IT Project Selection: Politics, Experience and good Friends

Keld Pedersen
Centre for IT-management, Aalborg University, Denmark
keldp@dps.aau.dk

Abstract: Selecting the right IT projects is increasingly important for many organizations. Project portfolio managers play a key role during project selection, but even though they have a great impact on the selection process, we have little knowledge about how they decide which projects to recommend for initiation. Most of the research on project selection is normative, suggesting new methods, but available empirical studies indicate that many methods are seldom used in practice. This paper addresses the issue by providing increased understanding of IT project selection practice, thereby facilitating the development of methods that better fit current practice. The study is based on naturalistic decision-making theory and interviews with experienced project portfolio managers who, when selecting projects, primarily rely on political skills, experience and personal networks rather than on formal IT project-selection methods, and these findings point to new areas for developing new methodological support for IT project selection.

Keywords: IT project selection, IT project justification, IT project portfolio management

1. Introduction

Selecting the optimal portfolio of IT projects is becoming increasingly important as the dependency on IT for organizational performance increases. Private sector companies rely on IT to lower costs and gain competitive advantage (e.g. Schryen, 2013), while IT is used in reforms of public sector organizations, for example by providing IT-based services to citizens (e.g. West, 2004). The selection of projects thus generally plays a major role in implementing new organizational strategies (e.g. Meskendahl, 2010).

Project selection is not easy however, and organizations struggle with issues such as starting too many projects (e.g. Blichfeldt and Eskerod, 2008), aligning business strategy and projects (e.g. Meskendahl, 2010), poor coordination between projects, lack of business management commitment, lack of cross-functional collaboration, and resistance to change (e.g. De Reyck et al., 2005), reluctance to terminate poor projects, and finding the right balance between short-term projects that improve current operations and long-term projects that increase potential for future success and competitive advantage (e.g. Elonen and Artto, 2003).

A large number of books (e.g. Bonham, 2005; Kaplan, 2005; Fitzpatrick, 2005; Morris and Pinto, 2010; Moore, 2010), professional standards (e.g. PMI's standard for project portfolio management) and research papers (e.g. Archer and Ghasemzadeh, 1999; Khalili-Damghani et al., 2013; Costantino et al., 2015) have suggested various ways of using portfolio management concepts and methods for project selection to increase the value of investments made in IT projects and projects in general.

While the list of methods for project selection is nearly endless, we still have little insight into how the activities take place in practice. Cooper et al. (1999; 2001) have made quantitative investigations into PPM best practices within new product development, but there is a shortage of empirical studies of actual decision-making practice within the area (Blichfeldt & Eskerod, 2008). Also Kumar et al. concluded in 2008 that there were only a few studies of IT portfolio management, and that research mostly focused on models and methods for various aspects of IT project selection. Recently Shollo et al. (2015) characterized the IT project selection literature as primarily normative and prescriptive, primarily based on the rational decision-making ideal, and paying too little attention to the role of management judgement.

It is difficult to find any descriptive research exclusively on IT project selection. Given the importance of choosing the right projects, this is problematic. The picture is the same for the related research area IT justification (see for example Gunasekaran et al. 2006): Little attention is paid to the way decision-makers make these decisions in actual practice. This paper attempts to address this issue by providing *an increased understanding of the way experienced IT project portfolio managers select IT projects.*

Section 2 describes the current body of knowledge on IT project selection, section 3 deals with the research approach, and section 4, the findings. Section 5 discusses the findings and the implications for theory and practice. The conclusion is presented in section 6.

2. Project selection: What do we know?

Project selection is a key activity. In selecting projects, organizations prioritize the use of scarce resources for solving both short-term operational problems and the creation of long-term strategic opportunities. Generally, they should try to balance their project portfolios along dimensions such as: risk vs. reward, short- and long-term effort, and different strategic issues (Meskendahl, 2010) such as creating competitive advantage or implementing public sector reforms. Over the last 40 years numerous sophisticated methods have been published to help organizations select the right projects. Cooper et al. (1999) categorized these methods into:

- Mathematically based portfolio models, e.g. software with built-in mathematical models that can choose the optimal portfolio of projects.

- Financial models and financial indices. For example, net present value.

- Probabilistic financial models, e.g. Monte Carlo simulation.

- Options pricing theory, similar to purchasing an option on a future investment.

- Strategic approaches: Selection of projects is driven by the strategy of the business.

- Scoring models and checklists: Projects are rated and scored.

- Analytical hierarchy approaches, for example, decision tools based on paired comparisons of projects.

- Behavioral approaches: For example, methods designed to facilitate consensus.

- Mapping approaches: Various parameters are plotted against each other in bubble diagrams.

Even though the development of new sophisticated selection methods continues, the empirical research (e.g. Cooper et al. 1999, Killen et al. 2007) indicates that they are not widely used, at least not within the context of new product development. Furthermore there is generally little empirical evidence of the benefits gained by using the various methods (Killen et al. 2007). To the extent that organizations use formal methods at all, they tend to use the user-friendlier ones, the most popular being the use of financial models (business cases), strategic approaches, scoring models and mapping approaches (Cooper et al. 1999).

The referenced sources so far mentioned are all concerned with project selection within project management in general, and new product development. Within information systems research there are two large, primarily quantitative project portfolio management studies (Jeffery and Leliveld, 2004; De Reyck et al., 2005) that have been used to design maturity models for project portfolio management practice. A literature review by Kumar et al. (2008) concluded that, up to that time, there had been few studies of IT portfolio management and that these studies mostly focused on models and methods for various aspects of IT project selection, e.g. portfolio risk (McFarlan, 1981). However, none of these studies investigates the actual selection process and how portfolio managers make selection decisions.

Recently Shollo et al. (2015) have studied project-selection practice focusing on how managers combined the use of quantitative data (e.g. cost-benefit analysis) and judgement during IT project selection, and found that managers use judgement to supplement, substitute, interpret, and reframe quantitative data. Furthermore they identified certain key resources that managers base their judgements on, e.g. expertise and personal networks.

Within IT justification research the picture is the same. The literature study by Gunasekaran et al. (2006) categorizes IT justification and evaluation research into the following streams: General IT evaluation and justification concepts; evaluation criteria for justifying IT projects; techniques and tools for evaluating and justifying IT projects; and evaluation of the implementation of IT projects. Little emphasis is placed on the actual decision-making process or the competencies and experience needed to make good decisions. Bernroider et al. (2013) have studied the use of various IT evaluation methods such as the financial investment method (e.g. cost / benefit methods), multi-criteria methods (e.g. balance scorecard methods), strategic and analytical techniques (e.g. SWOT analysis) and portfolio methods (e.g. portfolio mapping) and found that there is a wide gap between the great number of methods suggested in the literature and their practical implementation: Many methods are simply not used in practice.

To identify possible explanations for the scarce use of formal methods, we can draw upon theory about decision-making in organizations. We know of two factors that might impact practitioners' use of these

methods: The decision-making context and personal preferences. Several studies have emphasized how the organizational context impacts behavior (see Table 1).

Table 1: Contextual factors for decision-making behavior

Contextual factors that push decision-makers towards specific decision-making behaviors	Decision-making behavior
When goals are clear, stable and agreed-upon, objective criteria and preferences are established, comprehensive information about alternatives is available, and there are sufficient resources (e.g. time) to perform a thorough analysis of the alternatives — decision-makers are pushed towards rational decision-making (Eisenhardt & Zbaracki, 1992).	Rational
When there is a lack of knowledge of cause-and-effect relations and little agreement about overall goals (Thompson, 1967), conflict of interest (Pfeffer, 1981), high degree of role interdependence (Pondy, 1966), high degree of uncertainty and disagreement over long-range strategic decisions (Tushman, 1977), extreme power imbalance (Eisenhart & Bourgeouis, 1988), and formal structures for decision-making are experienced as insufficient (Eisenhardt & Bourgeois, 1988) — decision-makers are pushed towards political decision-making.	Political
When there is high time pressure (Burke & Miller, 1999), a high degree of expertise and experience within the domain (Burke & Miller, 1999), a strong preference for decision-making based on intuition among decision-makers (Agor, 1986), a high level of environmental turbulence (Busenitz & Barney, 1997), decisions are highly judgmental with no obvious right or wrong options (Dane & Pratt, 2007), and a lack of information or too much information (Khatri & Ng, 2000) — decision-makers are pushed towards intuition-based decision-making.	Intuition

We also know that certain personal characteristics make managers more or less prone to rely on either rational or intuitive decision-making. Agor (1986) found that the use of intuition varies with management position, profession, sex and ethnic background. Busenitz & Barney (1997) found that entrepreneurs have a much stronger preference for intuitive decision-making than other managers. Research also indicates that preferences may change over time: Burke and Miller (1999) found that older and experienced employees use intuition more than younger and inexperienced employees do.

One possible explanation for the gap between research and practice based on theory could be that the formal methods clash with the context or with personal preferences. One way of improving our understanding might be to exploit the lessons of naturalistic decision-making. Within naturalistic decision-making (e.g. Klein, 2008) there is a tradition of empirical research aiming to understand decision-making practice, especially how professionals make decisions in situations characterized by "*limited time, uncertainty, high stakes, vague goals and unstable conditions*" (Klein, 2008). Researchers have studied how navy commanders, pilots, nurses, and engineers make decisions under difficult circumstances. Naturalistic decision-making was originally motivated by the same issues that characterize IT project-selection research: There was a gap between the formal methods suggested for making decisions within certain domains, and actual decision-making practice. Naturalistic decision-making is characterized (Lipshitz et al., 2001) by

- Studying proficient decision-makers: how people use their experience to make decisions in a field setting.

- Process orientation: the cognitive processes of proficient decision-makers, especially the information they use, how they interpret the information, and the decision-rules and principles they apply.

- Situation-matching decision rules: decision-making as a matching process rather than a choice. Options are selected or rejected on how well they match the specific situation or the decision-makers' values, rather than on their relative advantages and disadvantages.

- Context-bound information modelling: decisions are based on experience-derived knowledge. Models of naturalistic decision-making focus on the actual information that decision-makers rely on and the arguments they actually use.

- Empirically-based prescriptions: normative prescriptions that are theoretically optimal are held to be worthless if they cannot be implemented. Instead, prescriptive advice is based on empirical data from the decision-making practice of proficient decision-makers.

These decision-making characteristics have also shaped this study of how portfolio managers use their experience, the information, rules and principles they apply to make decisions. The study primarily focuses on increasing our understanding of practice, but the limited prescriptive advice provided here is based on

empirical data on the decision-making practice of the studied portfolio managers. The use of naturalistic decision-making is described in more detail in the next section.

3. Research approach

Since the goal of this research was to increase our understanding of actual decision-making practice, data were collected in a field setting, not through laboratory experiments, and the data analysis aimed to identify decision-making strategies, rules and principles, e.g. how decision-makers combine experienced-based intuition and deliberate rationality.

Eight experienced IT-project portfolio managers were interviewed. Subsequently the interviews were transcribed, coded and analyzed with the purpose of identifying common patterns across the interviews. The findings were evaluated by the same project portfolio managers in follow-up interviews.

The portfolio managers were selected on the following criteria:

- To make sure that the interviewed persons had established a high level of expertise in project selection, they should have had at least two years' experience in project selection, project portfolio management and substantial IT management experience in general.

- They should be currently managing portfolios of more than 40 ongoing projects. This criterion was meant to secure a reasonable level of complexity in project selection tasks.

All the interviewed portfolio managers except one (in organization 3) had substantial project management experience, and all the portfolio managers except one (in organization 8) also had other management responsibilities (e.g. management of IT personnel, methods development or quality assurance).

Table 2: Participating organizations

Organization	Characteristics
1	1,000 employees. Local government. The interviewed portfolio manager had ca. 6 years' experience in IT project management and 14 years of IT management and PPM experience. -
2	5,000 employees. Local government. The interviewed portfolio manager had ca. 10 years' experience in IT project management and 20 years' experience in IT-management and PPM.
3	6,000 employees. Local government. The interviewed portfolio manager had ca. 9 years' experience in IT-management and PPM.
4	5,400 employees. Local government. The interviewed portfolio manager had ca. 8 years' project management experience and 16 years' experience in IT-management and PPM.
5	Software development, revenue approx. € 11 mln. The interviewed portfolio manager had ca. 15 years' experience in IT-development and IT project management and 5 years' IT management and PPM experience.
6	Retails, revenue approx. € 6 bln., the interviewed portfolio manager had ca. 5 years' IT-management experience and 2 years' IT management and PPM experience.
7	Manufacturing, jewelry, revenue approx. € 5 bln. The interviewed portfolio manager had ca. 20 years' experience in IT project management and 7 years of IT management and PPM experience.
8	Manufacturing, food industry, revenue approx. € 10 bln. The interviewed portfolio manager had ca. 15 years' experience in IT project management and 10 years' IT management and PPM experience.

Each portfolio manager was interviewed twice. The first interview lasted approximately 2.5 hours and was concerned with identifying the manager's decision-making behaviors during project selection. In the second interview (also ca. 2.5 hours) the portfolio manager commented on the findings from the first interview and the researcher had the opportunity to ask follow-up questions.

The interview data were analyzed and coded in an iterative process that is a specific method within the naturalistic decision-making tradition, called cognitive task analysis (CTA) (Crandall et al., 2006). CTA is the study of cognition in professional practice in real world contexts, with the focus on how practitioners reason, make decisions and apply knowledge. In order to get closer to actual professional practice, data collection is done either by observing decision-making as it takes place and conducting follow-up interviews, or − if observation is difficult − by interviewing decision-makers about specific incidents which serve as a starting point (e.g. the last time they made a decision regarding IT project selection). During the interview the

practitioner first describes the overall decision-making process, and after that the interview focuses on critical points during the decision-making process identifying the information and knowledge they use, how they use their experience, and what principles, values and rules they apply. In this case the decision-making context was also studied because we know that it influences decision-making behavior. In this study the data collection was, for practical reasons, based on practitioner interviews using previous incidents as the starting point. The data was analyzed in an iterative process during which the codes were gradually refined to reflect the increasingly detailed insights from the portfolio managers' decision-making practice.

Table 3: Coding scheme

Level 1 coding	Level 2 coding	Level 3 coding
Information used during project selection	Formal	
	Informal	
Values guiding the decision-making process		
Focus areas during project selection	Politics	Rules and principles
	Value	Rules and principles
	Execution	Rules and principles
Decision-making during project selection	Use of experience and intuition	
	Mental simulation	
	Using personal network	Different purposes
Decision-making context	Factors that influence decision-making behavior.	

The starting point for the coding schema was key concepts from naturalistic decision-making – "information", "knowledge and experience", "values", "decision-making process", "rules and principles", as well as "decision-making context". The codes were refined as our understanding of practice increased. For example, the important distinction between formal and informal information as well as the heavy reliance on informal personal networks was unexpected, and the related codes were added in a later iteration. The variation in depth within the coding scheme reflects the variation in the data. For example, there was no purpose in inventing sub-codes within "values".

4. Analysis of IT project-selection practice

In this section the findings from the analysis of the portfolio managers' decision-making behavior are presented: First the overall values that guide their behavior, then the kind of information that they rely on, followed by the areas they focus on when considering a project proposal, the way they use experienced-based intuition and mental simulation, and finally, how they use their personal networks during the decision-making process.

4.1 Guiding values

When making portfolio decisions the portfolio managers are guided by their perceptions of what is in the best interest of the organization. They perceive themselves as more neutral and objective than other organizational actors, e.g.:

> *We are the only ones that take a company perspective. As in many other companies there is a lot of silo thinking. We want to get the best solution for the whole organization. That's why we interact and talk with a lot of people and explain the consequences of various projects. We know who we need to convince, how to do it and how fast it might go. Some people need an almost finished summary, others something less finished. Knowing how to communicate is an art (Organization 6).*

However, all the interviewed portfolio managers engage in political activities. Not only in order to do "what's best for the organization" but also to protect their own departments and their personal reputation and careers. One portfolio manager (Organization 6) describes how they force business management to take their part of the responsibility for risks, another (Organization 8), how he thoroughly checks all project proposals because he doesn't want to look bad. One portfolio manager (Organization 1) said he made sure that projects only were prioritized if the IT department could actually staff the projects (even though the projects could be important from a business perspective), and in another organization the portfolio manager (Organization 2)

found it difficult to turn project proposals down because the IT department wanted to be perceived as flexible and responsive in order to avoid outsourcing.

4.2 Formal and informal information

Portfolio managers use both formal and informal information when selecting projects. The formal information is produced according to established standards and procedures and is distributed through the official management system. It typically consists of executive summaries describing project proposals, business cases and high-level requirement specifications and project plans. The informal information serves as background information needed to understand, validate and fill out the gaps in the formal information, and it is distributed more or less deliberately through informal personal networks and personal interaction. The portfolio managers are highly dependent on informal information to make high-quality portfolio decisions. A project proposal is not just good or bad as an isolated phenomenon but must be evaluated in context. The portfolio managers are especially concerned with the political context. Some of this information is acquired through long-term membership in the organization and interactions with the various stakeholders e.g.:

> *I know the people behind the business case and what their interests are, so I can spot it if the business case is a bit biased. I know why it is written in a specific way, I know what to look for and which estimates and assumptions to double check. You couldn't do that without knowing the interests of various persons. I know the area and can see whether something has been excluded (Organization 6).*

Other kinds of informal information are collected more deliberately for a specific purpose in evaluating projects, typically from personal networks. The portfolio managers all have horizontal and vertical personal networks that they use during decision-making. This way they get access to sensitive information that is vital to making good decisions. Sensitive information (e.g. whether a project manager is qualified to manage a specific project) might have a great impact on the assessment of a project proposal, but can be difficult to handle through the formal management system. Portfolio managers have an important role in bridging the formal and the informal management systems in their organizations, to ensure thereby that decisions are based on all the available information and not just the information that can be captured in formal documents, such as business-case documents. The portfolio managers use both formal and informal information and management structures not only to prepare and make decisions, but also to easen the process of implementing the decisions thereafter. One of the interviewed portfolio managers (Organization 5) described how he would make sure that the implementation of unpopular portfolio decisions wasn't sluggish or had a negative impact on morale by using his personal networks to explain the decisions personally to the involved employees; another (Organization 7) said he combined both formal status information and informal information collected through his personal network to fully understand how projects were going.

4.3 Focus areas: Politics, value and execution

When processing the information and selecting projects, portfolio managers consider political issues, how the projects contribute in terms of value creation, and how they might be executed.

4.3.1 Politics

Understanding and dealing with political issues is considered a core competence by all the portfolio managers. The political considerations serve four main purposes. First, it is important for the portfolio managers to understand the politically defined boundaries within which they can make their decisions. How much is there really for them to "decide about" on a specific proposal? Some projects might be mandatory in the sense that they just have to be done, because powerful internal (e.g. a highly placed manager or politician), or external (e.g. an important customer or government agency) stakeholders simply insist that the projects be initiated, e.g.:

> *In our organization we have to consider the political aspect.. there might be a politically decided strategy stating that "something" is the most important right know… whereby we can profile ourselves politically right now in our municipality… even though something else might be more important from an operational perspective, but just not as valuable politically (Organization 4).*

An important part of understanding the political boundaries is also to understand the position and interests of the various stakeholders and how to deal with them, e.g.:

> *The political situation has changed, so what was politically impossible last year might be possible now. There is a new generation of politicians who have a different attitude (towards e-government) (Organization 2).*

Achieving this understanding is important in order to secure smooth decision-making processes and management acceptance of the suggestions forwarded by the portfolio manager, e.g.:

> *I am very aware of who the decision-makers are. I know exactly what type of questions they will have because I know the organization. It's important for me that the proposals I forward and the recommendations I make are acceptable to the decision-makers. I know what I can sell them. Due to my long career and track record they trust me, and before I forward any proposals I make sure that they are solid – e.g. that the numbers aren't inflated. Due to my experience I can spot problematic issues and the people behind the proposals must clarify these issues before I go along. I know what management will ask about, and besides, I don't want to look like a fool at the meeting (Organization 8).*

The second purpose is about how to deal with risk and potential failure. Risk and failure were revealed to be difficult to deal with for most of the organizations, with participants engaging in political games about who should take responsibility for risks – the IT department, the business side, line management or project management. When risks actually materialize and projects get into trouble, it is sometimes easier to get more money to continue a troubled project, than to cancel the project.

The third purpose is the ability to critically evaluate formal documentation based on insight into the political situation, for example by being aware that somebody may be trying to hide the real costs of a project in order to get it approved. And finally, the purpose is the ability to evaluate whether a proper level of management commitment is, or could be, established in order to successfully execute the project and realize the benefits, e.g.:

> *It is important that the management within an area understands it (the project) and agrees, because getting people to work in a new way is very difficult, even though it eventually will make things easier.. there is resistance… and if local management can't see the benefits, they will resist as well – they are not different from the employees (Organization 1).*

On this issue, both too much and too little management commitment is considered problematic by most interviewees. The portfolio managers experience management commitment as a double-edged sword. Some highly placed managers might be so committed to a specific project that they neglect standard procedures and available experience that is normally applied to select and optimize projects. These pet projects have no problem getting resources etc., but can end disastrously if allowed to continue for too long. In public companies, getting political commitment to a specific project is the ultimate management commitment making sure that the project is funded. However it also means that decision-making about the project is more cumbersome, and dangerous, because failure to meet project goals can turn into nasty political problems. In both cases, a high level of commitment from high-level stakeholders makes decision-making about projects more difficult and increases the risk of bad decisions.

In all the organizations it is considered vital in project selection to understand the political aspects, especially political boundaries, dealing with potential failure, biased project proposals and issues concerning management commitment.

4.3.2 Value

Within this area portfolio managers primarily focus on four issues: Does the project have a clear purpose? Does the project provide value for the organization? Do the different stakeholders (e.g. IT departments and business units) understand and agree on the requirements? And is the project aligned with current strategies, architectures, applications and other projects?

The portfolio managers insist that projects should have a clear purpose. Without a clear purpose it is difficult to focus the project effort and have meaningful discussions about scope and requirements among stakeholders. Fuzzy projects are considered high-risk projects. The next issue is whether fulfilling the purpose

actually provides value for the organization. The portfolio managers focus on value creation from a business perspective, e.g.:

> *It is vital that the benefit side be sufficiently analyzed before a project is started: What do we stand to gain from doing this project? (Organization 3)*

Most portfolio managers perceive themselves as gatekeepers who should insist on carefully considering the chances for value creation even though the business side is ready to move on with initiation. Besides their focus on value proposition, the portfolio managers feel they must determine whether a sufficient level of shared understanding between the major stakeholders has been established surrounding the issue of project deliveries and requirements that must be fulfilled in order to deliver the expected value, e.g. whether the specification is detailed enough to reduce the risk of misunderstanding, and whether the various stakeholders have been sufficiently involved in the specification process. Finally, the portfolio managers stated that they evaluated how well projects fit in with other business strategies or political goals, architectures and products in order to avoid sub-optimization. For them, considering the level of strategic compatibility not only serves a rational, business-oriented purpose, but is also perceived as an indicator of how much organizational commitment and power can be established behind a project.

4.3.3 Execution

Project execution is considered a key issue:

> *Our problem is that we get too many ideas and that they aren't prioritized effectively, and because of that we don't get sufficient impact… executing the projects takes too long, it gets muddy and un-focused (Organization 4).*

Within this area the portfolio managers focus on the following issues: Can we allocate the right people to the project? Is it realistic to expect that the project can be executed within budget and timeframe? And is the project plan and setup aligned with the critical issues of value creation?

The portfolio managers' evaluation of the possibilities for successfully executing a project depends on whether they believe that the right people can be allocated to the project. The project plans could be appropriate, but if the portfolio managers lack trust in the project manager or find that the project group lacks relevant experience or doesn't represent the most important stakeholders, they will be reluctant to recommend the project.

Portfolio managers also focus on whether plans are realistic, whether management actually understands the risks, and on how the right conditions should be established in order to execute the project and avoid problems later on. They especially focus on the robustness of the plan in terms of the issues that matter for value creation. If for example value creation is highly dependent of finishing the project on time, the project is evaluated with that in mind:

> *In some projects delays are not that important, they might reduce the value but not significantly. In these projects we are mostly concerned with controlling costs, and even minor increases in costs have to be approved. In other projects, for example … major events like a soccer championship, we are mostly concerned about the deadline. They (the organizers) are not going to postpone the European championships because we are late (Organization 8).*

Having described the topics that the portfolio managers are concerned about when they select projects, in the next sections we look into the decision-making processes they use.

4.4 The use of experienced-based intuition

All the interviewed portfolio managers emphasized how they use their intuition to select projects and that their first impression of a project seldom changes even when they take additional time to analyze it:

> *In most cases the first idea or decision that comes to mind is retained also later. Extra time taken to conduct further inquiry seldom changes the initial decision. I use my experience, especially regarding issues that are hard to quantify. The initial prioritization is based on judgement and experience − rational analysis is used to check whether it seems doable (Organization 5).*

When asked why they didn't use some of the many rational methods for selecting and prioritizing projects, the portfolio managers expressed a firm disbelief in these methods e.g.:

> *When I started I believed in bobble diagrams and scoring algorithms. I don't anymore. It's about something else that's more important than scores on a spreadsheet: Being able to argue for specific projects from a business perspective. It's about selling an idea or a solution by creating a sense of urgency, or convincing others that it will fix an important business problem, or that the project might create new business opportunities. When the business people are good at that, scoring something as a "4" or "5" on a spreadsheet doesn't count for much. They simply don't accept the spreadsheet as part of the foundation for making a decision. These decisions can't be simplified into assigning numbers to prioritization criteria. I am older now and base these decisions more on experience and intuition, and it is just the same for the vice-presidents in this organization (Organization 7).*

This picture is consistent across all the interviewed managers. They emphasized experience, intuition and trust, rather than formal methods and governance structures. Even for large projects the portfolio managers said that they make up their minds within a few minutes and seldom change their initial decision later.

4.5 Mental simulation

Having formed a first impression and a preliminary decision, the portfolio managers perform a mental simulation of how project might unfold. In this simulation they try to identify critical issues and possibilities for improvement. The simulation starts with the project purpose: How might this purpose be achieved, and are the project plans realistic? E.g.:

> *I perform a mental simulation of the project starting from the project purpose, and if that's not OK, the rest doesn't matter anymore. I look at various milestones in the project plan and try to imagine how the people involved are going to get there: Have they remembered all the issues? For all the stakeholders I consider how the dialog and interactions with them might be. Have the project people forgotten something that might undermine the entire project? (Organization 6).*

Furthermore they consider the most likely scenarios for execution or value creation, e.g. whether there are similar projects that a new project could be included in, or whether there are dependencies between projects that must be dealt with. This mental simulation is primarily based on personal experience. Only one of the eight organizations systematically collects data from past projects that can be used during the process. For the remaining organization the process depends mostly on the portfolio managers' personal experience.

4.6 The use of personal networks

Personal networks during decision-making are vital for portfolio managers. They use networks for at least four purposes: to gather background information, reduce uncertainty, optimize decisions and prepare acceptance. The section about formal and informal information describes how much the portfolio managers depend on informal information. Building and using personal networks to get access to informal background information is vital. Furthermore they use their network to compensate for information and competencies that they don't have themselves:

> *I guess I boil it down to the most essential issues when I make a decision. Then I might ask someone else about important issues that I am unqualified to deal with, and the rest will have to remain the way it is. We almost never put something on hold because we are uncertain. We'll go along and deal with any problems later on (Organization 7).*

Portfolio managers test difficult decisions informally on other members in the organization. One portfolio manager emphasizes how he consults people he expects to express negative as well as positive attitudes towards the decision:

> *I use both negative and positive persons in my network. The people that disagree might actually be right. I use them in order to incorporate their criticism. I want to make good decisions. Another reason is that these persons might have an important role afterwards (in realizing the decision) (Organization 5).*

The portfolio manager in Organization 7 had quite the opposite attitude and didn't involve persons whom he expected to be negative. This difference in attitude reflects quite different situations and cultures. Organization 5, because of its economic situation and the market, is very concerned with starting the right projects – they can't afford large-scale failures. Organization 7 is in a different situation: subjected to immense pressure from the market to be a first mover, they are extremely deadline-oriented, so that taking too long to make a decision might mean the opportunity is lost.

Politics plays a major role, and the portfolio managers use their personal networks to prepare for the acceptance of their proposals before formal meetings by creating advance commitment among vital stakeholders – not only decision-makers but also among the stakeholders who will be tasked with implementing the decisions:

> *I make sure that I am aligned with all major stakeholders who have decision authority or who take part in implementing the decision… That last category of stakeholder involvement is necessary to increase the likelihood that implementation is smooth. It's important that I can justify the decisions afterwards to be able to get people to commit themselves to realizing the decisions. You must be able to explain why you have prioritized the way you have, and you must be able to convince people that the organizational goals are more important than individual preferences (Organization 5).*

The personal networks are vital: They are fast, give access to information and expertise, and help create acceptance and commitment to decisions.

4.7 Organizational context and personal preferences

Across the interviewed portfolio managers the decision-making contexts share similar characteristics: much uncertainty and time pressure when selecting IT projects, poorly defined procedures and processes, many conflicting interests between IT departments and business units, much role interdependency, decisions that are cross-functional in the sense that IT project selection decisions involve many departments, as well as the fact that the power and expertise needed to make decisions are highly distributed among organizational actors who have only a limited shared understanding of key aspects relevant to making good decisions. For example that top management lacks understanding of project execution issues.

Comparing the contexts with the factors described in Table 1, we can see that the preconditions for rational decision-making are poor, and that the context pushes decision-makers towards the use of intuition and political behavior. Furthermore, all the participating portfolio managers expressed their preference for intuitive decision-making.

4.8 Summarizing the findings

The purpose of the present research is to *provide increased understanding of how experienced IT-project portfolio managers select IT projects.*

The short answer to this research question is that the project portfolio managers combine experienced-based intuition with deliberate rational analysis in the form of mental simulation, and they overcome their personal limitations by exploiting their personal networks.

IT project selection is perceived to involve quite a wide range of behaviors. The project portfolio managers are not only concerned with the actual selection, but also with how projects might be improved, e.g. to reduce risks and optimize the outcome, and also with the organizational implementation and impact of the decisions. This is not just about making the right decisions, but also about making sure that they become the right decisions; that the approved IT projects actually become successful. Selection decisions are furthermore not just perceived as isolated incidents regarding specific IT projects, but also as events that have wider personal and organizational consequences, e.g. for how trustworthy the project portfolio managers are perceived or how flexible and reliable the IT department is perceived.

The portfolio managers rely on both formal and informal information. They receive formal information in the form of business-case descriptions, executive summaries, requirement specifications and project plans, but informal information also plays an important role. The information is processed in the following way:

- Having received a project proposal they first use their experience-based intuition to form a first impression of the project and whether it should be selected or not. This draft decision is made within a few minutes (e.g. 5 to 20 minutes), and even though they may take additional time to study the proposed project, the fundamental decision is usually not changed, only optimized in the sense that they might suggest ways to improve the proposal or refine their arguments against the project.

- Secondly, they perform a mental simulation of the project. Starting from the purpose of the project, they perform this simulation of the project similarly to thinking ahead in a game of chess. In this simulation they apply their experience of similar cases to evaluate whether the project process seems realistic and whether the expected business value can be created.

- In parallel they use their personal informal networks to improve decision quality by:

    - Gathering informal information

    - Reducing uncertainty surrounding the decision

    - Optimizing the decision and

    - Preparing the case for arguing the acceptance of the decision.

This process is not sequential and the outcome is not always a simple yes-or-no decision. It also includes recommendations about how the project might be improved, and political recommendations on how to get acceptance from the involved stakeholders.

The project portfolio managers alternate between project-level and portfolio-level considerations, e.g. between considering the possibilities for successful execution of the single project and the dependencies between a new project and on-going projects.

During this process the portfolio managers focus especially on three areas as described in table 4.

Table 4: Focus areas

Politics: What are the political circumstances surrounding this particular project?	
a	What kind of political behavior is needed to get acceptance of the best decision (from the perspective of the portfolio manager)?
b	What's the political boundary within which the decision must be made?
c	What are the interests of the various stakeholders?
d	What's the political implication of failure?
e	Is responsibility for the risks allocated to the right management levels and units?
f	Is the formal documentation biased by political interests?
g	Is there a proper level of management commitment?
Value: Is this project worthwhile from a business perspective?	
a	Does the project have a clear purpose?
b	Is the project going to be valuable to the organization?
c	Do the different stakeholders understand and agree over the requirements?
d	And is the project aligned with current strategies, architectures, applications and other projects?
Execution: How can we successfully execute this project?	
a	Can we allocate the right people to the project?
b	Is it realistic to expect that the project can be executed within budget and timeframe?
c	And are the project plan and setup aligned with critical issues of value creation?

Within these areas portfolio managers have some experience-based principles (formulated as questions above) that they rely on, for example that the overall purpose of a project should be absolutely clear. From existing theory (see Table 1) we know that the context influences the decision-making behavior. What is apparent here is — not surprisingly given the context and the project portfolio managers' level of experience — that these project portfolio managers rely heavily on experienced-based intuition and pay much attention to the political issues involved and engage in political behaviors. The level of support for decision-making provided by the organizations in terms of methods and tools is low. For some projects, business-case descriptions are included in the formal documentation of project proposals, but none of the other more advanced project-selection methods are used.

Figure 1 illustrates the major components of project selection as performed by the interviewed project portfolio managers in terms of the areas they focus on, the interaction with both the formal and informal organization, the way they process information and make decisions, and the role of the decision-making context. All these components influence the quality of project-selection decisions. The quality of the information received from the informal and formal organization, the areas project portfolio managers focus on, the relevance of the principles they rely on, their capabilities to exploit intuition and conduct mental simulations, and the way the context encourages and supports certain kinds of decision-making behavior — all affects the quality of decisions.
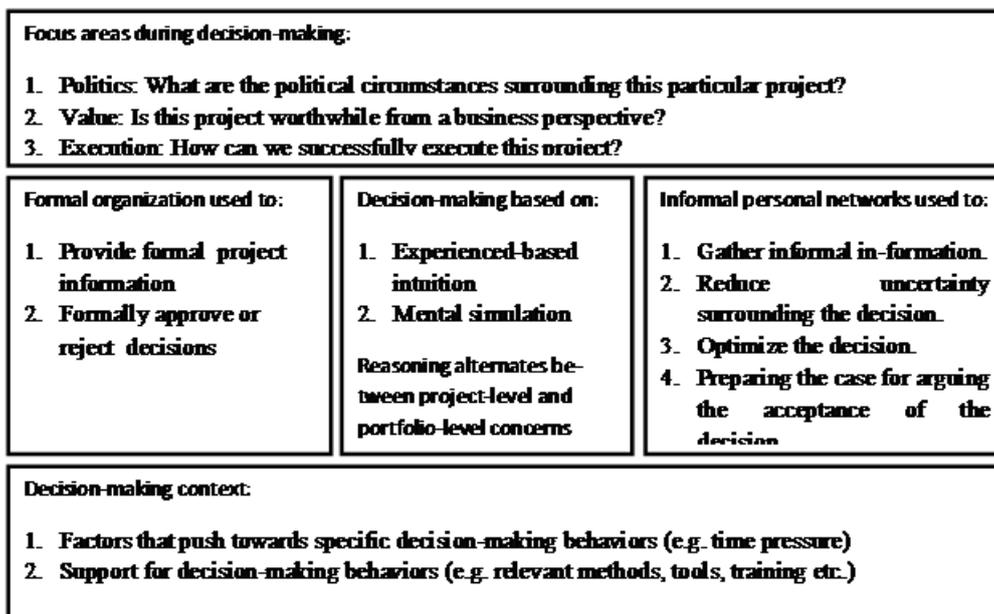

Focus areas during decision-making:

1. Politics: What are the political circumstances surrounding this particular project?
2. Value: Is this project worthwhile from a business perspective?
3. Execution: How can we successfully execute this project?

Formal organization used to:

1. Provide formal project information
2. Formally approve or reject decisions

Decision-making based on:

1. Experienced-based intuition
2. Mental simulation

Reasoning alternates between project-level and portfolio-level concerns

Informal personal networks used to:

1. Gather informal in-formation.
2. Reduce uncertainty surrounding the decision.
3. Optimize the decision.
4. Preparing the case for arguing the acceptance of the decision

Decision-making context:

1. Factors that push towards specific decision-making behaviors (e.g. time pressure)
2. Support for decision-making behaviors (e.g. relevant methods, tools, training etc.)

Figure 1: Components in IT project selection

Beyond the purely descriptive level, the components in Figure 1 can therefore be used for two different purposes:

- Practitioners might use the model in Figure 1 as a starting point for improving decision-making during IT-project selection in their own organization, and

- Researchers might use the model in Figure 1 as a starting point for identifying research opportunities for developing new support for IT-project selection.

These two issues will be discussed in the next section.

5. Discussion

The research has several implications for practice and research. Practitioners might use the model in Figure 1 as a starting point for systematically improving decision-making during project selection. They can consider how the components impact the quality of decisions during project selection.

Starting with the context, practitioners can consider whether there are factors that threaten decision quality. In the organizations studied here, the time pressure was immense and the context was highly political. Both of these factors threaten decision quality. Saving time by relying on first impressions might be right, but it can also lead to anchoring and ultimately poor decision quality because too much emphasis is put on the initial information received during the decision-making process (Hammond et al. 1998). As for politics, it is generally acknowledged that decision-making in organizations often involves political behavior (e.g. Eisenhardt & Bourgeois, 1988), even though it threatens decision quality. In this case, pushing the responsibility for risks between project- and line-managers and between IT and business people – instead of proactively managing risk – is not in the best interest of organizations. Only one of the organizations supports (through quantitative data from past projects) the mental simulations performed by the portfolio managers, and as a consequence, the quality control performed during mental simulations is limited to their own personal experience.

Regarding the focus areas (see Table 4) practitioners might discuss whether these focus areas represent what is important in their organization, discuss their experience-based principles and develop similar checklists to be used by project portfolio managers. Furthermore, the focus areas represent areas within which the project portfolio managers should be knowledgeable in order to make qualified decisions. The focus areas also point to areas where portfolio managers might seek to improve their personal networks as one way of compensating for their lack of knowledge.

Generally the portfolio managers try to compensate for the limitations of their personal experience and intuition by relying on personal networks. While this is clearly valuable, it also means that organizations can become very dependent on portfolio managers' individual ability to build and exploit personal networks and in that case there is very little formal control over one of the major components that affects the quality of IT-project selection decisions. Most of the project portfolio managers use their insight into local political interests and their informal networks to smooth out the decision-making process. While this is efficient because open conflicts are avoided, it might not always effective: Conflicts during decision-making might actually lead to better decisions if managed properly (e.g. Amason, 1996).

In decision-making the reliance on experienced-based intuition has advantages, but several biases that distort intuition have been identified (e.g. Bonabeau, 2003) and, since intuiting is deeply personal and related to personal experience, it is obvious that managers can be intuitive only about something that they really know something about (Minztberg in Campbell, 1991). Since the use of intuition plays a substantial role, looking into how to systematically improve the use of intuition might be beneficial. From available research (e.g. Hodgkinson et al. 2009) we know that intuition is improved by, for example, gaining relevant experience, getting feedback on the quality of decisions, and building self-awareness of one's preferred decision-making behavior (e.g. preferences in using intuition), and, knowing in what situations this decision-making behavior is suitable.

As for the formal organization, practitioners could evaluate the degree to which formal documentation actually matches the needs of the portfolio managers, e.g. whether it is easy to understand key issues in value creation and project execution as expressed in Table 4.

In short, there are several issues in the decision-making practice investigated here that threaten decision quality:

- Sticking to first impressions

- The extent of political behavior

- Time pressure

- Little support for decision-making

- Intuition that may not always be reliable

- Relying too much personal experience during mental simulations

- Dependency on personal networks

- Conflict-avoidance

In a similar way researchers might use the model in Figure 1 as a starting point for identifying research opportunities to develop new support for IT project selection. The IT project selection literature described in section 2 mostly focuses on formal methods and the role of the formal organization (e.g. the governance structures), but each of the components in Figure 1 could inspire research that supports IT project selection, such as the significance of the context, how to establish and use personal networks in IT project selection, or how to improve the use of experiential intuitions during IT project selection.

The decision-making practice described here — the context in which the decision-making takes place and the personal preferences among the portfolio managers — make it easier to understand why many of the sophisticated formal methods aren't used. The formal methods are based on an assumption that project selection is a mathematical problem and that it can be calculated which projects to select. The concerns of portfolio managers however are not easy to quantify or use as input in advanced formulas and tools. Furthermore the uncertainty surrounding project characteristics is so high that the precision and validity of

data used as input to these formal methods doesn't seem to match the sophistication of the algorithms. One of the key insights from naturalistic decision-making is that researchers, when trying to improve decision-making procedures, should base their suggestions on insights into the decision-making practices of proficient decision-makers within specific domains, instead of basing suggestions on decision-making ideals (typically the rational decision-making ideal). The purpose of research should not be to fundamentally change the decision-making behavior (e.g. convince us not to rely on intuition) but rather to improve current decision-making practice (e.g. suggest ways of improving the use of intuition). This is however not easy. This paper illustrates how complicated it is to develop relevant methods and other kinds of support for IT project selection. In particular:

- It is clearly a multi-disciplinary problem that involves aspects such as economics, politics, decision-making behavior at the individual and organizational level, as well as knowledge about information systems and systems development.

- The way IT project selection is performed might vary from organization to organization depending on the decision-making context as well as on personal preferences among decision-makers.

- Both the uncertainty and the complexity related to IT project selection are immense. Each IT project is in itself uncertain and complex. At the project proposal stage there are many unknowns, and the history of projects clearly shows us that both costs and outcome are difficult to estimate. Moreover, considering not only a single IT project but a whole portfolio of IT projects that are more or less interdependent is a still more challenging task.

- Decision-making at the individual level is a cognitive process that involves the use of tacit, intuitive knowledge which is hard to visualize, and because of this it is also difficult to develop methods that support this process.

Key success criteria for new IT project decision-making methods could be that they: a) reflect the multi-disciplinary nature of the problem; b) match the decision-making context and the personal preferences among decision-makers; c) acknowledge the uncertainty and complexity of IT project selection; d) are based on models of actual decision-making behavior; and e) improve decision quality in a real-world setting.

6. Conclusion

Selecting the right IT projects is increasingly important for many organizations. This research aimed to provide increased understanding of the way experienced IT project portfolio managers select IT projects. We attempted to do this by interviewing experienced IT project portfolio managers and analyzing the resultant decision-making behavior using the naturalistic decision-making approach, and especially the method of cognitive task analysis.

Portfolio managers were found to use a decision-making process based on intuition and experience, mental simulation and the exploitation of personal networks. During this process the portfolio managers focus on politics, value creation and project execution. Briefly put, they evaluate whether projects are politically sane, practically doable and actually create value, and they rely on both formal and informal information during the process.

The empirical findings were structured using a model with five components: Focus areas and principles, formal organization, informal organization, decision-making behavior and the decision-making context. Each of those components impacts decision quality. This simple model can be used by practitioners to identify possibilities for improving IT project selection in a systematic way, and by researchers to identify possibilities for future research.

The study also indicates why the many advanced IT project-selection methods are seldom used in practice — one major reason being that both the decision-making contexts as well as the personal preferences implicit in the specific decision-making behaviors identified in this study are not well compatible with the basic assumptions behind these methods. To develop better support for IT project selection, researchers might benefit from exploiting naturalistic decision-making approaches that start from an understanding of the actual decision-making behavior among proficient decision-makers, and acknowledge that IT project selection is a multi-disciplinary task beset by a high level of uncertainty and complexity. The by no means easy task of developing relevant methods for IT project selection could then be on a more promising track.

The present research has clear limitations in that it is based on data from a limited number of relatively experienced IT project-portfolio managers. IT project portfolio managers with less experience or other decision-making preferences, or working in different contexts might behave differently when they make IT project-selection decisions. Given that selecting the right IT projects is very important for most organizations, future research could focus on getting a broader understanding of this specific decision-making process.

References

Agor, W. A. (1986). The logic of intuition: How top executives make important decisions. Organizational Dynamics, 14(3): 5–18.

Amason, Allen C. Distinguishing the effects of functional and dysfunctional conflict on strategic decision making: Resolving a paradox for top management teams. Academy of management journal 39.1 (1996): 123-148.

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

Bernroider, E. W., & Schmöllerl, P. (2013). A technological, organisational, and environmental analysis of decision making methodologies and satisfaction in the context of IT induced business transformations. European Journal of Operational Research, 224(1), 141-153.

Blichfeldt, B. S., & Eskerod, P. (2008). Project portfolio management–There's more to it than what management enacts. International Journal of Project Management, 26(4), 357-365.

Burke, L. A., and Miller, M. K. (1999). Taking the mystery out of intuitive decision making. The Academy of Management Executive, 13(4), 91-99.

Busenitz, L. W., & Barney, J. B. (1997). Differences between entrepreneurs and managers in large organizations: Biases and heuristics in strategic decision-making. Journal of business venturing, 12(1), 9-30.

Bonabeau, E. (2003). Don't trust your gut. Harvard Business Review 81.5 (2003): 116-123.

Bonham, S. S. (2005). IT project portfolio management. Artech House.

Campbell, A. (1991). Brief case: Strategy and intuition—A conversation with Henry Mintzberg. Long Range Planning 24.2 (1991): 108-110.

Costantino, Francesco, Giulio Di Gravio, and Fabio Nonino. "Project selection in project portfolio management: An artificial neural network model based on critical success factors." International Journal of Project Management (2015).

Cooper, R.G., Edgett, S.J., Kleinschmidt, E.J. (1999). New product portfolio management: practices and performance. Journal of Product Innovation Management, Volume 16, Issue 4, July 1999, Pages 333–351

Cooper, R., Edgett, S., & Kleinschmidt, E. (2001). Portfolio management for new product development. r&D Management, 31(4), 361-380.

Dane, E., & Pratt, M. G. (2007). Exploring intuition and its role in managerial decision making. Academy of Management Review, 32(1), 33-54.

Crandall, B., Klein, G. A., & Hoffman, R. R. (2006). Working minds: A practitioner's guide to cognitive task analysis. Mit Press.

De Reyck, B., Grushka-Cockayne, Y., Lockett, M., Calderini, S. R., Moura, M., & Sloper, A. (2005). The impact of project portfolio management on information technology projects. International Journal of Project Management, 23(7), 524-537.

Eisenhardt, K. M., & Bourgeois, L. J. (1988). Politics of strategic decision making in high-velocity environments: Toward a midrange theory. Academy of management journal, 31(4), 737-770.

Eisenhardt, K. M., & Zbaracki, M. J. (1992). Strategic decision making. Strategic management journal, 13(S2), 17-37.

Elonen, S., & Artto, K. A. (2003). Problems in managing internal development projects in multi-project environments. International Journal of Project Management, 21(6), 395-402.

Fitzpatrick, E.W., 2005. Planning and Implementing IT Portfolio Management: Maximizing the Return on Information Technology Investments, IT Economics Corporation.

Gunasekaran, A., Ngai, E. W., & McGaughey, R. E. (2006). Information technology and systems justification: A review for research and applications. European Journal of Operational Research, 173(3), 957-983.

Hammond, J. S., Keeney, R. L., & Raiffa, H. (1998). The hidden traps in decision making. Harvard Business Review, 76(5), 47-58.

Hodgkinson, Gerard P., et al. "Intuition in organizations: Implications for strategic management." Long Range Planning 42.3 (2009): 277-297.

Jeffery, M., & Leliveld, I. (2004). Best practices in IT portfolio management. MIT Sloan Management Review, 45(3), 41-49.

Kaplan, J. D. (2005). Strategic IT portfolio management: governing enterprise transformation. PRTM.

Khalili-Damghani, Kaveh, Soheil Sadi-Nezhad, and Madjid Tavana. "Solving multi-period project selection problems with fuzzy goal programming based on TOPSIS and a fuzzy preference relation." Information Sciences 252 (2013): 42-61.

Khatri, N. and Ng, H. A. (2000). The Role of Intuition in Strategic Decision Making. Human Relations, 53(1), 57-86.

Klein, G. (2008). Naturalistic Decision Making. The Journal of the Human Factors and Ergonomics Society 2008 50: 456

Killen, C.P., Hunt, R.A., Kleinschmidt, E.J.(2007). Managing the New Product Development Project Portfolio: A Review of the Literature and Empirical Evidence, Management of Engineering and Technology, 1864–1874.

Kumar, R., Ajjan, H., & Niu, Y. (2008). Information technology portfolio management: literature review, framework, and research issues. Information Resources Management Journal (IRMJ), 21(3), 64-87.

Lipshitz, R., Klein, G., Orasanu, J., & Salas, E. (2001). Taking stock of naturalistic decision making. Journal of Behavioral Decision Making, 14(5), 331-352.

McFarlan, W. (1981). Portfolio approach to information systems. Harvard Business Review, 59(5), 142-150.

Moore, S., 2010. Strategic Project Portfolio Management Enabling a Productive Organization. New York: John Wiley & Sons.

Meskendahl, S. The influence of business strategy on project portfolio management and its success—a conceptual framework. International Journal of Project Management 28.8 (2010): 807-817.

Morris, P., & Pinto, J. K. (2010). The Wiley guide to project, program, and portfolio management (Vol. 10). John Wiley & Sons.

Pfeffer, J. (1981). Power in organizations. Marshfield, MA: Pitman

Pondy, L. R. (1966). Systems theory of organizational conflict. The Academy of Management Journal, 9(3), 246–256.

Shollo, A., Constantiou, I., & Kreiner, K. (2015). The interplay between evidence and judgment in the IT project prioritization process. The Journal of Strategic Information Systems, 24(3), 171-188.

Schryen, G. (2013). Revisiting IS business value research: what we already know, what we still need to know, and how we can get there. European Journal of Information Systems, 22(2), 139-169.

Thompson, J. (1967). Organizations in action: Social science bases of administrative theory. New York: McGraw-Hill.

Tushman, M. L. (1977). A political approach to organizations: A review and rationale. Academy of Management Review, 1977(2), 206–216.

West, D.M. (2004). E-Government and the Transformation of Service Delivery and Citizen Attitudes, Public Administration Review, 64, 1, pp. 15-27,