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Identifying Project Contingency Factors for Situational Project Management Method Engineering

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ABSTRACT

While several researchers and practitioners stated that project management methods should fit the project context, engineering a project management method to fit a specific situation has not yet received much attention in the literature. Only recently, some studies have introduced Project Contingency Theory (PCT) and suggested various project contingency factors that could guide method selection or engineering. However, a thorough overview of contingency factors lacking. Remarkably, in information systems (IS) development research, a rich tradition of situational method engineering exists. IS development contingency factors have been studied and linked to engineering requirements for IS development methods. It is the objective of this paper to initiate a similar tradition for Situational Project Management Method Engineering. A first step needed is to develop a comprehensive list of project contingency factors. In this paper we built such a set of 28 project contingency factors. We elicited these factors from both theory and practice. We conducted a systematic literature review to analyze theories in both project management and IS literature. We obtained input from practice through semi-structured interviews with project managers. We merged the contingency factors found in theory and practice and described each factor using the literature surveyed and the interview data. Quotes from the interviews with project managers are given to illustrate the contingency factor and its impact on project management practices. Furthermore, we provide a comparison of the contingency factors found to the notion of critical success factors. The 28 contingency factors presented are grounded in practice and theory and provide a solid foundation for further research towards Situational Project Management Method Engineering.

Keywords

Project Management Methods, Project Contingency Theory, Contingency Factors, Method Engineering, Situational Methods

INTRODUCTION

Projects can be viewed as "temporary organizations within organizations" Shenhar (2001). As no two organizations are the same, context of project varies greatly and the effectiveness of the "one-size-fits-all" methods for project management is increasingly debated. Scholars as well as practitioners are looking for ways to fit project management methods to the organizational context. To use the words of Shenhar (2001): "*Indeed, several authors have recently expressed disappointment in the universal 'one-size-fits-all' idea*…". Khazanchi & Zigurs (2008) recognize that project management methods may differ depending on the context. The literature has often ignored the fact that not all projects are the same and that there is no universal set of project characteristics (Shenhar, 2001). Recently, the birth of Project Contingency Theory (PCT) calls for a connection between project management methods and the project context (Srivannaboon, 2006; Howell et al., 2010). Quoting Howell et.al. (2010): "PCT argues that the best approach to managing a project depends on context: different conditions require different project organizational characteristics, and the effectiveness of the project is related to how well organization and conditions fit each other". Payne and Turner (1999) support the need to tailor project management procedures. As can be seen in Figure 1, their study shows that tailoring increases the chance for success and failure rates are reduced. However, the literature base on the subject is limited and PCT is still in its infancy, indicating that further research is needed (Howell et al., 2010). Although researchers and practitioners stated that project management methods should fit the project context, engineering a project management method to fit a specific situation has not yet received much attention.

		Tailored procedures		Common procedures	
		% success	% failure	% success	% failure
Projects by size	Large	78%	5%	69%	9%
	Medium	73%	5%	73%	7%
	Small	80%	2%	59%	16%
Differing resource types		74%	7%	70%	10%

Figure 1: The effect of tailoring procedures, adapted from Payne & Turner (1999)

PCT has its roots in classical contingency theory. Contingency theory has been influential in a wide range of management theories (Drazin & Van de Ven, 1985; Lawrence & Lorsch, 1967; Otley, 1980). Shenhar (2001) describes the essence of contingency theory as *"different external conditions might require different organizational characteristics, and that the effectiveness of the organization is contingent upon the amount of congruence or goodness of fit between structural and environmental variables"*.

In the field of Information Systems (IS), the study of engineering development methods has a mature research tradition. The notion of Method Engineering (ME) has been coined by an active research community (e.g. as can be seen from a series of IFIP WG8.1 conferences). Method Engineering is defined as the engineering discipline to design, construct and adapt methods, techniques and tools for IS development (Henderson-Sellers & Ralyté, 2010). In a systematic literature review of the ME field, Henderson-Sellers and Ralyté (2010) identify Situational Method Engineering (SME) as a major component of ME. SME encompasses all aspects of creating a development method for a specific situation. SME can be an alternative to the problem of selecting the most appropriate method[8] for a project. The key idea of SME is to select and integrate method fragments, or pieces, that already have been created and stored in a so-called method base (Harmsen, 1997). This selection process is guided by the project context, as observed by Van Slooten et al. (1994): *"contingency factors are circumstances of the project influencing in some way the selection or construction of an approach (situated method) to systems development*". Clearly, the idea of SME is linked to contingency theory (Bucher, Klesse, Kurpjuweit, & Winter, 2007)

Similarly to development methods in IS, there seems to be no single best method to guide project management organization. The project management method must be contingent upon various internal and external factors that influence effectiveness. While this idea has recently received some attention in project management literature, systematic identification of contingency factors and the creation of method fragments for project management methods has yet to begin. In this paper we focus on the identification of contingency factors. It is the objective of this paper to initiate a similar tradition for Situational Project Management Method Engineering. A first step needed is to develop a comprehensive list of project contingency factors. The identification of these factors is an essential first step in developing situational method engineering for project management. Working towards Situational Project Management Method Engineering is valuable both from a theoretical and practical perspective. For theory, studying project contingency factors and the link to the effectiveness of project management methods can bring important insights into the conditions that determine effectiveness of methods and the requirements for method engineering. For practice, Situational Project Management Method Engineering can support project managers in developing approaches that recognize the relevant environmental conditions and deploy ways of working to deal with these factors effectively. In the remainder of this paper we discuss the research approach, the results of the study and conclusions.

RESEARCH APPROACH

In working towards a workable list of contingency factors, various research methods were applied. First a systematic literature review was conducted in order to capture the most relevant insights from scientific literature. Next, semi-structured interviews were conducted with project managers at Nibag, a mid-sized company specializing in project management, in order to capture practical insights and experiences. By combining the literature survey and

[8] Following the line of reasoning of Henderson-Sellers and Ralyté (2010), we will take the words method and methodology as synonyms for the purpose of this study.

empirical data, a comprehensive list of project contingency factors was built. In this section we describe the research approach in detail.

Systematic Literature Review

To conduct the systematic literature review, the structured approach proposed by Webster and Watson (2002) was used. By using the proposed systematic way of reviewing scientific literature, the accumulation of a relative complete census of relevant literature is achieved. This does not mean that every single important paper is captured by this methodology. However the chances of missing relevant articles are reduced to a minimum within the given time frame. Webster and Watson propose 3 steps that we followed:

Step 1. Identify key journals and select key words

To identify key journals in project management, the selection of relevant top journals by Kwak and Anbari (2009) is used. They took the FT40 (Financial Times top 40 journals in Business) to review the most important literature of various disciplines related to Project Management which resulted in 18 journals. It is important to add project management specific journals as well. By extending the journal list of Kwak and Anbari (2009) with 8 project management specific journals that they identified, we assembled a list of 26 journals that was used in this literature review. To also include insights from the IS and method engineering field in our review, we further included the top-25 IS journals used by Schwartz and Russo (2004) based on the top 50 IS journals according to Mylonopoulos and Theoharakis (2001). Table 1 shows the complete set of journals used for the systematic review. A combination of the scientific literature databases Scopus (Scopus, 2010), Web of Science (Web of Science, 2010) and the AIS electronic library provided full coverage of the journals identified. These databases were searched using a comprehensive list of keywords: *Project contingency factors, project contingency theory, project management contingency, project method selection, project method engineering, situational method engineering and method engineering AND project management.* Only recent publications were reviewed (after 2005). The queries that were used did not limit the search to the mentioned lists of journals to further decrease the chance of missing other relevant articles published in other journals.

Step 2. Backward search

Due to the multidisciplinary characteristic of these fields of research and the years of research that have already passed, prior work can also proof very important. In order to find foundational articles, backward search was performed on the initial collection of papers that were identified during step 1. Reference sections were reviewed to select additional relevant papers.

Step 3. Forward search

Having identified the most important papers, further articles citing these papers were identified and scanned using the forward search technique.

After applying the steps described above, initially 782 articles were identified. Based on the title and abstract, these were assessed on their relevance to the research subject, this number was reduced to 28. After forward and backward search the set was extended to 47 articles. A careful assessment of the content resulted in a total of 25 articles to be included in this research. The selection process is shown in the flowchart in Figure 2. In order to synthesize the findings in these articles, a concept-centric approach was used (Webster & Watson, 2002).

Top 26 Journals in Project Management	**Top 25 IS Journals**
AOM Perspectives/Executives	MIS Quarterly
AOM Journal	Communications of the ACM
AOM Review	IS Research
Operations Research	Journal of MIS
Management Science	Management Science
Organization Science	IEEE Transactions (various)
Information Systems Research	Harvard Business Review
Interfaces	Decision Sciences
Harvard Business Review	Decision Support Systems
California Management Review	Information and Management
Sloan Management Review	European Journal of IS
Longe Range Planning	Sloan Management Review
IEEE Transactions of Engineering Management	ACM Transactions (various)
Journal of Operations Management	Data Base
MIS Quarterly	Organization Science
Strategic Management Journal	Information Systems Journal
Administrative Science Quarterly	Academy of Management Journal
Journal of Small Business Management	Communications of the AIS
Project management journal (*)	IEEE Computer
International journal of project management (*)	Journal of Strategic IS
International journal of managing projects in business (*)	Admin. Science Quarterly
Journal of construction engineering and management (*)	Academy of Mgmt Review
Journal of management in engineering (*)	International Journal of E-Commerce
Construction of management and economics (*)	ACM Computing Surveys
Technovation (*)	Accounting, Management & IT
R&D management and research policy (*)	

Table 1: Journals used in the systematic literature review: The 8 project management specific journals are indicated with an asterisk(*).

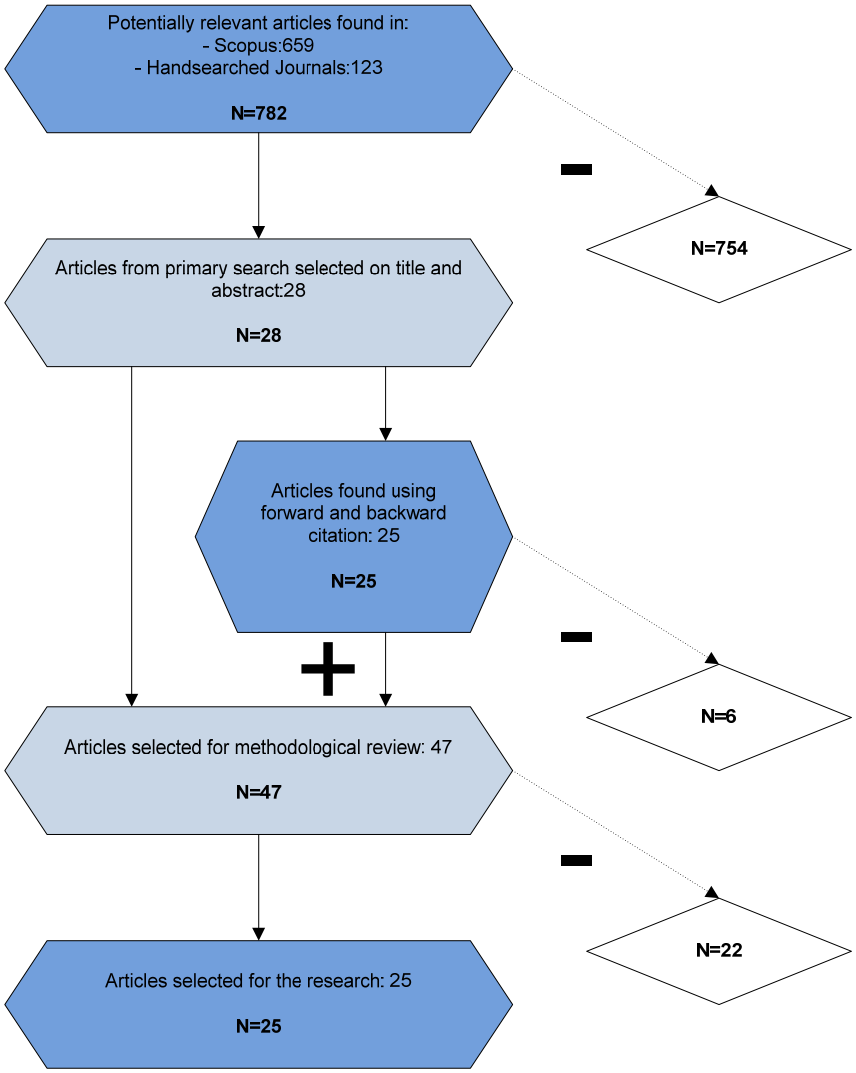

Figure 2: Flowchart literature review process

Semi-structured interviews

In addition to the systematic literature review, semi-structured interviews with project managers were held to compare theoretical findings with practical insights. Meridith et al. (1989) explain benefits of semi-structured interviews: *"Here, people are interviewed using open-ended questions. As issues or points of interest to the researcher arise, these are followed up on the spot or in later interviews to give further insight to the researcher. This approach is particularly good for the descriptive and exploratory phases of research. It has the advantage that the issues are framed by the participants and the researcher may not have even been aware of them. It can also be used for testing hypotheses"* (Meredith et al., 1989). The possibility this technique offers, of following up questions and answer on the spot, ensured that we could capture rich data. The goal of the interviews was to get information on contextual factors project managers consider important to the way they organize a project. To prevent influencing the response, the contingency factors identified in literature were not shown to the project managers in advance. To assure that we did not guide the answers of project managers, we did not provide pre-defined structured lists of factors. Rather, semi-structured questions were asked on the use of project management methods, successful and unsuccessful practices, and the relationship between project context and practices applied. Topics to discuss were identified in advance and are given in the appendix.

The sample consisted of project managers in the case company (Nibag BV) with varying technical project management experience, mainly in the engineering industry. Nibag BV was selected as case company because of its specialization in (generic) project management. Eight subjects were identified in a meeting with the director based on their project management experience and knowledge about project management. Years of experience in technical project management varied from 1 year up till more than 20 years. The duration of the interviews was between 45 and 90 minutes and interviews were audio recorded after approval of the interviewee. A pilot test interview was conducted with the director and evaluated to learn and improve for the next interviews. Table 2 shows the interviews held.

Interviewee[9]	**Project Manager Role**	**Years at Nibag**	**Interview Date**
Jacco	Segment owner Care	5	21-1-2011
Pim	Project Manager Safety	5	11-1-2011
Bjorn	Project Manager Monument Conservation	4,5	7-2-2011
Nico	Project Leader Energy	0-1	21-1-2011
Gijs	Project Manager BPM and MJOP	4,5	22-1-2011
Jeffrey	Segment owner Corporations	5	26-1-2011
Mark	Project Manager Insulation	18	26-1-2011
Manuel	Project Manager Durability	2	2-2-2011

Table 2: List of interviews

The interviews confirmed the statement "one-size-does-not-fit-all projects", as could be expected from our literature review. Identifying the contingency factors that made a difference to their project management approach/method proved to be a challenging yet insightful experience for the project managers interviewed. They indicated that this way of thinking about their practice was very valuable to them.

The audio fragments were transcribed after the interviews the same or next day in order to take all non-verbal information into account as well. In order to optimize this process, the most important interview characteristics were written down immediately after the interview session. Transcription was not word by word, but due to time constraints and interview length limited to capture most important insights. Still, the amount of text of the transcription ranged from 5-10 full text pages per interview. For the data analysis, the research software package QSR NVivo 8 was used. First, transcribed interviews were imported into NVivo in order to code various sections of the interview. Next, relevant sub topics were coded. Finally, contingency factors were identified and coded. Instead of applying time intensive double-coding we chose to cross check the list of factors identified in the interviews with the factors identified in the literature. Also, we aim at validating the contingency factors in future research using structured and quantitative surveys.

RESULTS

By combining the results of the systematic literature review and the semi-structured interviews, a comprehensive set of contingency factors is presented and discussed in this section. As a result of the research approach, the factors are grounded in research and practice. As noted by Howell et al. (2010) contingency factors have two properties : *"(a).. must be variables which are primarily environmental (i.e. external to the project), and (b) potentially require different project characteristics for optimal performance"*. Based on the literature review and interviews we explain the contingency factors and how they may require different project organization for optimal performance.

Following Webster and Watson (2002), a concept matrix was created to order the findings resulting from the systematic literature review. This matrix is presented in Table 3. The first column lists the article from the systematic literature review result set. In the remaining columns, contingency factors that we identified in the articles are shown.

[9] The surnames of the interviewees have been omitted for privacy reasons

Concepts																											
Uncertainty/stability	Complexity /scope	Team Empowerment	Criticality	Urgency/Pace/time/duration	Size	external control/power	interdependencies /dependency	Openness	Novelty/innovation	Technology	Management Commitment	Importance	Impact	Shortage of resources	Cost	expertise degree / Knowledge/ deepness	Stakeholders	Formality	Repetitiveness / Reusability	domain (knowledge gap)	quality	Resistance	User involvement	Relationships	clearness / ambiguity/ clarity	Team location
X	X	X	X	X																							
X	X				X	X																					
							X	X																			
	X			X					X	X																	
							X																				
X	X			X	X		X			X	X	X	X	X	X	X	X	X	X	X			X	X			
X			X	X	X		X		X							X			X	X	X				X	
X	X									X																	
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X				X	X				X		X	X	X	X		X	X	X	X	X		X	X		X	
X	X			X	X		X		X		X	X	X	X		X		X				X		X	X	
X	X		X	X		X				X						X					X					X

Table 3: Concept Matrix based on the literature review

Each row in the Table 3 represents a different article from the final selection of 25 papers. It can be seen in the table that there is some overlap between the columns and factors are defined at different levels of abstraction. For example, uncertainty and stability represent the same idea and size feels intuitively related to complexity to indicate a difference in abstraction level. Therefore, we synthesized the factors to arrive at a smaller set of similar factors. We then combined the set with the factors identified in the semi-structured interviews with project managers. The result is shown in Table 4. As shown in Table 4, most contingency factors reported on in literature are confirmed by the data from the semi-structured interviews (checked in the first column). However, project managers also indicated contingency factors that were not reported on in the literature (checked in the second column). Remarkably, project managers did not stress relevance of some factors that receive considerable attention in literature such as management commitment. Factors not recognized during the interview sessions are unchecked in both columns in Table 4.

Contingency Factors	**Recognized in interviews**	**Added from interview data analysis**
Ambiguity	X	
Complexity	X	
Cost	X	
Criticality	X	
Dispersal	X	
Domain knowledge gap		
Expertise degree	X	
Formality	X	
Impact		
Importance		
Innovation	X	
Interdependecies	X	
Law and regulation		X
Management commitment		
Novelty	X	
Openness		
Politics		X
Quality	X	
Repetitiveness		
Resistance	X	
Shortage of resources	X	
Stakeholders		
Team empowerment		
Team size	X	
Time	X	
Uncertainty	X	
Urgency	X	
User Involvement	X	

Table 4: Alphabetical list of Contingency Factors from literature and interviews with project managers

Not all factors are well defined in literature. Sometimes definitions are completely missing. In order to arrive at workable definitions the findings from literature are combined with the experience from project managers regarding the meaning and importance of a factor. In the remainder of this result section we present the findings from the literature review and interviews for each contingency factor. We combine theoretical insights from the literature with quotes from the interviews. Quotes are selected based on their relevance and their expressiveness, i.e. the way they capture the opinion the project manager expressed in the interview. In case similar quotes were found in the data set, the most relevant quote was selected.

Ambiguity

Clarity, or ambiguity, can be defined as *".. to what extent the goals, needs and desires of the users are clear and coherent enabling a sound specification of the functional requirements*" (van Slooten & Hodes, 1996). A sound specification can also be named unambiguous. This sound specification can be noted in very different formats, as stated by Jacco for example:

".. one time it is 1 A4, another time 2. A contract in Energy Procurement is sometimes not more than an e-mail, saying sign this and you'll save that. <…> But I also have a contract with a specification of more than 70 pages… Is that workable? Not quite, but there were some thoughts specified that proved very useful…"

Complexity

Complexity is one of the most prominent contingency factors identified in scientific literature (Howell, et al., 2010). Together with uncertainty, the concept of complexity is noted in more than half of the papers in the literature review. Project complexity is defined as "*.. the degree of differentiation and interdependence of project elements*" (Howell, et al., 2010). This definition of complexity is also strongly related to the scope of a project (Punter & Lemmen, 1996; Shenhar & Dvir, 1996; Van Slooten & Schoonhoven, 1996). Another way of distinguishing levels of complexity is described by Van Donk and Molloy (2008), based on the work by Mintzberg (1979). The typology of projects used here, based on complexity and ranging from a low level of complexity to a high level, is; the simple project, the bureaucratic project, the divisionalized project, the professional project and the adhocracy project. The complexity created by multiple processes in one project and their influence of on project management is also recognized by Pim:

"These contain some specific things, but in general also have identical behavior. Then you go searching for processes to improve and optimize things inside the project."

Cost

Kornyshova et.al. (2010) identify cost as being a context characteristic essential for an engineering project. However being identified, no definition is provided by the authors on what exactly is meant with cost. We define cost as being the amount of costs that have to be made by the organization in order to make the project work. The costs involved in a project were not recognized as a contingency factor in the interviews.

Criticality

Criticality means how much is "at stake" in the project (Howell, et al., 2010). This means the effect upon the organization or individuals of project failure. There can be great financial as well as non-financial consequences to project failure. Although being identified as a contingency factor mainly in IS literature, criticality is also named by the majority of the interviewees. Different terminology is used by the interviewed project managers to relate the effect upon the organization or individuals of project failure. Examples are; consequential costs of failure (Jeffrey), risk factor of failure (Mark), company risk (Pim) or liability(Manuel). Concerning liability, Manuel notes:

"*Recently, I started to work in a more formal fashion, purely considering liability. <….> These are some pretty progressive concepts. It still is a calculation on paper, but if company X starts building such an innovative building…. What if the building turns out to be uncomfortable, or not energy neutral, …. Quite a big claim can be the result.*"

Dispersal

One element to be related to the functioning of a project team is identified to be dispersal (Howell, et al., 2010). This factor is also referred to as team location in literature (Little, 2005) and represents the geographic dispersion of team members. Dispersal affects the ease of communicating between team members and therefore limiting the ability to use the formal power assigned to the teams effectively. As noted by Little (2005), operationalizing this factor is hard. As can be imagined, when a team is dispersed among different locations, the functioning of the project team depends on the kind of people that have or lack the ability to easily communicate with each other. The problem with communication between team members when they are not located in the same room is also noted in practice by Jacco.

"*The extent to which project management is formalized also depends on where your people are. Is it wise to have all three project members in the same room? When you have to communicate with people throughout the country, then it might be a smart thing to do."*

Domain knowledge gap

The contextual characteristic domain is identified in two papers (Kornyshova, et al., 2010; Kornyshova, Deneckère, & Salinesi, 2007), but they do not provide a definition for this factor. It is imaginable that a certain domain or market poses different demands on a project management than another. Little (2005) has a different look on domain knowledge and uses the term *domain knowledge gap*. The Domain knowledge gap is the discrepancy between the amount of knowledge available in the project team and the amount of domain knowledge needed. Lack of knowledge about the domain should indicate the need for an expert. This factor was not identified in the interview sessions.

Expertise Degree

In a diversified portfolio of projects, there is also a differentiation in the amount of knowledge that is needed to complete the project. As projects require more knowledge, they put different demands on project management. We adapt the definition by Van Slooten & Hodes (1996) to "*the extent the members of the project team possess enough knowledge and experience to deliver the demanded product/service*". Manuel indicated that in certain areas knowledge and expertise has to be brought in:

"*.. I make a report on for example some kind of climate concept and then in very awkward buildings. Some kind of glass house. Now, you make a sustainable office inside such a building that does not get overheated in a sustainable concept which means not using air-conditioning units. In that case I will identify where the knowledge and expertise is in this area, and we will buy it"*

Formality

One external factor that may require changes in their way of working is the level of formality demanded by the project. Formality is defined as "*to what extent there are lasting rules, procedures and standards for the business process and supporting information*" (van Slooten & Hodes, 1996). These restrictions on the freedom of the project team in conducting their project can come from inside the organization, or from the side of the principal. It is also greatly agreed on by practitioners to be relevant to their project management and the extent to which formality is demanded varies enormously between projects. A nice example is the statement by Gijs on the lack of formality:

"*Creating a schedule of requirements for example, with a good team it is not needed. The point is knowing what should be where. If I don't do it, will it hurt me? I now have a customer… he doesn't even want to sign a contract…"*

Impact

We adapt the definition for IS project provided by Van Slooten & Hodes (1996) to "To what extent the project will change business operation after implementation". As it was not identified in practice as being relevant, it needs to be determined if this factor is useable as a contingency factor the field of IS project management.

Importance

Importance is defined as "*To what extent the project is important to the organization*" (van Slooten & Hodes, 1996). This contextual factor is also identified by Kornyshova et al. (2007), but they don't provide a definition. For example, one could expect a project to be important if the company wants to make the move into another market segment and the project is the first they conduct. Another reason may be that the company expects a lot of follow-up projects when a current project is successfully completed. This may pose additional demands on project management as well.

Innovation

Shenhar & Dvir (1996) have related technology to uncertainty. They state that the amount of change in technology is associated with uncertainty and they classify the levels of technological uncertainty at the time of project initiation. Van Slooten & Hodes (1996) take a similar but slightly broader view by not only considering newness of the technology, but also the newness of applied methods to the organization. This is defined as "*.. to what extend the*

applied technology and/or the applied methods, techniques, and tools are new to the organization" (van Slooten & Hodes, 1996). Pim noted that innovations in methods and systems require project management attention:

"…but a project like X, there you develop an entirely new product. This is a combination of products in a new look and feel, resources working together for the first time and working with new working systems… you should store this knowledge somewhere in the organization. As a project manager you should think about these topics in advance. This is important for the transfer to colleagues, as well as to the principal"

Interdependencies

Interdependency of a project can be identified as "*how well projects depend on each other*" (Canonico & Söderlund, 2010). This notion can however be extended to other activities going on in the organization looking at the definition of dependency by Van Slooten & Hodes (1996) "*to what extent the project depends on activities and conditions outside the project*". One problem when not looking at interdependencies with other projects in the organization is nicely stated by Jacco:

".. if we go back in time, we had different clients in childcare. Every different client had its own project manager. Despite selling the same kind of service, every project manager started organizing his environment in his own way. At a certain moment in time we had 4 different ways of working in the same segment, for 1 service. Lots of capacity was lost, because employees had not enough work on one project, but could not be allocated to another since they worked differently."

Law and Regulation

A factor not found in literature, but brought up in the interviews with project managers, is the laws and regulation relevant to the project. Bjorn indicates that is critical to think of law and regulation in advance. For example, new laws or regulations can affect the timing of a project or the documentation required.

Management Commitment

The commitment of general management is important for a project. Lack of top management support is identified as being one of the most important issues for project failure. Hence the importance of management commitment as a factor in project management. We will use the definition by Van Slooten & Hodes (1996): "*To what extent management supports the project*". Remarkably, this factor is not mentioned by the interviewees.

Novelty

The service or product which is provided by the project to the customer, can be new to the customer which can pose different demands on project management (Shenhar, 2001). Sauser et.al. (2009) state novelty to be "*the product newness to the market and customers*". This factor was not identified by the practitioners in the interviews.

Openness

Openness is defined as "*the degree to which projects depend on other organizations' resources and expertise to be able to achieve their set goals*" (Canonico & Söderlund, 2010). This factor was not brought up by the interviewees.

Politics

An element not explicitly stated in literature is politics. However, this factor is one of the most noted factors during the interview sessions. Six out of the eight interviewees made statements highlighting its importance to them in their project management activities. We define this factor as "*the extent to which the political situation inside the principal organization and other stakeholders poses higher demands on project management*". A practical concern raised by Bjorn:

It is also about the person you are talking to; is it an interim manager, then he would like to score fast. Decision making is faster in such a case. But talking to a person of high age working for the government for a very long time, it is much more bureaucratic."

This bureaucratic aspect of organizations is also provided as an example by Gijs:

"… If your client is a facility manager at a child care, you know the project is very sensible to the politics. The location manager has an opinion on it, the financial manager, region manager… Your client has no permission to make the decision and is just a toy in the organization. In that case phasing of your project is very important. "

Quality

This factor is identified in literature but a definition is lacking. One can imagine that a specific quality will be demanded by the principal that is not necessarily the highest. Lower quality may reduce costs but the margins may be unclear. Gijs indicated that quality is really important to him. Looking at one of his major responsibilities, long term maintenance plans, quality is really an issue since these are made based on the desired level of quality.

Repetitiveness

The factor repetitiveness is identified by Kornyshova et. al. (2007) as being a project characteristic, but a definition of the concept is lacking. Closely related to repetitiveness is a factor called reusability. Van Slooten & Hodes (1996) define this concept as "*to what extent is a level of reuse required in the development project*". If a project has a repetitive character, project management can deal with it in a way it is reusable in upcoming comparable projects. We therefore define the concept repetitiveness to be "*To what extent the elements of the project are suitable for reuse in projects to follow*". During the interview sessions with practitioners, repetitiveness was not identified.

Resistance

Resistance is defined as "*To what extent stakeholders have different or conflicting interests*" (van Slooten & Hodes, 1996). Within a project, there can be parties that have different goals or would like things to go another way. This will pose greater demands on the management of the project. This factor was not identified by the practitioners in the interviews.

Shortage of Resources

The shortage of resources in a project is defined as "*to what extent the number of people available for the project is experienced as insufficient*" (van Slooten & Hodes, 1996). When acquiring a new project, the amount of resources the company employs may not be sufficient.

Stakeholders

In two articles (Kornyshova, et al., 2010; Kornyshova, et al., 2007) "*The amount of stakeholders involved in the project*" is brought up as a factor. One can safely assume that a high number of stakeholders requires specific project management activites. This factor was not mentioned in the interviews.

Team Empowerment

Team empowerment is defined as "*.. not only the discretionary power formally assigned to the team, but also externally imposed factors which may limit their ability to use this power effectively*" (Howell, et al., 2010). Team empowerment is concerned with the amount of freedom the project team has in conducting their project as well as the possibilities to use this freedom to successfully fulfill the assignment. None of the interviewees addressed this factor.

Team Size

In contingency literature the factor size are widely identified (e.g. (Henderson-Sellers, Gonzalez-Perez, & Ralyté, 2008; Kornyshova, et al., 2007; van Donk & Molloy, 2008). Van Donk & Moloy (2008) relate size to the amount of people working in the organization and Kornyshova etal. (2007) just refer to the size of the organization in terms of low, middle or high. We adopt the definition of (Henderson-Sellers & Ralyté, 2010): "*the amount of people in the project team*"

Time

This factor can be defined as: "*the extent to which the available time is experienced as being insufficient*". The actual duration of the project can however also pose it different demands on the management of the project. In the interviews, time is one of the most cited contingency factors named by the majority of the interviewees. Pim states:

"*Some projects just last for 3 weeks. But if the duration of the project is over two years, you really have to think ahead*."

Uncertainty

Uncertainty encompasses not only probabilistic and undefined outcomes but also lack of clarity and ambiguity over situational parameters (Howell, et al., 2010). In general, it is defined as being unable to predict future outcomes (Shenhar & Dvir, 1996). Throughout organizational contingency theory, uncertainty is the strongest theme (Howell, et al., 2010). Uncertainty is closely related to stability which can be defined as *".. to what extend the goals, needs, and desires of the users will not change over time enabling a stable specification of the functional requirements*" (van Slooten & Hodes, 1996). The importance of the factor stability in practice can be seen in quotes by practitioners on what they do to cope with changes in goals, needs or desires. Pim states:

"*Changes and risks are things I standardized in my feedback sessions and agenda as well as for the kickoff. These are project risks and these are identified in advance from the perspective from us and the user*"

Urgency

Urgency is the extent to which time constraints are a factor in project activities and decision making (Howell, et al., 2010). In literature, this concept is also related to as pace (Henderson-Sellers & Ralyté, 2010) and time pressure (Kornyshova, et al., 2007; van Slooten & Hodes, 1996). The time pressure is often largely externally imposed and is defined by Van Slooten and Hodes (1996) as *"..to what extent the available time for the project is experienced as insufficient"*. The effect of time pressure is noted by Gijs:

"*Time pressure…. Sometimes you just have to deliver something. It's quite important to keep that in mind, it is a factor that is always there*."

User Involvement

User involvement can be defined as "*The kind of user participation in the project*" (Kornyshova, et al., 2010). It is frequently studied in IS research. Manuel:

"*The critical thing for me is the amount of commitment needed from the client. Especially in bigger projects, clients also have to deliver things. I'll take that into account in my project management."*

CONTINGENCY VERSUS CRITICAL SUCCESS FACTORS

Our extensive literature review also revealed a substantial number of publications on critical success factors (Slevin & Pinto, 1987), especially in the IS dominated project management –and implementation literature (Hartman & Ashcraft, 2002). CSF's are fundamentally different from contingency factors as their founding theory is different. Both concepts themselves already are self-explanatory in their phrasing, but essentially CSF's are derived by ex-post investigations into project failures. CSF's assume a direct relationship between the factor and its success. In other words a CSF in the most generic sense is essential to become successful in achieving a specific objective. A contingency factor takes a fundamentally different approach in describing its environmental influence without being critical and also without specifying causal relationships towards success or failure.

From our literature review and our interviews we are able to make some observations. We observe two categories of CSF's. First CSF's are often phrased as "active" factors that describe activities that can be deployed, partly planned and intensified, during the project. Exemplary CSF's of that type mentioned in Project management or Implementation literature are like: Top Management Support, User Involvement, Training, Communication, etc. Secondly, CSF's in some situations also are strongly related to the project content. Typical examples of that type of top listed CSF's in literature are: Project Goals, Project Planning, Scope changes, etc. Inspecting our results and

comparing them with the top 10 of cited CSF's in literature shows three occasions were our derived contingency factors overlap with the first activity based CSF's, like involvement and empowerment of different involved stakeholders. In the majority of our findings our factors do not overlap and confirm what scholars in the project management domain phrase as real environmental and subordinate factors (Turner & Müller, 2005).

Our results confirm the differences between CSF's and contingency factors. But our results also show the value of using both. In that perspective the emphasized attention to CSF's in our opinion should shift towards adopting elements from contingency theory. Based on this first result we assume criticality is hard to describe upfront and plead to dynamically use contingency factors, as there is no one best way to organize a project. So fundamentally both concepts differ, but both also are related as critical success factors may be contingent or a contingency factor may become critical for success during the project. The latter elegantly describes how our contribution can be applied in this domain. A deliberate use of contingency factors makes project managers or involved participants aware of the environmental influences that are situational specific for *that* particular project. The projects progression and deployment of the contingency factors gradually can indicate the critical property of these factors. A situational project management approach can assist in analyzing these factors, assessing them upon criticality and adjusting the approach when necessary.

CONCLUSION AND FUTURE RESEARCH

While widely used in several management disciplines, contingency theory has only recently gained ground in project management research. Some authors have introduced the notion of Project Contingency Theory (PCT), but the literature base on the subject is still limited. There is some support for the benefits of tailoring project management methods, but Situational Method Engineering has not gained much ground in project management yet. A first step towards Situational Project Management Method Engineering is the identification of project contingency factors. In this paper, we created a comprehensive set of project contingency factors based on a systematic literature review and semi-structured interviews with project managers. The majority of contingency factors was identified in the field of IS research. The choice did not provide interviewees with a pre-defined list of contingency factors resulting in additional factors that are not listed in literature. Moreover, the comparison between literature and interview data revealed that most factors reported on in literature are confirmed by project managers. However, based on the interview data we could adapt some factors recognized in IS literature to better fit generic project management terminology. Our research should be seen as complimentary to the existing amount of CSF based research. Our results mainly show the differences with this field, but also show how the two themes can contribute to each other.

To the best of our knowledge, the comprehensive list of contingency factors presented in this paper is the first of its kind in PCT and a contribution to project management theory. The identification of these factors is an crucial first step in developing situational method engineering for project management. The list can be used to conduct studies that can bring insights into the conditions that determine effectiveness of methods and the requirements for method engineering. For practice, working towards Situational Project Management Method Engineering can support project managers in developing approaches that recognize the relevant environmental conditions and deploy ways of working to deal with these factors effectively. However, more work is needed to arrive at situational project management method engineering. The list of 28 factors produced in this study is presented in alphabetical order and lack themes or clusters of factors. Such a classification would make the list more usable and understandable. More importantly, identifying contingency factors is only the first step. The next step is to identify project management methods, techniques and tools that can be effectively use to engineer or tailor a project management method to fit the context of the project. Finally, more empirical research is needed to validate the contingency factors and practices that tailor project management methods. We plan to address these challenges in future research.

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APPENDIX

In the period of january-february 2011 interviews have been conducted with practitioners at Nibag B.V.. As explained in the article, these were semi-structured interviews. In order to give more insight in the followed methodology, topics used in the interviews are presented here. These topics were identified prior to the interviews and serve as guiding, semi-structuring, the interview. Interviews were conducted in Dutch, but the translation of topics will be provided. Although topics are mentioned below, due to the nature of a semi-structured interview, it is possible that questions were not posed. Next to this, the weight of this interview was on contingency factors and the time discussing subjects was therefore not evenly spread.

- Could you explain the project management approach?
    - Try to think of your last project and more specifically, the management part.
    - Could you indicate the phases you apply?
        - Is this always the same?
        - Could you indicate the activities in each phase?
        - Are there types of problems you encounter in certain phases?
    - Could you indicate which type of documents you use per phase?
        - This concerns management documentation, not technical documentation
        - When no phases are used, then indicate the documents generally used
        - Are there templates used for this end?
        - Are there also documents which are only used in specific types of projects?
        - What are criteria for applying these different documents?
    - What are the principles applied during the project management?
    - Are there any other problem areas concerning project management? Perhaps difficult topics often encountered, or critical aspects during the project.
    - Could you indicate the strengths of your approach?
- Could you indicate how you got to your project management approach?
    - Was this created from scratch?
    - Was a method prescribed by Nibag?
    - Did you create the approach yourself, or was this created based on discussions with other project managers?
    - Which factors lead to this approach or do you think are relevant for this?
    - Is the approach you currently apply fixed, or is this adjusted to the situation?

  - If adjusted, what are the criteria applied to adjust the approach? Which factors of the project context are relevant, or would be relevant?
  - On which elements of project management do these criteria/factors have effect? (Phases?, Documentation?, ctivities?)
  - On what time during the project is this determined? Or continuously?
  - `Which factors are hard to determine? And on what way are they identified?
  - What do you do concerning evaluation and registering learning?
- What is your perspective on project management company wide?
  - Are there certain problems relating to different ways of working across the organization?
    - From an internal perspective?
    - From the client perspective?
  - Are there internal meetings to discuss different approaches?
- What is your view on a generic approach to project management, which can be adjusted to the context?
  - What is your opinion? Do you have ideas for the use of such a model?
  - What do you think are disadvantages of such an approach? What could be advantages?
  - Questions or suggestions?