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Successful projects or success in project management - are projects dependent on a methodology?

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Abstract:
The purpose of this paper is to bridge two seemingly disparate views of project management: proponents of project management methodologies promote a view where a standard set of predefined project practices guarantee project success, while a contingent view of projects suggests that project management needs to be adaptive to project actuality and context. Our aim in this paper is to understand how these different forms of managing projects impact project success. We investigate projects through a lens of discretion, defined as autonomy in the project team to adapt the project to its context as opposed to a reliance on a pre-defined set of rules for project management. We also look at the role of exploration, that is, whether the project focuses on the development of new knowledge, or whether the focus is on furthering existing competences. Based on our analysis, we propose a framework to determine the right amount of discretion in a project, highlighting which project management methodology is suited for the work at hand or whether discarding methodology altogether is more likely to lead to project success.

Keywords:
agile project management; traditional project management; contingency theory; discretion; exploration; exploitation.

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1. Introduction

Project work is often governed by standard work practices defined in a project methodology. Numerous studies and books advocate the use of these standardized ways of working for a successful project [1]-[6]. Project success, in turn, has traditionally been defined with the help of the "iron triangle" of efficiency, exemplified as adherence to budgetary constraints, a timeline, and the goals specified for the project. Despite the alleged panacea of project methodologies and standard practices, project success rates remain low [3],[7],[8]. Clearly, project methodologies do not work equally well in all projects.

Instead, contingency theory posits that an emergent project management style is needed to cope with the unique features and complexities of projects, thereby adapting the project to its organizational context [9]-[13]. This supports a notion of discretion, whereby project managers have the autonomy to independently decide how work should be organized. Naveh [14] defines discretion as spontaneity and breaking the rules of a methodology, as opposed to formality, where pre-defined processes govern project work.

In this paper, we review ways to determine which project methodology suits a given project type, particularly relating to traditional 'waterfall' methods and iterative agile methods. Both have been used in our case company. We also review studies that address the suitability of different project methodologies. These studies typically work with an assumption that a pre-defined methodology is needed for project success [3],[15],[16]. The more provocative question we seek to answer is whether methodology is needed at all, or whether it is sufficient that management practices in the line organization are applied in a temporary project context. This would assume that projects are better off with full discretion. We develop a framework to understand the characteristics of projects that benefit from a formal methodology and projects that benefit from discretion. Unlike previous ways to categorize projects based on, for example, complexity, uncertainty, and dynamism [10],[12],[16], we examine the role of exploration in projects [17]. We thus turn to organizational learning, looking at whether new competences are developed in the project, or whether the project relies on existing competences [18].

Earlier research on project contingency has focused on the project characteristics that call for emergent project management [10]-[12]. Similarly, research that advocates standardized project management list several factors why project management methodologies work [1]-[3],[5]. Alternatively, some studies maintain that projects benefit from altering between formality and discretion [14]. Our findings address a gap in literature by simultaneously examining project discretion and a view that promotes strict adherence to a formal methodology [19]. We address this tension by viewing project management as a continuum from established project management methodologies to fully emergent project management. At the same time, we move from a descriptive to a prescriptive study, detailing principles for when to adapt what kind of project management. In other words, we determine when a contingent view and discretion is advisable, and when predefined practices and formality should be applied for project success.

In the next section, we will examine relevant literature on the subject at hand. Section 3 outlines the context of our study, and the methods we used to analyze our empirical data. Section 4 details the results, followed by Section 5 which discusses the results considering previous literature. In the last section, we present key conclusions, limitations of the study, and recommendations for further research.

2. Project management and project actuality

Typical for most definitions of projects is the focus on two dominant traits: the project is a temporary endeavor, and it is unique in nature [4],[10],[20],[21]. Rather than focusing only on the "iron triangle", project success is increasingly also defined through stakeholder satisfaction [21]-[23]. This implies that success is "in the eyes of the beholder" [21, p. 768]. As such, project success is multi-faceted rather than limited to predefined metrics.

In this section, we review previous literature with respect to key elements of our framework. We discuss project methodologies as well as contingency theory in a project management context. Further, we identify discretion and

exploration as key dimensions in projects. We also identify additional concepts, which we later use as control variables when we empirically test our framework.

2.1 Project methodologies

Project work often adheres to a set of rules. Ways of working are defined in a project management methodology and formality is strong. Joslin and Müller [13] outline processes, tools, techniques, methods, capability profiles, and knowledge areas as the building blocks of a project methodology. In other words, the methodology is a comprehensive toolkit that governs many, if not most, aspects of project work. The methodology is presented as proven good practice, implying that adherence to the outlined practices will result in well-run, effective projects, often stressing the universal applicability of the methodology in question [4],[6,],[15].

One underlying assumption of project research and practice is the plan-act-control cycle, whereby plans forms the basis of activities that are monitored for quality [24],[25]. This view has also been criticized. The agile manifesto, originating in software development but widely quoted in project management in general, exemplifies a shift of focus [26]. It states that, for example, "responding to change" is more important than "following a plan". In this view of projects, social interaction in the temporary organization is more important than planning of activities. As such, iterative planning, frequent customer feedback, and incremental steps lie at the core of agile project management (APM), whereas traditional project management (TPM) relies on one sequential plan-act-control cycle where customer feedback is gathered at the end of the project [27]. However, *any* project methodology relies on an assumption that certain pre-defined ways of working lead to project success. Further, APM merely breaks down the plan-act-control cycle to smaller entities. In practice, the cycle is reiterated several times throughout the project [3],[19].

2.2 Selecting a methodology for a successful project

APM's "rise to fame" has been rapid in recent years. For example, the latest edition of the Project Management Body of Knowledge [4] contains several additions covering agile practices. Practitioners and researchers alike stress that APM leads to higher success rates compared to traditional methods [3],[28]. So, does this mean that APM is the (only) way forward? It would appear there is more to the story: project success rates remain low, despite the prevalence of APM [7]. Overall, studies suggest that the benefits of APM are highest when there is uncertainty regarding how to achieve the project's goals [15],[29],[30], or when environmental dynamism is high, that is, there are frequent changes in the project's operating environment [16],[31]. Yet with growing support for APM, recent studies that advocate the use of TPM are hard to find. All-in-all, it would seem a shift has occurred, whereby APM is deemed suitable for most projects.

Studies have looked at structural complexity as a key dimension to consider when selecting project methodology. Structural complexity grows with the size, interconnectedness, and number of elements in a project [12],[20],[32],[33]. However, previous studies paint a somewhat contradictory picture regarding how structural complexity should be handled, some advocating APM [20],[32], and some declaring traditional methods unsuitable [16],[34]. In contrast, Shenhar and Dvir [12] conclude that the need for formality grows with structural complexity. Indeed, there are studies pinpointing specific challenges with APM, particularly in relation to managing interdependencies [35],[36]. A pertinent study by Paasivaara *et al.* [37] notes challenges with, for example, cross-site teams, integrations, and a common backlog in agile projects. As such, growing structural complexity might create challenges in agile projects. In summary, growing uncertainty and dynamism should drive the adoption of APM, whereas there are contradictory findings regarding structural complexity and project methodology.

Despite their promise, there is ambiguity on whether any given methodology can be universally considered the right approach to project management [38]. Several scholars have put forward that project management needs to consider organizational context and the actuality of projects (for an overview, see Hanisch and Wald [9]). This view of projects has garnered significant interest with studies advocating a contingent approach to project management based on, for example, complexity [10] and uncertainty [12],[39]. Some also promote a view where elements from methodologies are selectively used depending on prevailing circumstances [13]. All-in-all, a contingency view of projects assumes that

organizational context beyond that of the project is considered when determining how the project should be managed. Next, we will examine what this means in practice.

2.3 Discretion in project work

Tatikonda and Rosenthal [40, p. 403] define discretion as autonomy in the project team to "meet emerging circumstances", as opposed to formality that assumes pre-defined rules, processes, and structures for the project [19]. According to Naveh [14], discretion is about breaking rules and structures in the face of a volatile environment. However, discretion does not imply that planning and control are absent, but rather that project practices are developed "on the fly" as opposed to being governed by a pre-defined process or template.

Previous research indicates that development projects benefit from both formality and discretion [14],[40],[41]. APM has been portrayed as a solution to this conundrum, allowing for structure and efficiency while at the same time promoting flexibility and iteration [3],[21]. This would imply that APM has a built-in mechanism to allow for a degree of discretion, despite the formality of a methodology. In practice, APM allows for adaptability and learning by splitting the plan-act-control cycle to smaller entities.

2.4 Exploration and the uniqueness of projects

Exploration refers to the acquisition of new knowledge in an organization as opposed to exploitation, the utilization of existing competences [17],[18]. Conceptually, exploration has been linked to innovation [17]. However, subsequent research has divided innovation to two types: exploitative incremental innovation and exploratory radical innovation, the former concerned with further development of existing competences and the latter with the development of completely new ideas [42]. Given that projects are unique and drive for change, one could argue that innovation lies at the core of the project's task. However, many projects clearly exploit existing competences while other projects seek entirely new solutions [39]. In other words, while 'uniqueness' might refer to innovation, it can be of both the exploitative and exploratory kind. In addition to supporting the development of new competences in projects, exploration can also act to mitigate negative effects of project uncertainty and dynamism [39]. In other words, new competences are needed when the path to the project's goal is unclear, or when the project environment undergoes significant changes. So, how can exploration in projects be enabled? Lenfle [43, p. 477] notes that exploratory innovation in a project requires a "fundamental shift in project management methodology" from a traditional, instrumental view of the project. Similar conclusions are presented by McGrath [44] and Shenhar *et al.* [45], noting that less oversight and a contingent view of projects are needed for exploration.

2.5 Combined lessons

We have examined previous literature regarding project management methodologies, discretion, and exploration in projects. Figure 1 summarizes the relationship between these constructs. In essence, we posit that a high degree of discretion corresponds to a contingent view of projects. This emergent project management style allows project work to be adapted to project actuality. A high degree of discretion also acts to enable exploration in the project. On the other side of the continuum, TPM relies on a high degree of formality and low discretion, while prohibiting high exploration. APM, while still reliant on a degree of formality, allows for more discretion, thus also supporting exploration to a higher degree. In effect, this creates a continuum of effective project management, which is tied to the level of exploration in the project.

Next, we will empirically test this framework. Considering the contradictory findings regarding structural complexity, we will also look at this project aspect in more detail. Given that a high degree of discretion and exploration mitigate the effects of project uncertainty and dynamism, we will not investigate these aspects further.

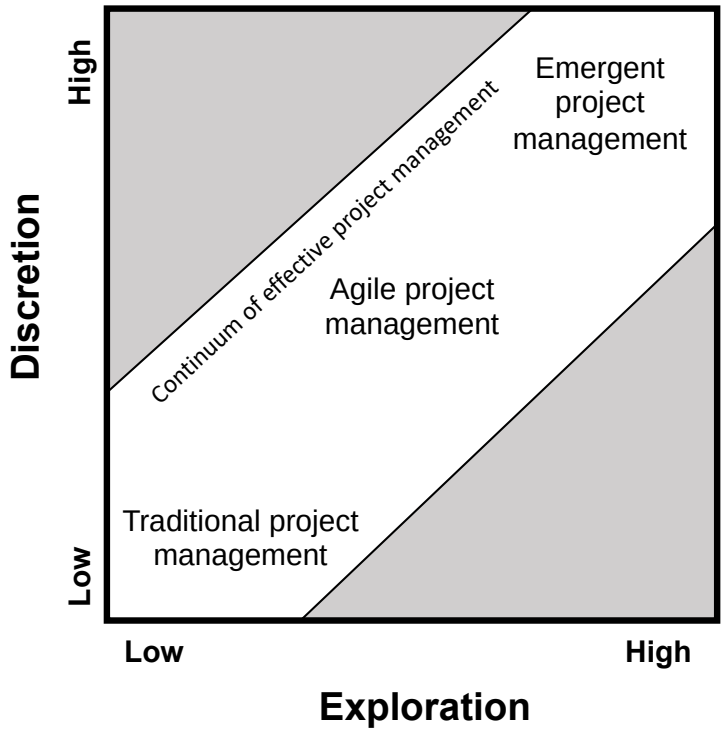

Figure 1. Relationship between discretion, project management, and exploration

3. Method

3.1 Interview data

In this paper, we examine different projects, how they were managed, and whether they were perceived as successful. In our analysis, we subscribe to a view of project success based on stakeholder satisfaction [21]-[23]. Our findings build on interviews with 32 project professionals and their managers at Nokia, an international telecommunications company (see Appendix A). The projects we examine varied in size and complexity, and they were managed with TPM, APM, or with full discretion for the project team (see Appendix B).

The sampling was purposive, including people who worked in projects and people who have switched from managing projects to managing teams (and project managers). As such, all our interviewees had experience in managing projects. Many of the projects investigated in this study also involved Nokia's suppliers. As such, we opted to interview supplier representatives from one of Nokia's largest partners (interviews number 14, 18, and 19 in Appendix A). The interviews were semi-structured; the central themes in the interviews centered around successful and unsuccessful projects, and the nature of exploration in projects. As the term 'exploration' is academic in nature, the word innovation was used in the interviews when referring to the process of seeking new knowledge. Each informant was asked to recall both successful and unsuccessful projects throughout their career and reflect on the role of innovation in said projects.

Data analysis was conducted in two steps. First, we did an inductive analysis of the interviews, starting with open coding [46]. After this, we gradually refined the coding categories to generate a conceptual model. To validate and extend the model, we conducted a qualitative comparative analysis [47],[48].

3.2 Context

At the time of the interviews, Nokia was a full-blown telecommunications company, offering mobile phones as well as telecommunications infrastructure. Since then, Nokia has shifted focus to only infrastructure. The projects that were discussed in the interviews concerned information systems (IS) development and product development. All product development projects involved both software and hardware development. Many of the IS projects concerned the implementation of standard IT solutions, such as Enterprise Resource Planning (ERP), advanced planning and scheduling (APS), or various data management or data exchange solutions.

The formal approach to project management at Nokia has followed a similar path to many other high-tech companies: projects that were organized according to traditional waterfall methods have taken an agile form [28],[37]. At the time of the interviews, Nokia was transitioning from an internal project management methodology to APM. The internal methodology was a milestone-based, waterfall methodology largely built around practices outlined in earlier editions of the Project Management Body of Knowledge [4].

3.3 Data analysis

The data collection stretched over a period of 18 months. The interviews were transcribed and coded, starting with open coding [46]. After this, the coding results were discussed, and a common set of categories were formed. The interviews and memos were re-read, focusing on one category at a time, resulting in redefined subcategories, and adding of new data to existing categories. New categories were created if there was need for it; a practice similar to the principle of constant comparison was present throughout the analysis [46]. In the final step, linkages between the categories were created.

Previous literature was read throughout the process, but the role of previous research for comparison was especially important in the later stages of the analysis. The categories often emerged in discussions between the authors, and whenever a new coding category was formed, previous literature helped in refining and defining the category further. The final categories are outlined in Section 4.4. Once the conceptual model was ready, we proceeded with a separate step to validate the model.

3.4 Validating and extending the model using qualitative comparative analysis

We used Qualitative Comparative Analysis (QCA) to validate the result of the interview coding [47],[48]. In addition, the QCA was designed to account for alternative explanations to project success, such as structural complexity affecting the outcome. QCA applies Boolean algebra and Quine's minimization algorithm to find the most parsimonious combination of antecedent variables capable of explaining an outcome variable. Due to the exponential growth of computing time, the method is most feasible when the number of cases is below 50 and the number of conditions (i.e., antecedent variables) is less than 12. In our analysis, we had 30 cases (i.e., projects listed in Appendix B). Five projects had to be excluded from the QCA due to incomplete data on some of the variables. In other words, the interviews contained insufficient information to assess specific variables. We defined seven antecedent Boolean variables affecting project success. These were based on previous literature, findings from the interview analysis, and characteristics in the data:

- Traditional project management;
- Agile project management (variable name 'A');
- Full discretion (B);
- High exploration (C);
- High structural complexity (D);
- Holistic architecture (E);
- Successful internal sales (F).

The first variable (traditional project management) was eventually excluded from the QCA as the second variable (agile project management) provided all necessary data. In practice, these variables contained opposite values and, thus, duplicate information. The number of cases (i.e., projects) is not directly tied to the number of interviews. Some informants referred to several projects, whereas some talked about projects in general without recalling a specific project.

We had clear criteria for assessing any given variable. Starting with the type of project management, some informants clearly indicated whether the project was milestone-based or agile. In other cases, we made the assessment based on how the informant described the project. One such example is when informants described projects having autonomy and a high degree of empowerment; project discretion was high. Some informants also described temporary undertakings as "not being projects". Given an organizational context that relied heavily on project methodologies, we believe some informants linked the definition of a project to the presence of a methodology. In line with the definition in this paper, we opted to classify these undertakings as projects with full discretion.

The role of exploration was determined based on the focus of the project. If, for example, the project concerned implementation, maintenance, or upgrades, we deemed that the focus was on exploiting existing competences. In contrast, some projects clearly aimed at developing new competences; we used the notion of exploratory innovation to guide coding of these cases [42].

Projects with high structural complexity always involved multiple organizational sub-units or partners where each entity had a big role in ensuring the success of the project. Typically, this resulted in multiple elements such as processes, partners, information systems, or product modules that needed to be combined in the project [12],[20],[32].

The last two variables, 'holistic architecture' and 'successful internal sales' were added because there were instances of project failure reported to us that did not fit any of the other antecedent variables. Projects 28 and 31 (see Appendix B) exhibited a lack of a holistic architecture. These were structurally complex new product development projects with hundreds of people working in smaller teams responsible for different product modules. Our informants described significant challenges with how interdependencies were managed. As such, a lack of 'holistic architecture' denotes a failure to manage structural complexity. Project 10 developed entirely new technology for mobile phones. However, at the time, no product team was willing to take the new technology into use. This was coded as a lack of 'successful internal sales', a challenge present also in some other projects.

3.5 QCA steps

We tabulated our data into a truth table (see Appendix B) composed of the outcome variable (project success) and seven antecedent variables. All antecedent conditions for the project outcome were coded as binary Boolean variables. This tabulation offers a useful way to represent variations in discrete data elements that underlie structured QCA. It also allows for systematically building an explanation, as opposed to an interpretation based on selected source text excerpts [49].

Next, we conducted the analysis using the Tosmana v1.1 QCA Excel Add-In [50]. We included six out of our seven antecedents in the analysis because of the duplicate information in the first variable (TPM). As a shorthand notation, we refer to the antecedent variables using upper case and lower-case letters to denote presence and absence of a project quality.

Our truth table was sparsely populated, as is usual, with only 19 causal conditions out of the theoretically possible 2^6 = 64 combinations of values. Frequently there are no instances of some configuration – a challenge known as a "problem of limited diversity" [51]. Often, though, such "remainder" rows represent cases that are theoretically unfeasible. Remainder rows can be used during the analysis as simplifying assumptions to reduce combinations of causal conditions [52]. We followed this approach in our analysis.

In the final QCA step, programmatic simplification of the truth table produces *prime implicants*. These are combinations of causal conditions that account for at least one positive instance of the outcome (see the prime implicant

chart in Appendix B). The prime implicants are further simplified to an equation that represents the causal conditions producing a given outcome.

The prime implicants in Appendix B contain some redundancy: only three of the six prime implicants cover a unique causal condition that needs to be included in a final reduced equation. The final reduced equation for project success combines these prime implicants with a fourth one:

O = abc + ACE + BCF + cd

As noted, upper case letters represent a condition that is present while lower case letters represent its absence. The letters represent the antecedent variables listed in Section 3.3, starting from 'agile project management' (that also details whether TPM was used or not). Separate conditions independently producing an outcome is represented with the logical OR operator '+'. These separate conditions are thus alone sufficient for the outcome (project success). Conditions that combined produce a given outcome are represented by writing the symbols for the conditions together. In such cases, all conditions are necessary, and no condition alone is sufficient for the outcome. We examine the reduced equation for project success further in Section 4.5 (results).

4. Results

4.1 Discretion in projects

Project management in our case company evolved from an empowered mode where people in the project were responsible for developing ways of working, towards a mode where the organization had an all-encompassing project management methodology. This formalization of ways of working, over time, was a recurring theme in the interviews. Some viewed this as a natural and positive development, whereas others saw it as less valuable for the success of the project. However, there were exceptions to how projects were run. Project discretion is well illustrated by one informant's response to the IT department's request for a formal review of the IT architecture:

> *Can we go with [name of IT tool]? I thought it had a funny name. In a way, this was very shocking [to them]. (Interview #6)*

The project selected the IT solution proposed by our informant and completed the project successfully in record time. The work in the project deviated from practices outlined in a methodology, focusing less on selecting the best possible IT solution and more on quickly getting the job done. Ultimately, formality and discretion were key coding categories in the interview analysis. Table 1 provides examples of formal practices linked with certain project methodologies, as well as examples of discretion where the project deviated from a project methodology.

Table 1. Examples of formality and discretion

Formality	**Discretion**
▪ Project plans with work-breakdown-structures ▪ Project phases, milestones ▪ Steering group meetings ▪ Business case calculations ▪ Project budgets ▪ Scope specifications ▪ Project roles and responsibilities, e.g., communication specialist, change management specialist, quality manager ▪ Concept descriptions (detailing business processes and high-level IT solution) ▪ IT architecture documentation ▪ Communication plans	▪ Picking and choosing elements of different project management methodologies for the same project ▪ "Fluid action plans" ▪ Decision making without steering group approval, a "just-do-it approach" ▪ Allocation of work "through personal contacts" ▪ Problem solving by re-allocating roles and responsibilities, "just getting these four guys to solve the problem" (as opposed to formal project planning) ▪ Less emphasis on planning, more acting "in the moment" ▪ Accountability in the line organization (as opposed

Formality	Discretion
▪ Change management plans ▪ Service level agreements ▪ SCRUM ▪ Demo sessions ▪ Portfolio management practices ▪ Exit criteria	to in the project organization) ▪ No "cast-list" (roles and responsibilities) in the project ▪ "Empowering people to do any changes they can"

4.2 Exploration in projects

Exploration was another key theme in our interviews. When tying innovations to projects, some informants described how new ways of working or entirely new products was brought about by the project. At the same time, some informants saw no link between innovation and project work. This resulted in two categories of projects, low exploration projects and high exploration projects. Examples of these are listed in Table 2.

Table 2. Examples of low- and high exploration projects

Low exploration projects	High exploration projects
▪ Implementation of standard Enterprise Resource Planning (ERP) solution ▪ Readiness for the conversion of national currencies to the Euro ▪ Implementation of new logistics capabilities ▪ ERP upgrade project ▪ Product delivery/installation project (network infrastructure) ▪ Implementation of new Product Data Management (PDM) solution ▪ Implementation of new Demand Planning solution ▪ Improvements to existing products	▪ Development of entirely new supply chain capabilities (including business process and IT solutions) ▪ Specification of a new business-to-business data interchange standard ▪ New product development ▪ Cost saving project (for existing product) ▪ Specification of a new mode of operations and organizational structure ▪ Development of new in-house supplier collaboration solution

The first category of projects relied on exploiting existing competences. Typical for this category of projects was that the problem to be solved was well formulated, and the means to do so could be planned. The need for exploration was low. Examples include projects that focused on the implementation of standard IT solutions. While it could be argued that the organization needed to learn new skills for the effective use of these solutions, the projects were not tasked with defining these skills. Instead, the solution was to be implemented in accordance with instructions from the vendor. Projects where a high degree of exploration was needed became the second category. This category contained projects that specifically focused on developing new solutions and competences.

4.3 Formality, discretion, and exploration

As with formality, also project discretion was sometimes described with negative connotations. Many had a firm belief in structure and formal methodology as means of ensuring project success, and many examples of the positive effects of a strict methodology were presented. On the opposite side, the interviews also revealed cases where formality was misplaced, and discretion was called for. In this section, specific projects are examined in more detail to establish the relationship between formality, discretion, and exploration. Figure 2 illustrates a categorization of projects along these dimensions, summarizing which projects relied on a high degree of formality (example projects III, IV and V), and the projects that exhibited high discretion (projects I, II, VI, and VII). Further, Figure 2 details whether these projects were characterized as exploratory or not. These projects are a subset of all the projects included in the QCA (see Appendix B).

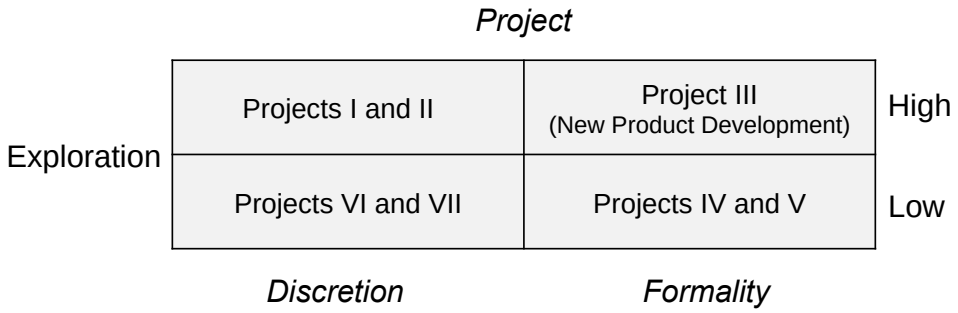

Figure 2. Project categorization based on work practices and degree of exploration

One informant described a large-scale project (project I) that involved more than one hundred suppliers, several international logistics service providers, development of new business processes, as well as new IT solutions. Project I spanned over several years and as a result, highly innovative, new supply chain capabilities were developed. While there were major challenges along the way, the informant considered the project very successful. The way of working in the project was characterized by discretion.

> *I just remember that I wrote a concept description, since I thought a concept description is needed. […] Then we concluded that a RosettaNet specification [XML based standard for electronic communication] is still missing. So, I went ahead and developed that. And then we started implementing all of this. […] If I remember correctly, this was implemented mostly through personal contacts in IT. I convinced a person I know in IT that this is needed. Maybe there then was some sort of steering group that gave the final approval, but basically, we got this done through entirely other means. (Interview #3)*

The next project (project II) concerned the development of a new database product. Conducted more than 30 years ago, the project developed a product that is still maintained and sold today. Discretion again played a big role in the project, and the informant indicated that this could have played a big role in the innovative nature of project II, both in terms of ways of working and outcome. The informant described the circumstances behind the success of the project as follows:

> *An open-minded attitude. We didn't have any practical experience with this kind of real-time systems. We basically went into it blind. […] At the time, we didn't know anything about project management either, so there were no inhibitions. […] We were also highly innovative because we also developed our own database query language. (Interview #11)*

Projects I and II are positioned as projects that exhibit exploration, while work practices are characterized by a high degree of discretion.

The interviews also included examples of formality coupled with a need for exploration. Nokia experienced a high degree of competition from both low-cost manufacturers and other new competitors. The product development process for mobile phones (project III) essentially followed the internal TPM methodology, and several informants revealed a certain degree of frustration with the somewhat rigid fashion in which new products were introduced. While some acknowledged that there are clear reasons (e.g., quality-related) to pursue a very structured approach to product development, a more localized approach could be put in place to counter smaller competitors with innovative products. Also, truly "new and groundbreaking" products could have benefitted from a less rigid approach.

> *We have enough people, we have enough expertise, but we don't have enough of a practical approach. […] We should be faster than them. (Interview #7)*

In this description, the lack of a "practical approach" is impeding the ability to counter small but fast competitors, who are very reactive to changing market conditions. As such, new product development projects are categorized as reliant on formality, while at the same time requiring a high degree of exploration during the project.

Project IV was a large-scale project concerned with the implementation of a new enterprise resource planning (ERP) solution for one division of the company. This project employed a milestone-based project methodology that later evolved into the companywide, formal methodology used across projects. The ERP solution was a standard, off-the shelf software package. A large part of the implementation involved the harmonization of business process across 44 different countries. In this sense, the formal methodology was used to sanction conformity rather than any form of exploration.

> *The challenge was specifically that every creek and island had their own managers, processes, ways of working, and system. There was a hell of a lot of complaints when we said, listen up, now each and every one should take [name of the ERP system] customer order management into use. […] So, we ended up using a clear-cut template [for the implementation], for example, with milestones with clear criteria [for completion]. The primary use was to get rid of these endless discussions, that 'this is no good for us.' […] The change management involved in getting global processes in place in a timely manner simply requires a clear project template. (Interview #2)*

One informant had been involved in an IS project concerning the readiness for the Euro currency (project *V*). This involved changes to accounting systems, but also a thorough review of existing contracts that were in soon to-be legacy currencies. Project V involved a high degree of planning ahead, together with a formalized risk management process.

> *So, then it became a matter of executing and just gathering the data and fixing it. So instead of innovation, it's just problem solving. […] Let's communicate it well and let's keep monitoring and making sure that it's working. And then we have a fallback plan if that something fails. (Interview #16)*

In projects IV, and V, we saw formality coupled with a low degree of exploration.

Our next example (project VI) exhibits a high degree of management direction in terms of setting the schedule for the effort. The project in question concerned the implementation of the ERP solution in the second major division of the company. Formality and planning became difficult due to the aggressive schedule imposed by management.

> *It's completely chaotic, very poor this visibility to kind of what stage are we [in]? Which thing should we do first? By setting [a] very aggressive schedule they were basically really destroying the process there, not doing things in the right sequence. Trying to achieve something really, really fast and… That was a nightmare. (Interview #16)*

In project VII, the intention was to implement a demand management tool for a particular division. This tool had earlier been implemented elsewhere in the company. The earlier, successful implementation was described to us as a having a "process perspective" with "timetables, what is to be done, when, and how". However, the account presented to us of a later implementation in the other division was substantially different:

> *But then, when this was taken to [division 2 of the company] what happened was that they took the subjective opinions of different people and tried to implement all of them. In the end, it became an amoeba that no one controlled. (Interview #14)*

According to the descriptions portrayed to us, projects VI and VII lacked formality; we categorized these projects as having a high degree of discretion. These projects were implementing standard solutions already developed and implemented elsewhere. As such, the need for exploration was low. Project steering relying on discretion seemed misplaced, resulting in projects that were largely perceived as unsuccessful.

4.4 Summary of interview results

A framework that summarizes our coding of the interviews is presented in Figure 3. The circles represent the final coding categories. Each project was first categorized based on the role of exploration in the project; was the need for exploration high or low? After this, the informant's view on the success of the project was determined, and what type of practices had an impact on the perceived success. Formality coupled with a low degree of exploration in the project, sometimes implying a need for conformity, worked well. On the other hand, a high degree of discretion in these kinds of projects was typically depicted as leading to failure. On the opposite side, when a high degree of exploration is required, discretion was better suited to govern the project than formality.

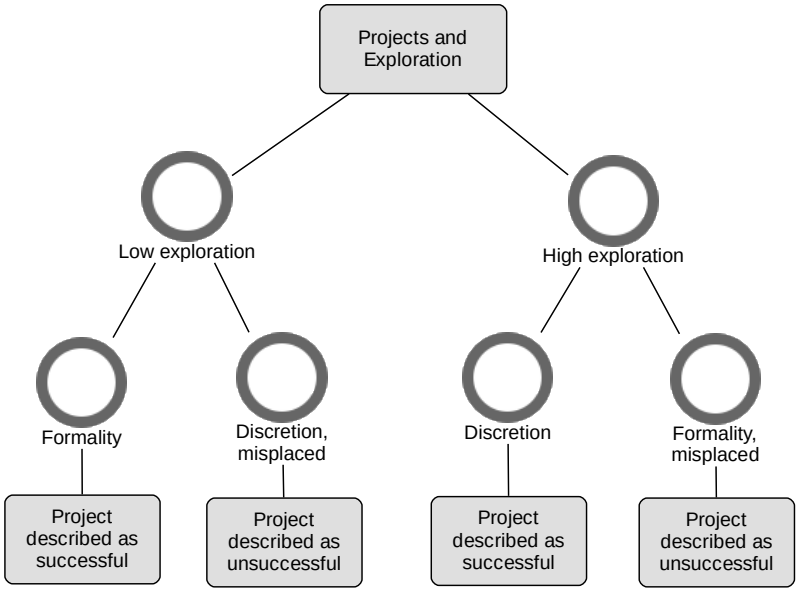

Figure 3. Interview coding categories

4.5 Validating and extending the model

The results of the QCA supported our findings from the interview analysis. The reduced equation for project success (O = abc + ACE + BCF + cd, see Appendix B) implies that successful projects with low exploration relied on TPM. Alternatively, projects with high exploration relied on either APM or full discretion to manage the project. In addition, a 'holistic architecture' was instrumental for agile projects, whereas projects with full discretion also demonstrated 'successful internal sales'. The last two conditions for successful projects, 'cd', imply that low exploration and low structural complexity lead to successful projects. This is likely to be the case. Yet, this "ideal" starting point for a project is far from the conditions many organizations and project managers face.

The need for a holistic architecture in structurally complex agile projects along with internal sales in projects with full discretion, prompted us to re-examine these projects in more detail. While agile projects 28 and 31 (see Appendix B) had challenges with managing interdependencies, similar projects such as numbers 12 and 35 had mechanisms in place to ensure that the overall architecture was managed. Quoting our informants, project 12 employed "architects", and project 35 stressed "collective code ownership" between teams to deliver customer value. In other words, there were specific roles and mechanisms in place to manage structural complexity. The lack of internal sales was exemplified by high exploration projects that had difficulties in anchoring developments with operations, such as project 10 (interview #9): "we should have discussed this more with marketing".

5. Discussion

We set out to understand the role project management plays in enabling project success. In effect, our findings support a contingency view of projects. However, unlike previous contingency studies, we posit that understanding the role of exploration is key to adapting project management to context. In practice, the role of exploration in a project determines the amount of discretion needed. We maintain that there is a case for high formality and TPM in projects that rely on exploitation, whereas exploration projects benefit from discretion, either through APM or by fully discarding established methodologies.

Earlier studies that advocate oscillation between project formality and discretion largely fail to address the specific conditions that require either formality or discretion [14],[40],[41]. In this regard, APM is interesting. It represents a "compromise" between formality and discretion, effectively implementing both at the same time. This is perhaps why it has garnered such interest in a wide variety of projects. Yet, APM is not a "one-size-fits-all" solution to project management, as evidenced by persistent high failure rates also in agile projects [7]. One reason for this might be that APM is applied where TPM or full discretion would be more suitable.

5.1 Project management that enables project success

Figure 4 summarizes the results of this study; our data analysis supports the model outlined in the beginning of the paper. If the project focus is on refinement of the existing, formality should be high. Exploitation is emphasized, and TPM is suitable to manage these projects. On the other side, a need for high exploration to facilitate new ideas and competences calls for discretion. In practice, pre-defined methodology is discarded in favor of an emergent project. Deviating from the outlined continuum in Figure 4 creates challenges, either due to incoordination or a "red tape". Incoordination implies at insufficient rules, processes, and structures for the project, whereas "red tape" is methodology inhibiting exploration through the same mechanisms.

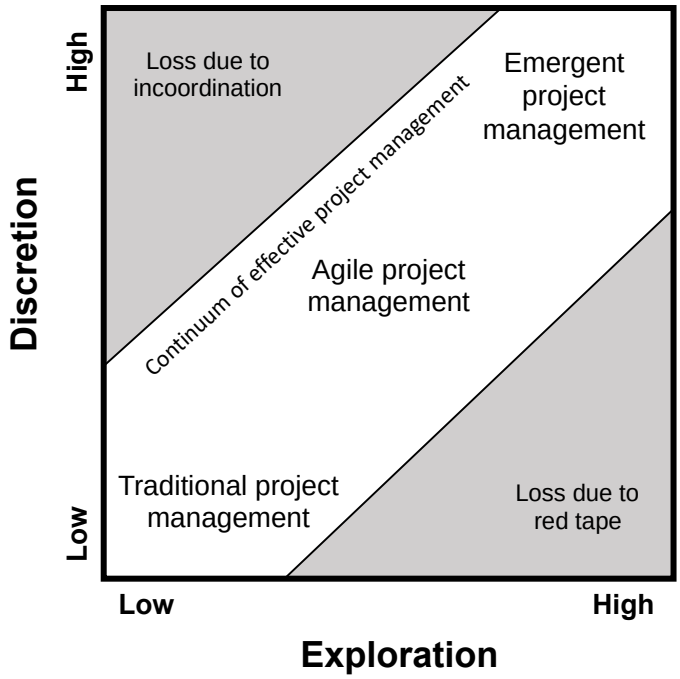

Figure 4. Relationship between discretion, project management, and exploration

Looking at this principle with the help of the project examples outlined in Section 4.3, we note that project one (I) belongs in the emergent project management category. This does not suggest an unsystematic way of working, but instead, high discretion and little or no adherence to a predefined methodology. On the other side of the spectrum, project four (IV) concerned the implementation of a standard ERP solution. The need for exploration was small as the focus was on implementing a standard IT solution. The focus was on uniform ways of working, and no exception to this rule was deemed acceptable. Formality to regulate behavior was important, both in terms of the project activities, but also to manage change. TPM was used for effect.

The degree to which exploration was needed in projects one (I) and four (IV) was different, as was the approach to project management. In effect, the temporary organization was used to provisionally overturn organizational focus. In project IV, this effectively meant that methodology was used to ensure conformity, to a degree the antithesis of what a company in the high-tech sector needs. In contrast, project I used the temporary organization to ensure that established ways of working are discarded. This emergent project management methodology allowed for the development of entirely new competences and solutions.

Project management methodologies always contain a degree of formality, but APM allows for a degree of discretion that can support exploratory initiatives. At the same time, a complete departure from established methodologies might be needed under certain conditions. Several scholars have noted that high exploration requires a move away from an instrumental view of a project [43]-[45]. Our study shows that this can mean that project methodologies should be discarded altogether. Despite the prevalence of APM, we also note that TPM can be very effective when the need for exploration is low. The implementation of standard software might be such a case. These IS projects might in fact benefit from low discretion, emphasizing the word ‘standard’ also in terms of how the project is managed.

5.2 Other factors affecting project success

Based on the QCA, we note that agile projects require attention to handle the effects of high structural complexity, specifically challenges with project interdependencies and architecture. Similar findings have been reported in other studies [35]-[37]. Unlike previous studies, we do not see structural complexity as a determining factor for selecting a project methodology [12],[16],[20],[32],[34], but emphasize the need to address structural complexity in agile projects. In practice, structurally complex agile projects might require mechanisms or project roles that ensure a holistic approach.

Further, the data revealed that successful emergent projects need to pay attention to internal sales. As these projects developed entirely new solutions, it is reasonable to assume that acceptance by the operative organization is not given. As such, emergent projects can benefit from practices inherent to APM, specifically emphasizing customer involvement throughout the project [35]. This ensures that customer requirements are considered.

6. Conclusion

6.1 Implications for theory

Scholars recognize the challenge with adapting projects to their actuality [9]-[13]. Complementing previous studies, we posit that the role of exploration is a key consideration when determining how projects should be managed; this should drive the degree of discretion applied in the project. We stress the need to not only distinguish between low and high exploration projects, but also provide directions for the management of said project types. In practice, high exploration projects require a high degree of discretion, whereas low exploration projects benefit from formality. Unlike previous studies that suggest development projects benefit from both formality and discretion [14],[40],[41], we separate the specific project types that benefit from either formality or discretion. In this vein, we also note that high discretion might mean that project methodologies are discarded altogether. This can create the necessary conditions for developing entirely new solutions. APM is effectively a compromise between formality and discretion, yet no silver bullet. For example, applying APM when implementing standard software can be challenging; APM allows for iteration, feedback,

and new paths that might in fact be undesirable in these projects. In these instances, TPM can be a better choice for managing the project.

6.2 Implications for practice

Projects can be used to both foster innovation and sanction conformity. Echoing previous research, this requires a move away from a uniform view of projects and how work therein is controlled [10],[11],[13]. Methodologies are used to legitimize formality – *sometimes* to their benefit. However, this paper puts forward that a uniform application of methodologies, be it traditional waterfall or agile, is the antithesis of what a successful project environment calls for. Further, the organization needs to consider whether to apply a methodology at all or whether to simply disregard predefined practices for project success. In effect, the temporary nature of the project needs to be used to its full potential. This means that structures prevalent in the organization can be provisionally overturned to either promote exploration and innovation, or sanction conformity and emphasize exploitation. These temporary structures need to be reconsidered for every project.

6.3 Limitations and future research

The focus of this study was on IS and product development projects. There are limitations in terms of the applicability of our findings to other project types. Further, this study looks at project work in one large high-tech company and its supplier. It is likely that the findings are applicable in this context; start-ups and smaller companies probably operate with far less bureaucracy and control. Similarly, public organizations might have time and budgetary limits that impact the choice of project management. At the same time, the projects examined in this study represent a diverse set of projects. As such, we believe the findings are useful in many large organizations having a wide variety of development needs.

Project management competence was not considered a variable in our analysis. All informants had a long background in managing projects, and some in managing teams of project managers. Organizations are likely to appoint people with experience in projects to manage temporary organizations, assuming experienced project managers are available. These experienced project managers are likely to be found in larger organizations, further stressing the applicability of our findings in this setting.

The limitations described above would merit further testing of the framework outlined in this paper in different contexts, including smaller companies, different industries, as well as public organizations. Given the prevalence of APM, we would also encourage studies that look at how suitable APM is in large-scale implementations of standard software, specifically in comparison with traditional methods with a higher degree of formality. The notion of disregarding methodology altogether is also a topic that would warrant further investigation, providing further descriptions of what a contingent approach to project management could look like in practice.

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Appendix A. The Interviews

#	Time	Title	Project type*	Language**
1	07/2011	Director	Product development	Finnish
2	08/2011	Director		Finnish
3	09/2011	Head of	Information systems	Finnish
4	09/2011	Vice President	Product development	Finnish
5	09/2011	Senior Manager	Information systems	Finnish
6	09/2011	Director	Information systems	Finnish
7	09/2011	Senior Specialist	Product development	English
8	09/2011	Director	Information systems	Finnish
9	09/2011	Senior Manager	Product development	Swedish
10	11/2011	Senior Manager	Information systems	Finnish
11	11/2011	Head of	Product development	Finnish
12	11/2011	Manager	Information systems	Finnish
13	01/2012	Senior Manager	Information systems	Finnish

#	Time	Title	Project type*	Language**
14	01/2012	Director	Information systems	Finnish
15	02/2012	Senior Manager	Information systems	Finnish
16	02/2012	Manager	Information systems	English
17	03/2012	Senior Manager	Information systems	Finnish
18	03/2012	Vice President	Information systems	English
19	03/2012	Manager	Information systems	Finnish
20	04/2012	Vice President	Product development	Finnish
21	04/2012	Vice President	Information systems	Finnish
22	04/2012	Director	Information systems	Finnish
23	10/2012	Manager	Product development	Finnish
24	10/2012	Manager	Product development	Finnish
25	10/2012	Manager	Product development	Finnish
26	11/2012	Head of	Product development	Finnish
27	11/2012	Head of	Product development	English
28	11/2012	Head of	Product development	English
29	11/2012	Head of	Product development	English
30	11/2012	Head of	Product development	English
31	01/2013	Senior Engineer	Product development	English
32	01/2013	Manager	Product development	English

* Project type refers to what kind of projects were primarily discussed during the interview.

** When applicable, translation to English has been done by the authors.

Appendix B. QCA Truth table and prime implicant chart

B.1. Truth table

	Causal Conditions						*Project success (O)*	
Projects (case # in QCA/ project number in interview analysis)	APM (A)	Full discretion (B)	High exploration (C)	High structural complexity (D)	Holistic architecture (E)	Successful internal sales (F)	Yes	No
4, 16, 23/V	0	0	0	0	1	1	3	0
1/IV, 13, 17, 22, 24	0	0	0	1	1	1	5	0
18	0	0	0	1	1	1	1	0
14	0	0	1	0	1	0	0	1
6/III	0	0	1	0	1	1	0	1
19	0	0	1	1	1	0	0	1
2	0	0	1	1	1	1	0	1
5	0	1	0	0	1	1	1	0
21/VI	0	1	0	1	1	1	0	1
25, 26, 27	0	1	1	0	1	1	3	0
11/II	0	1	1	1	1	1	1	0
10	0	1	1	1	1	0	0	1
3/I	0	1	1	1	1	1	1	0
15	1	0	0	0	1	1	1	0
20/VII	1	0	0	1	1	1	0	1
30	1	0	0	1	1	1	0	1
29, 32	1	0	1	0	1	1	2	0
28, 31	1	0	1	1	0	1	0	2
12, 35	1	0	1	1	1	1	2	0
7, 8, 9, 33, 34 (excluded)								
All other combinations of conditions (45)							?	?

NOTE: 1 = yes, 0 = no. Variable names in parentheses are the mnemonics used in Boolean equations.

B.2. Prime implicant chart for outcome (project success)

Terms to cover (O = 1, project successful)									
		Primitive expressions							
		abcdEF	*abcDEF*	*AbCdEF*	*AbCDEF*	*AbcdEF*	*aBCdEF*	*aBCDEF*	*aBcdEF*
Prime implicants	abc	x	x						
	ACE			x	x				
	Ad			x		x			
	BCF						x	x	
	Bd						x		x
	cd	x				x			x

Reduced equation: O = abc + ACE + BCF + cd

Biographical notes

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