests that managers should pay attention to inoperative management control practice within their project governance and seek ways to make it more enabling by noticing points of lacking flexibility, internal/global transparency and repairability.

Finally, every research approach, including the action-research mode, has inherent risks and limitations. To avoid the risk of idiosyncratic findings with low-level external validity, our findings and the context thereof were reviewed against the background of previous studies' findings. The case narrative based on the 114 meetings was based on the data featuring active participation of the interventionist action researchers, which might cause biases in analyzing and interpreting the data. However, this dataset, given the presence of different voices of multiple actors, provided several possibilities for triangulation of the findings. Furthermore, the possibility to extend the data with 4 interviews and 12 follow-up interviews provided an additional triangulation point, regarding the practice beyond research interventions. Essentially, the case is not to promote the choices made by the interventionist researchers, but the longitudinal interventionist setting, with a uniquely deep access, allowed us to unveil and analyze the broader dynamics in the development of the NPD control practice (in line with Lyly-Yrjänäinen et al., 2017). Thus, our conclusions are based on an exceptional research data that can shed light on those dynamics more in depth than earlier studies have. We offer confirmations of our findings from many perspectives; the applications of our work are both practical and academic.

References

Adler, P.S., Borys, B. 1996. Two types of bureaucracy: enabling and coercive. Administrative Science Quarterly, 41(1), 61–89.

Ahrens, T., Chapman, C.S. 2004. Accounting for flexibility and efficiency: a field study of management control systems in a restaurant chain. Contemporary Accounting Research, 21(2), 271–301.

Ahola, T., Ruuska, I., Artto, K., Kujala, J. 2014. What is project governance and what are its origins?. International Journal of Project Management, 32(8), 1321-1332.

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

Biesenthal, C., Wilden, R. 2014. Multi-level project governance: Trends and opportunities. International Journal of Project Management, 32(8), 1291-1308.

Breese, R., Couch, O., Turner, D. 2020. The project sponsor role and benefits realisation: More than 'just doing the day job'. International Journal of Project Management, 38(1), 17-26.

Brown, S. L., Eisenhardt, K. M. 1997. The art of continuous change: Linking complexity theory and time-paced evolution in relentlessly shifting organizations. Administrative Science Quarterly, 41(1), 1-34.

Carbonell, P., Rodriguez-Escudero, A. I. 2013. Management control, role expectations and job satisfaction of new product development teams: The moderating effect of participative decision-making. Industrial Marketing Management, 42(2), 248-259.

Chapman, C. S., Kihn, L-A. 2009. Information system integration, enabling control and performance. Accounting, Organizations and Society, 34, 151–169.

Clegg, S., Killen, C.P., Biesenthal, C., Shankaran, S. 2018. Practices, projects and portfolios: Current research trends and new directions. International Journal of Project Management, 36, 762–772.

Cooke-Davies, T. 2002. The "real" success factors on projects. International Journal of Project Management, 20(3), 185-190.

Curtis, E., Sweeney, B. 2017. Managing different types of innovation: mutually reinforcing management control systems and the generation of dynamic tension. Accounting and Business Research, 47(3), 313-343.

Davila, T., 2000. An empirical study on the drivers of management control systems' design in new product development. Accounting, Organizations and Society, 25, 383–409.

Davila, T., Foster, G., Li, M., 2009a. Reasons for management control systems adoption: insights from product development systems choice by early-stage entrepreneurial companies. Accounting, Organizations and Society, 34, 322–347.

Davila, A., Foster, G., Oyon, D., 2009b Accounting and control, entrepreneurship and innovation: venturing into new research opportunities, European Accounting Review, 18(2), 281–311.

Dinsmore, P. C., Rocha, L. 2012. Enterprise Project Governance: A Guide to the Successful Management of Projects Across the Organization. Amacom.

Dossi, A. Patelli, L., 2008. The decision-influencing use of performance measurement systems in relationships between headquarters and subsidiaries. Management Accounting Research 19, 126–148.

Englund, H., Gerdin, J. 2015. Developing enabling performance measurement systems: On the interplay between numbers and operational knowledge. European Accounting Review 24(2), 277-303.

Gerdin, J., Johansson, T., Wennblom, G. 2019. The contingent nature of complementarity between results and value-based controls for managing company-level profitability: A situational strength perspective. Accounting, Organizations and Society, 79, 1-17.

Gioia, D., Corley, K. and Hamilton, A. 2012. Seeking Qualitative Rigor in Inductive Research: Notes on the Gioia Methodology. Organizational Research Methods, 16(1), 15-31.

Hall, M., 2010. Accounting information and managerial work. Accounting, Organizations and Society, 35, 301–315.

Jordan, S., Messner, M., 2012. Enabling control and the problem of incomplete performance indicators. Accounting, Organizations and Society. 37(8), 544–564.

Jørgensen, B., Messner, M., 2009. Management control in new product development: the dynamics of managing flexibility and efficiency. Journal of Management Accounting Research, 21, 99–124.

Jørgensen, B., Messner, M., 2010. Accounting and strategizing: a case study from new product development. Accounting, Organizations and Society, 35(2), 184–204.

Kennerley, M., Neely, A. 2003. Measuring performance in a changing business environment. International Journal of Operations & Production Management. 23(2), 213-229.

Korhonen, T., Laine, T., Martinsuo, M. 2014. Management control of project portfolio uncertainty: A managerial role perspective. Project Management Journal, 45(1), 21-37.

Korhonen, T., Laine, T., Suomala, P. 2013. Understanding performance measurement dynamism: a case study. Journal of Management & Governance, 17(1), 35-58.

Laine, T., Korhonen, T., Martinsuo, M. 2016a. Managing program impacts in new product development: An exploratory case study on overcoming uncertainties. International Journal of Project Management, 34(4), 717-733.

Laine, T., Korhonen, T., Suomala, P., Rantamaa, A. 2016b. Boundary subjects and boundary objects in accounting fact construction and communication. Qualitative Research in Accounting & Management, 13(3), 303-329.

Lewin, K. 1946. Action research and minority problems. Journal of Social Issues, 2(4), 34-46.

Lukka, K., 2007. Management accounting change and stability: loosely coupled rules and routines in action. Management Accounting Research, 18(1), 76–101.

Lukka, K., & Vinnari, E. 2014. Domain theory and method theory in management accounting research. Accounting, Auditing & Accountability Journal, 27(8), 1308-1338.

Lyly-Yrjänäinen, J., Suomala, P., Laine, T., Mitchell, F. 2017. Interventionist management accounting research: Theory contributions with societal impact. Routledge.

Malmi, T., Brown, D. A. 2008. Management control systems as a package—Opportunities, challenges and research directions. Management Accounting Research, 19(4), 287-300.

Martinsuo, M. 2013. Project portfolio management in practice and in context. International Journal of Project Management, 31 (6) 794-803.

Martinsuo, M., Geraldi, J. In press. Management of project portfolios: Relationships of project portfolios with their contexts. International Journal of Project Management.

Martinsuo, M., Hoverfält, P. 2018. Change program management: toward a capability for managing value-oriented, integrated multi-project change in its context. International Journal of Project Management, 36 (1), 134-146.

Martinsuo, M., Korhonen, T., Laine, T. 2014. Identifying, framing and managing uncertainties in project portfolios. International Journal of Project Management, 32(5), 732-746.

Maxwell, J. 1992. Understanding and validity in qualitative research. Harvard Educational Review, 62(3), 279-301.

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.

Miller, P. 2001. Governing by numbers: why calculative practices matter. Social Research, 68(2), 379–396.

Miller, R., Hobbs, B. 2005. Governance regimes for large complex projects. Project Management Journal, 36(3), 42-50.

Moll, J. 2015. Special issue on innovation and product development. Management Accounting Research, 28, 2-11.

Mouritsen, J., Hansen, A., Hansen, C. 2009. Short and long translations: management accounting calculations and innovation management. Accounting, Organizations and Society, 34, 738–754.

Mundy, J. 2010. Creating dynamic tensions through a balanced use of management control systems. Accounting, Organizations and society, 35(5), 499-523.

Müller, R. 2009. Project governance. Gower.

Müller, R., Turner, J. R. 2007. Matching the project manager's leadership style to project type. International Journal of Project Management, 25(1), 21-32.

Müller, R., Pemsel, S., Shao, J. 2014. Organizational enablers for governance and governmentality of projects: A literature review. International Journal of Project Management, 32(8), 1309-1320.

Müller, R., Shao, J., Pemsel, S. 2016. Organizational enablers for project governance. Project Management Institute.

Müller, R., Zhai, L., Wang, A. 2017. Governance and governmentality in projects: Profiles and relationships with success. International Journal of Project Management, 35(3), 378-392.

Müller-Stewens, B., Möller, K. 2017. Performance in new product development: a comprehensive framework, current trends, and research directions. Journal of Management Control, 28(2), 157-201.

Newell, S., Bresnen, M., Edelman, L., Scarbrough, H., Swan, J. 2006. Sharing Knowledge Across Projects: Limits to ICT-led Project Review Practices. Management Learning, 37(2), 167–185.

Strauss, A. and Corbin, J. 1998. Basics of qualitative research: Techniques and procedures for developing grounded theory (2nd ed.). Thousand Oaks, CA: Sage.

Suomala, P., Lyly-Yrjänäinen, J., Lukka, K. 2014. Battlefield around interventions: A reflective analysis of conducting interventionist research in management accounting. Management Accounting Research, 25(4), 304-314.

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.

Thiry, M., Deguire, M. 2007. Recent developments in project-based organisations. International Journal of Project Management, 25(7), 649-658.

Turner, J. R. 2006. Towards a theory of project management: The nature of the project governance and project management. International Journal of Project Management, 2(24), 93-95.

Unger, B. N., Rank, J., Gemünden, H. G. 2014. Corporate innovation culture and dimensions of project portfolio success: The moderating role of national culture. Project Management Journal, 45(6), 38–57.

van der Kolk, B., van Veen-Dirks, P. M., ter Bogt, H. J. In press. How combinations of control elements create tensions and how these can be managed: An embedded case study. Management Accounting Research.

Van der Meer-Kooistra, J., Scapens, R. W. 2015. Governing product co-development projects: The role of minimal structures. Management Accounting Research, 28, 68-91.

Verma, D., & Sinha, K. K. 2002. Toward a theory of project interdependencies in high tech R&D environments. Journal of Operations Management, 20, 451–468.

Vuorinen, L., Martinsuo, M., 2018. Program integration in multi-project change programs: agency in integration practice. International Journal of Project Management, 36(4), 583-599.

Wouters, M., Roijmans, D., 2011. Using prototypes to induce experimentation and knowledge integration in the development of enabling accounting information, Contemporary Accounting Research, 28(2), 708–736.

Wouters, M., Wilderom, C., 2008. Developing performance-measurement systems as enabling formalization: a longitudinal field study of a logistics department. Accounting, Organizations and Society, 33, 488–516.