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Linking the benefits of project management maturity to project complexity

Insights from a multiple case study

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Abstract

Purpose – The purpose of the research presented in this article is to identify potential influences on an organization-specific "ideal" level of project management maturity by adopting a qualitative, exploratory approach.

Design/methodology/approach – In this paper, the results of a multiple qualitative case study, which has been conducted within industrial enterprises from automotive industry and energy sector, are presented. The research methods applied within the case research are qualitative guided interview, document analysis and standardized interview (maturity questionnaire).

Findings – The interview data reveal that the complexity of the companies' projects might be a determining factor regarding the "ideal" level of maturity. A comparison of the findings of the case research with a secondary literature review on project complexity showed that particularly those facets of project complexity that affect the interaction of the project participants (project team, client, suppliers) seem to require a certain level of maturity.

Originality/value – The idea of an organization-specific "ideal" level of maturity was raised by the developers of project management maturity models (PMMM). It is of interest for professionals due to efficiency reasons. Research literature in the context of PMMM has so far touched on environmental/circumstantial influences on this ideal maturity level only to a slight degree. The results of the qualitative research presented herein mark a contribution to this research gap and allow for quantitative testing.

Keywords Multiple case study, Project management maturity, Industry projects, Project complexity, Project management maturity models

Paper type Research paper

Introduction

As industrial enterprises are increasingly organizing their business in projects (Whittington *et al.*, 1999; Lundin and Stablein, 2000; Turner *et al.*, 2009), models for the sophistication and optimization of project management are also gaining in importance. Project management maturity models (PMMM) are to be considered in this regard. Despite considerable criticism (Kujala and Artto, 2000) PMMM provide one comprehensive approach to strategically develop further an organization's project management structures. Several examples of companies applying a PMMM to their project business are mentioned in the literature (Steeger, 2010). These industrial enterprises either rely on established models or develop one of their own. Thus, PMMM actually do receive attention from professionals. The basic premise underlying PMMM, namely that the higher the degree of maturity, the higher the chances to complete one's projects successfully, remains a promise by the developers of PMMM,

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though (Ahlemann *et al.*, 2005). To date, there is no empirical proof that the level of maturity significantly affects project success or correlates with success dimensions on the project level (Besner and Hobbs, 2008a).

In the last ten years, research in the context of PMMM has focused on studying the benefits of a high level of maturity. There is some evidence provided by the work of Yazici (2009) and, more recently, Jiménez *et al.* (2012) that project management maturity positively correlates with certain success criteria on the level of the organization (e.g. market share). The quantitative studies that were undertaken so far adopted a particular PMMM. Yet, there is an ongoing debate on what the theoretical construct "project management maturity" is/should be composed of Pasian *et al.* (2012). As an additional aspect, the idea of an organization-specific "ideal" level of project management was coined (Wheatley, 2007). For reasons of efficiency this aspect is of particular interest for professionals. Cooke-Davies (2007) stressed that environmental differences with regard to the project business might affect the benefits of applying a PMMM, and accordingly also the benefits of a certain level of maturity.

The article at hand takes this as its starting point. Through a multiple qualitative case study it is tried to explore potential environmental or circumstantial influences on this hypothesized ideal level of project management maturity. The paper is organized as follows: after introducing basic notions on PMMM, an overview of the research in this field is given. This overview also touches on certain inter-linked streams of research, e.g. research on the return on investment (ROI) of project management. On the basis of this a research gap is contoured. After explaining the research methodology, the results of a multiple qualitative case study are presented. The research results reveal that project complexity might play a prominent role in determining the organization-specific ideal level of maturity, and thereby moderate the (hypothesized) relationship between project management maturity and project success. Patterns of complexity are validated through a comparison with previous literature on project complexity. Finally, implications for academics and practitioners are outlined.

Research on PMMM

Organizations of any kind, such as companies, public administrations or NGOs who organize their business or parts of it in projects might utilize PMMM as frameworks for the measurement and improvement of their project management competence. PMMM are constituted by three structural elements which can be observed from Figure 1.

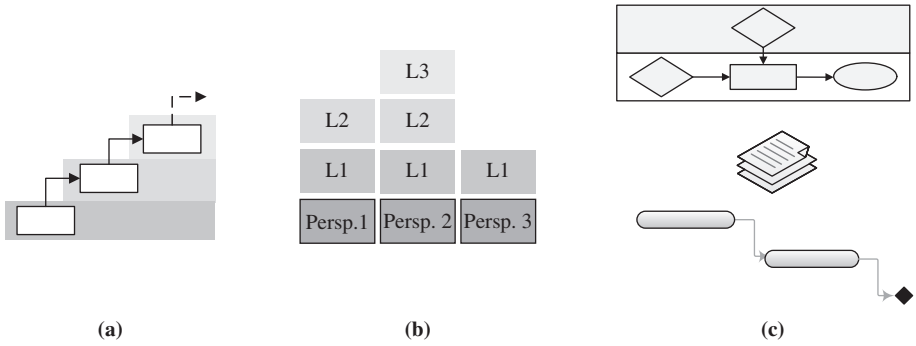

Figure 1.
Structural elements of PMMM

The project management maturity of an organization might be depicted by a number (e.g. five) of maturity levels (Figure 1(a)) or expressed as a percentage (spider-web diagram as used in Gareis (2002), or bar chart as used by Project Management Institute (2008)). The lowest level represents informal or "*ad hoc*" project management, while with higher levels of maturity the project management structures will be documented, formalized and continuously improved. Formalization is usually for a major part achieved by establishing a framework of project management processes. In terms of a maturity assessment the occurrence of certain attributes or processes (Figure 1(c)) is checked. These attributes/processes might be grouped to perspectives (Figure 1(b)). Several PMMM use the knowledge areas of PMBOK guide as their perspectives (Jugdev and Thomas, 2002). The central role of project management processes is well documented in the literature (Pasian, 2010). Other aspects of project management maturity are for example:

- the institutionalization of project management within the organization (e.g. through a project management office) (Kerzner, 2001, p. 98; Crawford, 2007, p. 9f);
- the support of the organization's top management (Kwak and Ibbs, 2000b; Kerzner, 2001, p. 67; Office of Government Commerce, 2010, p. 7f);
- project management-related activities of personnel development (Fincher and Levin, 1997; Kwak and Ibbs, 2000b; Crawford, 2007, p. 9);
- the availability and use of a project management software (Fincher and Levin, 1997; Kerzner, 2001, p. 102); and
- the availability and consistent application of a project management terminology (Fincher and Levin, 1997; Office of Government Commerce, 2010, p. 7f);, etc.

The motivation to use PMMM can take a variety of shapes. For instance, single time orientation, provide evidence of a certain project management competence for business partners, apply PMMM for purposes of benchmarking, or implement a continuous improvement process within the organization's project business (Albrecht and Spang, 2011; Ahlemann *et al.*, 2005; Jugdev *et al.*, 2001, p. 39). The idea of the maturity modeling of management structures originates from the disciplines of quality and process management (work of Crosby (1979) and Humphrey (1989)). PMMM are therefore strongly influenced by certain philosophies of quality management such as total quality management and continuous improvement. Hence, they are originally designed to be applied in a cyclical process of assessment, analysis of assessments' results, definition and implementation of measures, and re-assessment (Project Management Institute, 2008). When considering the benefits of PMMM one can distinguish between benefits of the application of PMMM in general and the benefits of a high level of maturity in particular. Regarding the former, editors of PMMM mention for instance the strategic planning of project management structures (Kerzner, 2001) and their improvement or the implementation of best practices and organizational strategy (Project Management Institute, 2008, p. 9) within the project business. Regarding benefits of a high degree of maturity, several models promise improvements in "classical" success dimensions, i.e. time/cost/quality (Chrissis *et al.*, 2009, p. 117). Furthermore, improvements regarding customer satisfaction (Office of Government Commerce, 2008, p. 5), minimization of project risk (Office of Government Commerce, 2008, p. 11; Project Management Institute, 2008), increase in ROI (Office of Government Commerce, 2008, p. 5), enhanced transparency and reduction of barriers against change processes (Kerzner, 2001) are listed.

Ahlemann *et al.* (2005) subsume this to the general premise that the higher an organization's project management maturity, the better its chances to complete its projects successfully. At the same time, PMMM and the field of project management maturity modeling have been criticized among other things for being inflexible, not providing enough granularity, and lacking a theoretical foundation (Jugdev, 2004; Mullaly, 2006; Cooke-Davies, 2007). Consequently, scholars empirically studied the benefits of project management maturity. Research on project management maturity (models) can be structured along three phases, as becomes apparent in Figure 2.

The institutional background of PMMM is not limited to the education sector, as several PMMM are edited by large project management organizations such as PMI, by consulting businesses or by companies. Scholars as, e.g. Kwak and Ibbs (2000b) or Gareis (2002) tried to establish their PMMM on a theoretical and empirical foundation. Apparently, transitions are fluent in this regard, as a number of researchers were involved in the development of PMI's OPM3 and PMI also provides consulting services.

It was the work of Mullaly (1998, 2006), Pennypacker and Grant (2003), Cooke-Davies and Arzymanow (2003) and other scholars that tried to compare average levels of project management maturity along different industries. The results of these studies are comparable only to a very limited degree due to the fact that the models employed in the studies, their design and the degree of access to data differed. Hence, these research works did hardly reveal new insights on the concept of maturity in project management.

The latest stream of research on the topic of maturity in project management tried to reconsider the benefits that potentially accrue from a high maturity level. It commenced at the turn of the millennium and comprises both empirical and conceptual research works as well as both qualitative and quantitative designs. Jugdev and Thomas (2002) adopted a conceptual approach in studying the question whether the application of PMMM would lead to a competitive advantage for an organization, but finally argued that it would rather lead to competitive parity. Thomas and

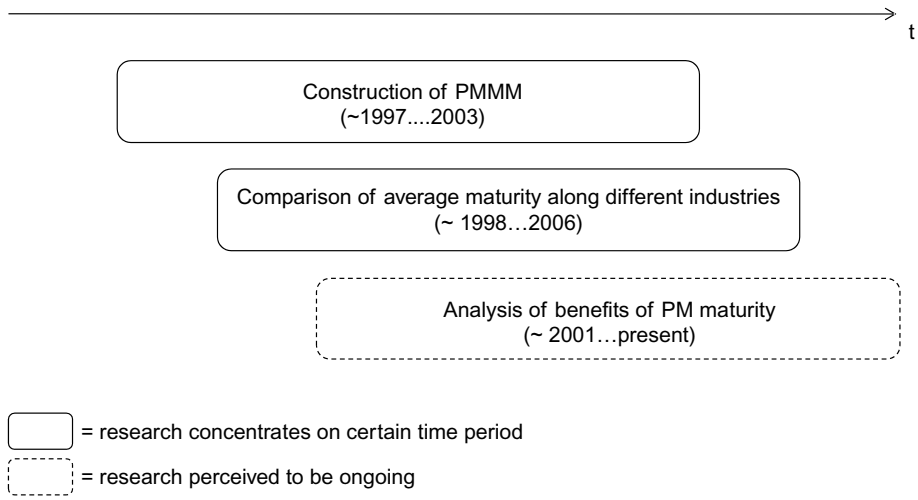

Figure 2.
Phases in research on PMMM

Mullaly's (2008) large PMI-funded study found that organizations on operating on higher levels of maturity were better able to create intangible values, such as transparency of the project management structures. Yazici (2009) and, more recently, Jiménez *et al.* (2012) were able to show a positive effect of project management maturity on certain criteria of organizational performance (e.g. new product success, sales growth, market share). A relationship between maturity and project performance criteria has – despite attempts by the working group of Ibbs (Kwak and Ibbs, 2000a; Ibbs and Reginato, 2002) – not been evidenced to date (Besner and Hobbs, 2008a).

An interesting aspect added to the debate on the benefits of project management maturity, is the question of an organization-specific "ideal" level of maturity. It has been uttered by developers of PMMM that not every organization should strive for the highest maturity level (Crawford, 2007). Professionals are concerned with this for efficiency reasons (Wheatley, 2007). Scholars like Kwak and Ibbs (2000a, p. 43) also discussed "diminishing returns on higher (maturity) levels" and the existence of "too much PM maturity", even if on statistically non-significant results. This aspect leads the path to inter-linked streams of research such as research on the ROI of project management (work of Ibbs *et al.*; Lappe and Spang, 2013), and on the value of project management (work of Thomas and Mullaly; Patah and Carvalho, 2007), but also research that critically studies the positive and negative aspects of standardization and formalization of project management, which naturally goes along with higher levels of maturity. However, it entails the question which characteristics of a project and which factors from a project's intra- and extra-organizational environment determine this ideal level of maturity.

The research on project management's ROI attempts to provide a method which enables an organization to determine its ideal level of investment in project management. It adopts an economic perspective trying to summarize the cost of project management and to quantify the benefits accruing from it (Lappe and Spang, 2013). Lappe and Spang (2013) found a number of correlations between certain cost and benefit dimensions, but their sample was limited to one company. In addition to issues of availability of data and data access, it generally seems to be very challenging to merge the benefits of a multi-facetted management approach like project management into one model (Thomas and Mullaly, 2008).

As the project management structures on the lowest maturity level in several PMMM are labeled "informal" (Voidevich and Jones, 2001; Fincher and Levin, 1997), higher maturity thereby goes along with higher formalization of project management. It therefore seems worthwhile to take the stream of literature into consideration that studies the effects of formalization, standardization and bureaucratization of project management structures. Several studies revealed both favorable effects, like improved organizational culture, increased transparency of organizational structures, or improved customer satisfaction (see Lappe and Spang (2013) for an overview), and unfavorable effects, like the dissatisfaction of the project personnel (particularly the project manager) (Crawford *et al.*, 2005), or the constraint of creativity and innovativeness (Teller *et al.*, 2012). The idea of there being a balance between positive and negative effects was also stressed in this stream of research (Milosevic and Patanakul, 2005).

Some authors of this field refer to contingency theory in studying the advantages and disadvantages of certain designs of organizational structures (Geraldi, 2008a, b; Besner and Hobbs, 2008b). Contingency theory is a general organization theory rooted in the middle of the twentieth century (Woodward, 1958), which was very frequently

referred to just in the last ten years of project management research (Müller and Turner, 2007; Engwall, 2003; Dvir *et al.*, 1998). According to contingency theory organizations need to achieve a "fit" between their structures and the environment they are operating in, in order to successfully persist (Ginsberg and Venkatraman, 1985; Venkatraman and Camillus, 1984). It was finally Mullaly and Thomas (2010) who adopted a contingency perspective and discussed the concept of fit in their research on project management maturity. This seems productive for the debate on the benefits of maturity, as previous research has for the most part adopted a comparatively narrow perspective, ignoring the organizations' environmental setting. Their results reveal that there is no one implementation of project management that delivers value and thereby confirmed central ideas of contingency theory (Drazin and Van de Ven Andrew, 1985). It was the application of contingency theory and its concept of fit that allowed them to evaluate specific value evoking from certain implementations of project management and context (Mullaly and Thomas, 2010).

Research gap and research design

The basic premise of PMMM, namely that with a higher level of maturity the chances to successfully complete one's projects, has not been supported by empirical studies, hitherto (Besner and Hobbs, 2008a; Grant and Pennypacker, 2006). It became apparent that potential influences on an organization-specific ideal level of project management maturity are not well understood to date and might be subject to further (exploratory) research. At the same time, Mullaly and Thomas (2010) were able to show the usefulness of a contingency perspective in explaining benefits of a certain project management implementation.

This article introduces the results of three qualitative case studies. They were guided by the research question:

RQ1. How can organizations benefit from a certain level of project management maturity?"

The case studies were conducted with organizational units of industry companies, executing either internal product development projects, or external development or plant engineering projects. A major objective was to reveal whether there exists an ideal level of project management maturity and what are potential influences on it. The case research was conducted applying the general procedure introduced by Yin (2009). The research methods were semi-structured interview and document analysis. Data triangulation through other interviews and/or document analysis was applied wherever it appeared appropriate. The guideline for the semi-structured interviews consisted of a total of six sections, five of which were developed by the author. They dealt with:

(1) Familiarity of the interviewee with PMMM.

(2) Process management within the organization and the interviewee's opinion on (dis-) advantages of this.

(3) The last project the interviewee was involved in.

(4) Definitions/perceptions of project success and customer satisfaction.

(5) Perceived maturity along different stages of the value chain.

(6) Demographical information.

An excerpt of questions can be obtained from Table AI in the Appendix of this article. The sixth section was the maturity model PjM3's self-assessment questionnaire (Office of Government Commerce, 2010). This model was chosen due to its international spreading, participation of researchers in the development process, access to the assessment tool, and transparency of evaluation criteria/process. The guideline comprised both open and closed questions. Deviations from the guideline were allowed in order to enable a deeper understanding of the circumstances to be found in the cases. The interviews were led in German, as this is the mother tongue of the interviewer and all participants. The self-assessment questionnaire was translated by the authors for this purpose.

The interviews were recorded and transcribed using the software F4 (www.audiotranskription.de/f4.htm). Data analysis was executed following a scheme introduced by Miles and Huberman (2009): in a very first step of selection, excerpts of the transcripts that did not provide any insights regarding the objectives of this phase of the research were faded out. The remaining data were structured under the three headings "maturity and formalization of project management", "success" and "circumstantial/environmental aspects of the project business". Organized in this particular way, the data were then analyzed in order to identify patterns and draw conclusions with the objective to formulate hypotheses, which can be subject to testing.

Results from a multiple qualitative case study

Selection and demographic characteristics of the cases

The cases within this research were three organizational units of larger companies belonging to the automotive branch and the energy sector. It was perceived necessary to incorporate at least two different branches into the qualitative part of the research. The first two cases were chosen because they applied a PMMM of their own and, hence, the possibility for discussion on challenges in application and adoption of PMMM was seen. After the first two cases were completed and partially analyzed, the interview guideline was shortened and it was decided to do one more case within a smaller company, which to a fewer degree than the first two ones is able to invest in organizational development. Apart from that it was practical considerations like access that led to the selection of these cases. Their general characteristics can be observed from Table I. All three companies were operating in a business-to-business environment with no direct contact to the end customer.

Two interviews were led per case. The interviewees were project managers (three interviewees), bosses of project managers (two), or members of the larger companies' central units (two). The members of the head organizations' central units were chosen because they were able to explain the overall companies' project management system (standards, structures, project classification, etc.), including their approach to project management maturity. All interviewees had significant experience as project managers, ranging from six to 26 years. The interviewees are referenced to using the following codes: PM – project manager, HPM – head of a group of project managers, CU – member of head organization's central unit. "PM2.A2" for instance stands for the second project manager interviewed in case A2.

Both head organizations of case A1 and E are running central organizational units that are responsible for the further development of the project management structures, processes and methods/tools. In the company case A2 is part of, such a central

Characteristics	Case A1	Case E	Case A2
Branch	Automotive	Energy sector	Automotive
Position in value-chain	First tier supplier	Plant engineering company	Second tier supplier
Unit of analysis/ case	Organizational unit part of a larger company	Organizational unit part of a larger company	Organizational unit part of a larger company
Type of projects	Product development (component)	Investment (power plant)	Product development (component)
Technological uncertainty	Medium-tech	Medium-tech	Low-tech ... Medium-tech
Turnover p.a. (€ million)	>50	>50	≤ 2
No. of employees	>250	>250	50...250

Table I.
Demographic information on the three cases

organizational unit does not exist to that extent. Further development of project management structures and processes is done by process owners, who meet on a regular cycle. Cases A1 and E have also been assessed with the companies' own PMMM, which both are based on elements of CMMI (five-level structure) and PMBOK Guide (knowledge areas, methods/tools).

The project business of the two branches considered in the case research is characterized by distinctive features and there are even particularities within the automotive branch, due to the different position of A1 and A2 on the value-chain. The differences between A1 and A2 are the size of the head organizations and their project management framework, the number of stakeholders involved and the projects' degree of internationalization. Furthermore, product development is more innovative in projects of A1 as compared to A2. In projects of A2, product development is rather focused on producibility; the projects are more order-based and have a higher degree of repetitiveness than the ones of A1.

While the routine business of cases A1 and A2 consists of production and retail of the products developed in terms of projects, projects mark the core business of case E. Project management can thus be considered a core competence of case E. The markets it is operating in are characterized by a high degree of internationalization, high degree of competition, low margins and a volatile inflow of orders. Plant engineering projects are risky due to their large scope (mostly $>$ €100 million), long duration (usually three to five years), and complexity.

Project management maturity measures of the cases

The questionnaire of PjM3 was applied in one interview per case. If an interviewee was unsteady regarding two answers/maturity levels, it was tried to incorporate the point of interest into another interview and/or to get additional information via document analysis. This kind of data triangulation was applied wherever it seemed possible and appropriate in order to enhance the reliability of the data. Figure 3 shows the results of the maturity assessments. "Benefits management" was the only process perspective of PjM3 that was not incorporated into the maturity assessments, because it was perceived too hard to grasp with regard to the cases' project business, namely development of industry goods and plant engineering, respectively.

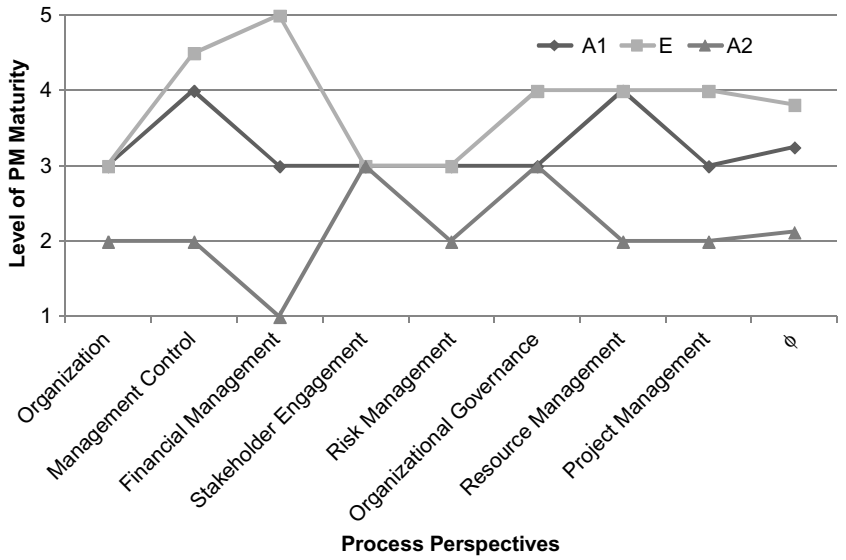

Figure 3.
Results of the maturity assessments with PjM3

The cases arrive at average maturity levels of 3.2 (A1), 3.8 (E) and 2.1 (A2), respectively, (Figure 3). What can be noticed is that all three maturity measures are quite homogenous, i.e. the difference between the highest and the lowest maturity level measured in a process perspective is two levels at maximum. The following statements provide first evidence supporting the notion of an organization-specific ideal level of project management maturity:

> "Communications are being optimized from extensive knowledge of the stakeholder environment, to enable the projects to achieve their objectives". – I think this is a noble approach, but we don't even have this focus (HPM.A1 reading a section of PjM3 and then commenting on it).

"'Financial management' – We're perfect in this regard, but in my opinion we are over the top" (HPM.E commenting on PjM3's process perspective "financial management"). And: "No, I don't see a benefit in defining and establishing project management processes, because we already have formalized a remarkable part of the tasks" (PM2.A2).

Existence of and potential influences on an organization-specific "ideal" maturity level

The interviewees' statements cited above already conveyed a first – yet slight – impression of their opinion on the formalization and standardization of project management. This point will be elaborated on further within this section. Subsequently, it is referred to their opinion on PMMM and the concept of maturity modeling. The last paragraph of the results then deals with project complexity as a potential circumstantial influence on an ideal level of maturity.

All interviewees gave the impression that they generally have a positive opinion towards formalization and standardization of project management structures. Particularly two aspects were observable in this regard: first, formal structures provide orientation:

> Years ago I said to the head of my division "I would like to have a formal process that tells me which kind of requirements there are in a certain project phase and which kind of templates I can use". And this is what we have today (HPM.A1).

Second, if balanced, they contribute to efficiency. "Information you had to gather manually in various meetings you nowadays have available at the push of a button, because there are defined and agreed on procedures" (PM.A1).

As explained above, case E executes large engineering projects with a financial volume mostly above 100 millions of euro. HPM.E argues: "you cannot organize a construction site with two to three thousand workers without clearly defined processes". Hence, a basic level of formalization is perceived a necessary prerequisite for the project to become a success.

On the other hand it were the same interviewees that were able to explain the advantages of formalization, who also hinted at the negative aspects, i.e. inefficiencies. A number of statements reveal diminishing returns from a project management implementation that seems to be too bureaucratic:

> Certain processes are inevitable – you just have to live them. The question is whether the level of detail is always appropriate. To give an example: there is a template for a project schedule in our project management software, which depicts every single step of the product development process. If I shall add resources and other things to it, then I'm only busy with this schedule and can do nothing else(PM.A1; also cf. HPM.A1 and HPM.E).

In the mind of the interviewees it was the claim to consider every eventuality that led to these inefficiencies.

Another disadvantage was the ineffectiveness of certain processes. Remarkably, interviewees from two different cases both gave the example of risk management in this regard: "I found our risk management processes never so effective. I did it in order to fulfill the requirements, but the risk register often contained trivial things" (CU.A1). And:

> You cannot believe how many gates our risk management process has, but for some projects there was a stomach ache in the sales department already. The people then exhaustively focused on complying with risk management procedures and pushed this ache aside (HPM.E).

This reflects a phenomenon of "hiding" behind formal structures and trying not to take responsibility.

Regarding cases A1 and E it was also possible to discuss advantages and disadvantages of maturity modeling, as the two companies, these cases are based in, both apply a self-developed PMMM. It was particularly HPM.E who was familiar with this approach and who was able to express a number of aspects he perceived as weaknesses of maturity modeling: he raised the question of how to measure the results of management processes and hinted at an over-emphasis on processes: "processes are important, but if you don't have the right people they are of no big use". In addition, he pointed at EFQM business model in arguing that actual results of an organization's project business should be incorporated into the systematic of PMMM. Other interviewees reported that they perceive the questions and explanations on higher levels of the PjM3 hard to grasp and were sometimes very unsteady how to answer (cf. HPM.A1, PM1.A2). It was particularly formulations like "optimal" or "sophisticated" that led to this.

As has been stated above, all three cases represented organization units that were part of bigger companies. Particularly in case A1 the role of the entire company in connection with project management maturity was stressed:

> The smaller the entire company is, the less it will be able to afford a "luxurious" process framework that ensures it is able to cope with a certain level of complexity (HPM.A1; also cf. PM.A1).

CU.E explained a cascading structure of project management offices (PMO) on different hierarchical levels, each one responsible for a certain level of aggregation of the project management process framework. A1 and E also had project management-related personnel development programs in place. A2 offered its project management staff certain opportunities for further qualification. While some of them technically were mandatory, the system in fact appeared to be permeable (cf. PM1.A2). Furthermore, the entire company's IT department put A1 in the position to customize its project management software in-house.

The examples given above reflect a possible decline of project management maturity levels in connection with decreasing size of the entire organization (cf. Besner and Hobbs, 2008b). This finally led to the selection of case A2 as a smaller organization unit in an, again, smaller entire company. However, (and as has also been shown above), in all three cases (i.e. on all three different maturity levels they represent) there was evidence for inefficiencies and diminishing returns as a result of certain structures, hinting at the existence of an ideal maturity level. Through explicitly bearing in mind contextual contingencies, these two issues shall now be combined taking a closer look at the environment the cases are operating in and the nature of the projects they are dealing with.

While all cases deal with a rather low level of technological uncertainty in their projects, cases A1 and E on the one side and case A2 on the other should generally be distinguished from one another. Projects of A2 were generally smaller in size as compared to A1 (particularly regarding financial budget) and E (regarding both financial budget and duration). As a result of this, the size of the project teams was greater in cases A1 and E, and, in addition, there were also more external stakeholders (e.g. suppliers) in these cases. In case A2 the project teams usually consist of less than ten people, who have a strong shared working history and geographically work very close together. As mentioned by PM1.A2, he even tries to group his team together in the same office (or "project room" as he put it) in the last phase of his projects. PM2.A2 also mentioned the intense and direct team work as an important success factor. In his opinion, this is why the company does not need a higher degree of formalization of project management. Project teams in cases A1 and E shared a less common working history and were highly geographically dispersed. In the eyes of HPM.A1, this demands a terminology, software, and a process framework which are familiar to all team members; project management-related training and the work of project management offices serve as a backbone in this regard (HPM.A1). He stated: "personally, I have a very positive opinion towards formalization [of project management structures] – especially when one is operating in a complex environment".

Linkage to project complexity

Since the mid-1990s, complexity is a concept which has been frequently referenced in project management literature (Gidado, 1996; Baccarini, 1996; Williams, 1999;

Vidal *et al.*, 2011). While there are several points of discussion and open questions regarding this concept (see Burcar Dunović *et al.* (2013) for a recent overview), two facts can be observed: on the most abstract level authors differ between an (socio-) organizational and a technological/technical dimension of (project) complexity (Baccarini, 1996; Chronéer and Bergquist, 2012; some single authors like Remington and Pollack (2007) mention more than two dimensions). Second, there is a bulk of studies that have identified factors or "drivers" leading to (an increased level of) project complexity. Table II links the characteristics of the cases' projects explained in the previous section with the literature on project complexity.

As all three cases are dealing with relatively low levels of technological uncertainty (with reference to the framework of Shenhar and Dvir (1996)), it becomes apparent that the complexity possibly affecting the ideal level of project management maturity is one of interaction and cooperation of the project participants. Hence, it is a kind of organizational complexity and not a technical one.

Discussion, conclusions and implications

The research presented in this paper attempted to identify factors determining an organization-specific ideal level of project management maturity through means of a multiple qualitative case study with organizational units of industrial enterprises. The foundation for this ideal maturity level is shaped by considerations of efficiency and the fit of an organization's structures to its environment, as proposed in contingency theory.

The analyses of the cases provided some support for the idea of a company-specific ideal level of maturity, because requirements on higher maturity levels were perceived as resource consuming and at the same time not value adding by the interviewees (HPM.A1; PM.A1; CU.A1; HPM.E; PM2.A2). Furthermore, certain formal structures, which go along with a higher degree of maturity, were shown to be inefficient, ineffectual, and, additionally, allowed for "hiding" behind these structures – to the disfavor of the projects of that organization (CU.A1; HPM.E). The results therefore go in line with both theoretical considerations (Kwak and Ibbs, 2000a; Crawford, 2007; Wheatley, 2007), and empirical research (Killen and Hunt, 2013; Teller *et al.*, 2012).

The adoption of a contingency perspective – as proposed by Mullaly and Thomas (2010) – turned out to be fruitful in determining variables that can be referred to in order to ascertain this ideal level of maturity. The concept of project complexity was

Table II.
Comparison of facets of project complexity as observed in the case research with previous literature

Facet of complexity as observed in case research	Citations
Project team size	Bosch-Rekveldt *et al.* (2011), Geraldi and Adlbrecht (2007), Müller and Turner (2007), Thomas and Mengel (2008)
Geographical dispersion of project team	Geraldi and Adlbrecht (2007), Vidal *et al.* (2011), Bosch-Rekveldt *et al.* (2011), Müller and Turner (2007), Maylor *et al.* (2008)
Common working history of project team members	Maylor *et al.* (2008)
Number of intra-organizational interfaces	Geraldi and Adlbrecht (2007), Vidal *et al.* (2011), Williams (1999), Bosch-Rekveldt *et al.* (2011), Ellmann (2008)
Number of extra-organizational interfaces	Geraldi and Adlbrecht (2007), Vidal *et al.* (2011)

perceived to occupy a prominent position in this regard (cf. previous two sub-sections). A comparison with the literature available on "drivers" of project complexity helped to validate this. It became apparent that it is a complexity of organization that both demands for a certain level of formalization (and hence: maturity) of the project management implementation, and might be viewed as a moderating construct in the relationship between project management maturity and its benefits on the project level.

Scholars could on the one hand execute further qualitative research that helps to cross-check and substantiate the results outlined in this article. On the other hand, the relationships that were touched on could be subject to quantitative surveys and an application of correlation and regression analyses as well as statistical testing of the data. One survey of this kind is currently being conducted in industry companies of various branches based in German-speaking countries (Albrecht, 2013).

As a practical implication, professionals might consider to combine their approach to measuring project management maturity with one to measure the complexity of their projects (models/methods presented in Bosch-Rekveldt *et al.* (2011), Aschoff *et al.* (2013) or Geraldi (2006) could be applied) in order to gain additional information for the determination of their target maturity level.

References

Ahlemann, F., Schroeder, C. and Teuteberg, F. (2005), *Kompetenz- und Reifegradmodelle für das Projektmanagement: Grundlagen, Vergleich und Einsatz*, ISPRI, Osnabrück.

Albrecht, J.C. (2013), "Projektmanagementreifegrad und Projekterfolg: untersuchung im Kontext industrieller Projekte", unpublished questionnaire, Kassel.

Albrecht, J.C. and Spang, K. (2011), "Towards an understanding of the relationship between project management maturity and project success", paper presented at International Conference on Current Issues in Management of Business and Society Development, Riga, Latvia, 5-7 May.

Aschoff, T., Albrecht, J.C. and Spang, K. (2013), "Tailoring unternehmensinterner standards für Energieanlagenbauprojekte", in Lau, C., Dechange, A. and Flegel, T. (Eds), *Projektmanagement im Energiebereich*, Springer Gabler, Wiesbaden, pp. 125-145.

Baccarini, D. (1996), "The concept of project complexity: a review", *International Journal of Project Management*, Vol. 14 No. 4, pp. 201-204.

Besner, C. and Hobbs, B. (2008a), "Discriminating contexts and project management best practices on innovative and noninnovative projects", *Project Management Journal*, Vol. 39, pp. S1-S123.

Besner, C. and Hobbs, B. (2008b), "Project management practice, generic or contextual: a reality check", *Project Management Journal*, Vol. 39 No. 1, pp. 16-33.

Bosch-Rekveldt, M., Jongkind, Y., Mooi, H., Bakker, H. and Verbraeck, A. (2011), "Grasping project complexity in large engineering projects: the TOE (technical, organizational and environmental) framework", *International Journal of Project Management*, Vol. 29 No. 6, pp. 728-739.

Burcar Dunović, I., Radujković, M. and Škreb, K.A. (2013), "Towards a new model of complexity: the case of large infrastructure projects", paper presented at 27th IPMA World Congress, Dubrovnik, CRO, 30 September-3 October.

Chrissis, M.B., Konrad, M. and Shrum, S. (2009), *Capability Maturity Model Integration (CMMI): Richtlinien für Prozess-Integration und Produkt-Verbesserung*, 2nd ed., Pearson Education Deutschland, München.

Chronéer, D. and Bergquist, B. (2012), "Managerial complexity in process industrial R&D projects: a Swedish study", *Project Management Journal*, Vol. 43 No. 2, pp. 21-36.

Cooke-Davies, T.J. (2007), "Project management maturity models", in Morris, P.W.G. and Pinto, J.K. (Eds), *The Wiley Guide to Project Organization and Project Management Competencies*, Wiley, Hoboken, NJ, pp. 290-311.

Cooke-Davies, T.J. and Arzymanow, A. (2003), "The maturity of project management in different industries an investigation into variations between project management models", *International Journal of Project Management*, Vol. 21 No. 6, pp. 471-478.

Crawford, J.K. (2007), *Project Management Maturity Model*, 2nd ed., Auerbach Publications, Boca Raton, FL.

Crawford, L., Hobbs, B. and Turner, J.R. (2005), *Project Categorization Systems: Aligning Capability with Strategy for Better Results*, Project Management Institute, Upper Darby, PA.

Crosby, P.B. (1979), *Quality Is Free*, 1st ed., McGraw-Hill, New York, NY.

Drazin, R. and Van de Ven Andrew, H. (1985), "Alternative forms of fit in contingency theory", *Administrative Science Quarterly*, Vol. 30 No. 4, pp. 514-539.

Dvir, D., Lipovetsky, S., Shenhar, A.J. and Tishler, A. (1998), "In search of project classification: a non-universal approach to project success factors", *Research Policy*, Vol. 27 No. 9, pp. 915-935.

Ellmann, S. (2008), "Management komplexer internationaler Projekte: Netzstrukturen, Governance und Handlungsempfehlungen", dissertation, Institut für Projektmanagement und Innovation (IPMI), Universität Bremen, Bremen.

Engwall, M. (2003), "No project is an island: linking projects to history and context", *Research Policy*, Vol. 32 No. 5, pp. 789-808.

Fincher, A. and Levin, G. (1997), "Project management maturity model", paper presented at PMI 28th Annual Seminars and Symposium, Chicago, IL, 29 September-1 October.

Gareis, R. (2002), "A process-based maturity model for the assessment of the competences of project-oriented companies", paper presented at 2nd SENET Conference, Cavtat.

Geraldi, J.G. (2006), "Patterns of complexity: the thermometer of complexity", paper presented at 20th IPMA World Congress, Shanghai, 15-17 October.

Geraldi, J.G. (2008a), "Reconciling order and chaos in multi-project firms: empirical studies on CoPS producers", dissertation, Management Internationaler Projekte (MIP), Universität Siegen, Göttingen.

Geraldi, J.G. (2008b), "The balance between order and chaos in multi-project firms: a conceptual model", *International Journal of Project Management*, Vol. 26 No. 4, pp. 348-356.

Geraldi, J.G. and Adlbrecht, G. (2007), "On faith, fact, and interaction in projects", *Project Management Journal*, Vol. 38 No. 1, pp. 32-43.

Gidado, K.I. (1996), "Project complexity: the focal point of construction production planning", *Construction Management and Economics*, Vol. 14 No. 3, pp. 213-225.

Ginsberg, A. and Venkatraman, N. (1985), "Contingency perspectives of organizational strategy: a critical review of the empirical research", *The Academy of Management Review*, Vol. 10 No. 3, pp. 421-434.

Grant, K. and Pennypacker, J. (2006), "Project management maturity: an assessment of project management capabilities among and between selected industries", *IEEE Transactions on Engineering Management*, Vol. 53 No. 1, pp. 59-68.

Humphrey, W.S. (1989), *Managing the Software Process*, Addison-Wesley, Reading, MA.

Ibbs, C.W. and Reginato, J. (2002), *Quantifying the Value of Project Management: Best Practices for Improving Project Management Processes, Systems, and Competencies*, Project Management Institute, Newtown Square, PA.

Jiménez, J.D., Martínez Costa, M. and Martínez Lorente, A.R. (2012), "EFQM process criteria results: a project management maturity perspective", paper presented at 4th P&OM Conference, Amsterdam, The Netherlands.

Jugdev, K. (2004), "Research issues: a conceptual look at project management as a source of competitive advantage", paper presented at Administrative Sciences Association of Canada, Quebec, Canada.

Jugdev, K. and Thomas, J. (2002), "Blueprint for value creation: developing and sustaining a project management competitive advantage through the resource based view", paper presented at PMI Research Conference, Seattle, WA.

Jugdev, K., Thomas, J. and Delisle, C.L. (2001), "Rethinking project management: old truths and new insights", *Project Management*, Vol. 7 No. 1, pp. 36-43.

Kerzner, H. (2001), *Strategic Planning for Project Management Using a Project Management Maturity Model*, Wiley, New York, NY.

Killen, C.P. and Hunt, R.A. (2013), "Robust project portfolio management: capability evolution and maturity", *International Journal of Managing Projects in Business*, Vol. 6 No. 1, pp. 131-151.

Kujala, J. and Artto, K. (2000), "Criteria for project performance in business context", *Project Management Journal*, Vol. 6 No. 1, pp. 46-53.

Kwak, Y.H. and Ibbs, C.W. (2000a), "Calculating project management's return on investment", *Project Management Journal*, Vol. 31 No. 2, pp. 38-47.

Kwak, Y.H. and Ibbs, C.W. (2000b), "The Berkeley project management process maturity model: measuring the value of project management", *Proceedings of the 2000 IEEE Engineering Management Society: EMS-2000, Albuquerque, NM, 13-15 August*, IEEE, Piscataway, NJ, pp. 1-5.

Lappe, M. and Spang, K. (2013), "Investments in project management are profitable: a case study-based analysis of the relationship between the costs and benefits of project management", *International Journal of Project Management*, November (in press).

Lundin, R.A. and Stablein, R. (2000), "Projectisation of global firms: problems, expectations and meta-project management", paper presented at IRNOP IV Conference, Sydney, Australia.

Maylor, H., Vidgen, R. and Carver, S. (2008), "Managerial complexity in project-based operations: a grounded model and its implications for practice", *Project Management Journal*, Vol. 39, pp. S15-S26.

Miles, M.B. and Huberman, M.A. (2009), *Qualitative Data Analysis: An Expanded Sourcebook*, 2nd ed., Sage, Thousand Oaks, CA.

Milosevic, D. and Patanakul, P. (2005), "Standardized project management may increase development projects success", *International Journal of Project Management*, Vol. 23 No. 3, pp. 181-192.

Mullaly, M. (1998), "1997 Canadian project management baseline study", paper presented at PMI 29th Annual Seminars and Symposium, Long Beach, CA.

Mullaly, M.E. (2006), "Longitudinal analysis of project management maturity", *Project Management Institute*, Vol. 36 No. 3, pp. 62-73.

Mullaly, M.E. and Thomas, J.L. (2010), "Re-thinking project management maturity: perspectives gained from explorations of fit and value", paper presented at PMI Research and Education Conference 2010, Seattle, WA.

Müller, R. and Turner, J.R. (2007), "Matching the project manager's leadership style to project type", *International Journal of Project Management*, Vol. 25 No. 1, pp. 21-32.

Office of Government Commerce (2008), "Portfolio, programme and project management maturity model (P3M3): introduction and guide to P3M3", available at: www.p3m3-officialsite.com/nmsruntime/saveasdialog.aspx?lID=456&sID=210

Office of Government Commerce (2010), "P3M3 v2.1 self-assessment, instructions and questionnaire", available at: www.p3m3-officialsite.com/nmsruntime/saveasdialog.aspx?lID=461&sID=166

Pasian, B.L. (2010), "Project management maturity: a critical review of existing and emergent contributing factors", paper presented at 24th IPMA World Congress, Istanbul, Turkey, 1-3 November.

Pasian, B.L., Williams, N. and Alameri, H. (2012), "The value of project management maturity models: a new conceptual model with a resource-based view", paper presented at 26th IPMA World Congress, Kreta.

Patah, L.A. and Carvalho, M.M. (2007), "Measuring the value of project management", paper presented at PICMET 2007, Portland, OR.

Pennypacker, J. and Grant, K. (2003), "Project management maturity: an industry benchmark", *Project Management Journal*, Vol. 34 No. 1.

Project Management Institute (2008), *Organizational Project Management Maturity Model* (*OPM3*), 2nd ed., Project Management Institute, Inc., Newtown Square, PA.

Remington, K. and Pollack, J. (2007), *Tools for Complex Projects*, Gower, Aldershot.

Shenhar, A.J. and Dvir, D. (1996), "Toward a typological theory of project management", *Research Policy*, Vol. 25 No. 4, pp. 607-632.

Steeger, O. (2010), "Projektmanagement und Siemens gehören zusammen", Interview mit dem Programmdirektor für PM@Siemens Dr Jürgen Schloß, Projektmanagement aktuell, No. 2, pp. 3-10.

Teller, J., Unger, B.N., Kock, A. and Gemünden, H.G. (2012), "Formalization of project portfolio management: the moderating role of project portfolio complexity", *International Journal of Project Management*, Vol. 30 No. 5, pp. 596-607.

Thomas, J. and Mengel, T. (2008), "Preparing project managers to deal with complexity: advanced project management education", *International Journal of Project Management*, Vol. 26 No. 3, pp. 304-315.

Thomas, J. and Mullaly, M. (2008), *Researching the Value of Project Management*, Project Management Institute, Newtown Square, PA.

Turner, J.R., Ledwith, A. and Kelly, J. (2009), "Project management in small to medium-sized enterprises", *International Journal of Managing Projects in Business*, Vol. 2 No. 2, pp. 282-296.

Venkatraman, N. and Camillus, J.C. (1984), "Exploring the concept of 'fit' in strategic management", *The Academy of Management Review*, Vol. 9 No. 3, pp. 513-525.

Vidal, L.-A., Marle, F. and Bocquet, J.-C. (2011), "Measuring project complexity using the analytic hierarchy process", *International Journal of Project Management*, Vol. 29 No. 6, pp. 718-727.

Voidevich, B. and Jones, M. (2001), "Developing and applying a project management capability maturity model", *Proceedings of PMI Annual Seminars and Symposium 2001, Nashville, TN, USA, Project Management Institute, Nashville, TN.*

Wheatley, M. (2007), "Maturity matters", *PM Network*, Vol. 21 No. 7, pp. 49-53.

Whittington, R., Pettigrew, A., Peck, S., Fenton, E. and Conyon, M. (1999), "Change and complementaries in the new competitive landscape", *Organization Science*, Vol. 10 No. 5, pp. 583-600.

Williams, T.M. (1999), "The need for new paradigms for complex projects", *International Journal of Project Management*, Vol. 17 No. 5, pp. 269-273.

Woodward, J. (1958), *Management and Technology, Problems of Progress in Industry Series*, Vol. 3, Her Majesty's Stationary Office, London.

Yazici, H.J. (2009), "The role of project management maturity and organizational culture in perceived performance", *Project Management Journal*, Vol. 40 No. 3, pp. 14-33.

Yin, R.K. (2009), *Case Study Research: Design and Methods*, 4th ed., Sage, Los Angeles, CA.

Appendix

Question	Section of the guideline
Please position the projects of your organization within the following classification scheme (framework by Shenhar and Dvir (1996))	Demographics
How would you describe the acceptance of your organization's project management processes by the project staff and what is your personal opinion on the formalization of project management through the definition of processes?	PM maturity and process management
Does the top management of your organization promote the development and improvement of the project management structures? Are there examples?	PM maturity and process management
Is there project management-related personnel development/training in your organization?	PM maturity and process management
Please characterize your last project (type, task/product, your role, size, etc.)	Last project of interviewee
When is a project considered to be successfully completed in your organization? What kind of criteria are taken into consideration in this regard?	Success and customer satisfaction
In which dimensions does your organization do project monitoring and control? (last project + generally)	Success and customer satisfaction
Who was the customer of your last project? Does your organization measure the satisfaction of its project customers or other stakeholders? If so, please describe	Success and customer satisfaction
What were success factors of your last project and projects of your organization in general?	Success and customer satisfaction
Does your organization assess the quality/maturity of the project management structures of potential suppliers?	PM maturity along value chain
With respect to the branch your organization is operating in: do you see a relationship between the position of a company on the value chain and the sophistication/maturity of its project management structures?	PM maturity along value chain

Table AI.
Excerpt from the interview guideline

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