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ABSTRACT

The objective of this paper is to investigate the tendency to continue a project even when it is obvious that it will not provide the planned benefits, often referred to as "project escalation" or "escalation of commitment." The investigation aims to identify factors that empirically have been found to promote IS project escalation. We examined 1163 papers related to the phenomenon of IS project and commitment escalation and found 42 of them to include relevant empirical research. We provide a comprehensive overview of 43 factors that can have important implications for practice, especially for organizations trying to avoid escalation in the first place or uncover already escalated projects.

Keywords

IS projects, project escalation, escalation of commitment.

INTRODUCTION

In this paper, we investigate factors that empirically have been found to promote escalation of IS projects. Escalation is related to the tendency to continue a project even when it is evident that it will be unsuccessful, often referred to as "project" or "commitment escalation." Realizing the planned benefits from IT investments has been a struggle for decades (e.g., Budzier and Flyvbjerg, 2013; Cooke-Davies, 2002; Flyvbjerg and Budzier, 2011; Holgeid and Thompson, 2013). The issue has been addressed from several perspectives: for example, from a software economics point of view (Boehm, 1984; Boehm and Sullivan, 1999), Value-Based Software Engineering (Biffl et al., 2006; Boehm, 2003; Boehm and Huang, 2003; Kauppinen et al., 2009; Wohlin and Aurum, 2005), agile software development practices (Stray et al., 2012) and management practices such as benefits management (Ababneh et al., 2017; Breese et al., 2015; Ward et al., 1996; Ward et al., 2007).

Motivated by a wish to contribute to science and practice to improve the rate of return from IS projects, we investigated the following research question from an empirical point of view:

RQ: *What factors have empirically been found to promote IS project escalation?*

Much research has been done to understand the phenomenon of escalation of projects in general, some covering areas such as the context of escalation (Sleesman et al., 2018), behavioral decision-making in projects (Stingl and Geraldi, 2017), decision-making in IS projects (Cunha et al., 2016), and the sunk cost effect on projects (Wang and Keil, 2007). Researchers have indicated that the sunk cost effect seems to be stronger in projects involving IS than in non-IS projects (Wang and Keil, 2007). However, we have not found a recent literature review focusing solely on empirical research of factors that promote IS project escalation. We therefore performed a review of literature inspired by Kitchenham (2007) and Brereton et al. (2007), and focused on empirical papers relevant in answering our research question.

The remainder of this paper is structured as follows: We first present an overview of project escalation and introduce key concepts. Then we describe the research method, followed by the results. We reflect on the validity and limitations of this study, discuss implications of our findings, provide concluding remarks, and suggest future work. Finally, we have included an appendix with additional information regarding our literature review.

BACKGROUND

In this section, we give an overview of escalation of IS projects as it pertains to our research question, and we introduce key concepts.

Escalation of commitment was introduced by Barry M. Staw in 1976, who examined a lab experiment involving 240 business school students (Staw, 1976). Staw found ".. *when individuals are personally responsible for negative consequences, they may decide to increase the investment of resources to a prior course of action*" (p. 41). One of many patterns of projects failing to realize the promised benefits are projects that seemingly take on a life of their own while using resources and never reaching their goal. Staw and Ross (1987a, referencing Staw and Ross, 1987b and Brockner and Rubin, 1985) point out that "*[r]ecent research has shown, however, that the tendency to pursue a failing course of action is not a random thing. Indeed, at times some managers, and even entire organizations, seem almost programmed to follow a dying cause.*"

As pointed out by Awazu et al. (2004), a great deal of research has been done in areas such as behavioral sciences to explain why people commit to a failing course of action, even with the presence of negative information. Awazu et al. summarize the main areas of related research by pointing to Festinger's theory of cognitive dissonance, prospect theory, agency theory, and bounded rationality. Festinger's theory (Festinger, 1962) holds that people making decisions intuitively focus on information that supports their viewpoint. The theory is built on two main hypotheses: (1) the existence of dissonance (or inconsistency between, for example, what a person believes and what the person does) will motivate the individual to reduce the dissonance; and (2) when dissonance occurs, the individual will try to avoid situations or information that can increase the dissonance.

Prospect theory (Kahneman and Tversky, 1979) holds that people are risk-seeking in the face of losing options but risk-averse given winning options. "*.. people underweight outcomes that are merely probable in comparison with outcomes that are obtained with certainty. This tendency, called the certainty effect, contributes to risk aversion in choices involving sure gains and to risk seeking in choices involving sure losses. In addition, people generally discard components that are shared by all prospects under consideration*" (Kahneman and Tversky, 2013).

Agency theory (see, for example, Arrow (1985)), focuses on the relationship between the principal (who delegates work) and the agent (who performs the work). The theory holds that due to an asymmetry of information the agent will choose decisions that maximize their own interest at the expense of the principal. From this it follows, in relation to our research question, that project managers might be less likely to cancel escalating projects if they are not according to their self-interest.

In addition to the above-mentioned theories, bounded rationality is relevant in considering our research question. Simon (1972) presents three limits on perfect rationality: "*.. uncertainty about the consequences that would follow from each alternative, incomplete information about the set of alternatives, and complexity preventing the necessary computations from being carried out*" (p. 169). Individuals, for example a project manager, might not be able to consider (or might not have access to) all relevant information before making a decision. For example, if status reports do not convey a correct picture, the decision-maker will potentially make calls to continue an escalated project (on the issue of reporting quality, see, for example, Iacovou et al. (2005) and Snow and Keil (2002)).

The different theories introduced above help in understanding why projects, in general, might escalate. This present study is particularly concerned with escalation of IS projects, a field of study that gained traction in the mid-1990s with researchers such as Mark Keil (see, for example, Keil (1995); Keil et al. (1994)). Mähring and Keil (2008) introduced a process model for IS project escalation. The process model has three phases: Phase 1 is the drift phase, characterized by the emergence of ambiguity concerning the project charter (concerning, for example, the project goal); Phase 2 is characterized by unsuccessful incremental adoption (problems are seen as remediable while maintaining their goal and direction); Phase 3 is characterized by rationalized continuation where credible explanations for past problems emerge, and alternative courses of action are viewed as not better than continuing the current trajectory. The move from one phase to the next is triggered by problem emergence (from Phase 1 to 2), increased problem visibility (from Phase 2 to 3), and imminent threat to project continuation (from Phase 3 to de-escalation intention).

Staw and Ross (1987b) introduced a taxonomy of factors that promote escalation, aggregated into four main groups. Project factors are objective aspects of a project, reflecting features such as costs and benefits. Psychological factors

are associated with the decision-maker's relationship with the project. Social factors are concerned with aspects of the social group surrounding the decision-maker. Structural factors include conditions related to the project's contextual dimensions.

RESEARCH METHOD

This literature review is inspired by Kitchenham (2007) and Brereton et al. (2007).

Review Protocol

Inclusion criteria:
- Primary empirical studies relevant to our research question.
- Peer-reviewed papers.

Exclusion criteria:
- Contributions not related to information systems projects were excluded. For example: papers that reported escalation studies of non-IT-related projects were excluded (the search string is presented in Table 1).
- Non-English contributions were excluded.
- Books and gray literature such as discussion papers, technical reports, academic statements, lecture notes, and presentations were excluded.
- Contributions with lack of relevance. Relevance was considered in relation to our research question. No papers were excluded based on rigor, but we present information relevant to rigor, such as description of context and study design.

We did not focus our review to a specific time-period, we rather considered all available research according to our search string. Some of the included papers are more than 20 years old and we consider them still relevant today as most are widely referenced and we view them to be key foundational articles to the literature stream. An example of one such contribution is Keil et al. (1994).

Literature Review Search String and Search Stages

We established the search string (Table 1) after an exploratory review of the literature. We used SCOPUS and filtered papers through four stages, as presented in Table 2, which led to a total of 42 papers being included in our review.

ALL (("project escalation" OR "escalation of project" OR "escalation of commitment" OR "de-escalation of commitment" OR "de-escalation of project") AND (*"digitalization" OR "digitalisation" OR "digital transformation" OR "digital business transformation" OR "IT project" OR "IS project" OR "software project" OR "software development" OR "information system project" OR "information systems project" OR "information technology project"*)) AND (EXCLUDE (SRCTYPE , "b") OR EXCLUDE (SRCTYPE , " k ")) AND (EXCLUDE (DOCTYPE , "bk ") OR EXCLUDE (DOCTYPE , " ch ") OR EXCLUDE (DOCTYPE , " re ")) AND (LIMIT-TO (LANGUAGE , "English "))*

Table 1: Search String

Stage 1	Identify potentially relevant papers (Google Scholar search August 2018) - Exclude papers not matching search string	n = 1163
Stage 2	Review titles and casual abstract review - Exclude papers according to protocol	n = 153
Stage 3	Review abstract - Exclude papers according to protocol	n = 87
Stage 4	Assess full papers - Exclude papers according to protocol	n = 42

Table 2: Research Contribution Filtering Process

Quality Assessment and Synthesis of Results

Quality assessment of the reviewed literature is performed as a qualitative consideration by presenting attributes associated with the respective papers (see Appendix 1).

During the review process of the selected papers, we extracted data in an iterative manner, with a focus on the following items: context, type of publication (journal/conference paper), research method; and where relevant and available: number of respondents, response rate, place of study (country), time of study (year), and quantitative and qualitative empirical data relevant for our research question. The results were structured according to the categories suggested by Staw and Ross (1987b), introduced in the background section. The results are further presented in paragraphs based on related themes emerging from the literature review. In driving out relevant themes, we were inspired by the method of thematic synthesis of the results, which is claimed to be one of the predominant methods for the synthesizing of systematic review data by software engineering researchers, according to Huang et al. (2018), who define thematic synthesis as follows: "*Thematic Synthesis is a defined method for identifying, analyzing, and reporting themes (patterns) in the data. It minimally organizes and describes the data sets in rich detail to describe data sets and also interprets diverse aspects of the research area*" (p. 1208).

Several of the papers included in our literature review are experiments, and some of those have student subjects. We refer to the Validity and Limitations section for further considerations related to type of study of the included papers.

RESULTS

In this section, we present the results from our review of the identified papers as they pertain to our research question. Among the 42 selected papers, we found 20 case studies, 13 experiments and 9 surveys (some had mixed methods). We included 29 journal papers and 13 conference papers. The context and the type of study of the reviewed papers are presented in Appendix 1 and the respective numbers of articles per conference and journal are presented in Appendix 2.

Our main findings are presented in **Error! Reference source not found.** where the factors are associated with the taxonomy introduced by Staw and Ross (1987b, Figures 2, 3, 4, and 5). Factors in *italics* and marked with "*" are additional factors extracted from our literature review. The factors are sorted by the frequency with which we found them to be reported in the selected literature, and they are presented in the following sections. To make it convenient for the reader to distinguish between papers that are included in the review and other papers referenced, we have used the square bracket "[]" reference style for papers included in the review.

Project Factors

Researchers have found evidence that several project-related factors might promote escalation. Large potential payoffs from continued investments in projects have been found to promote escalation [12, 29], which is also moderately supported by the following hypothesis tested in [39]: "*A decision maker is more committed to an IS project when project payoff is large and the cost of payoff is small rather than when they are small and large, respectively*" (p. 792). Escalated projects have also shown attributes of potential long-term payoffs: "*the project was regarded as an investment in research and development*" [12, p. 430], that a project is viewed as an investment rather than expense [29], that the project is a strategic investment, e.g., the project ".. *was perceived as strategically important and there was no alternative*" [6, p. 350], and "*New arguments are offered for why the project is strategic for the bank and how the bank will benefit*" [15, p. 10]. Further, a continued investment in a failing course of action is sometimes promoted when there is a lack of information about the costs of stopping the project, the existing cost may be more than the cost of carrying on, there are difficulties in calculating whether the project is delivering value, and one might have concerns about how abandoning a project might affect other projects [42, p. 18]. The cost of alternative courses of action can pose a dilemma: "*Decision makers face the dilemma of whether to persist with a troubled project based on the opportunity cost incurred in investing in a project turnaround rather than a new project*" [31, p. 1167]. When decision-makers are aware of alternative courses of action, they are less likely to stay the course of a failing trajectory [16, 21]. Decision-makers should be aware of potential biases when exercising such options, as reported in [23]: "*.. IT managers were risk averse while exercising growth options and risk seeking while exercising abandonment options*" (p. 385), and "*project size intensified the biased decisions for growth options and for abandonment options*" (p. 383). In some

Factor	References
Project factors	
Equivocal situations/ambiguity/goal incongruency*	[1,2,3,4,5,8,15,28,30,32,34,42]
Project management aspects/misreporting/information asymmetry/bias*	[5,6,14,17,22,32,34,41]
Infeasibility of alternatives (e.g., lack of alternatives /opportunity cost)	[16,21,23,29,30]
Investment character of project/long-term payoff	[6,12,15,29]
Large-size payoff	[12,29,39]
High closing costs	[30,42]
Small seemingly innocent variances to plan*	[36,37]
Temporary cause of setback	[12,29]
Efficacious resources*	[29]
Legal requirement to complete*	[42]
Low cost of payoff	[39]
Project size*	[23]
Psychological factors	
Personal responsibility for failure (this can also be a social factor)	[8,12,22,26,29,31,33,38,39,42]
Sunk cost	[7,15,16,20,21,29,30,31,32,33]
Illusion of control*	[5,6,10,11,13,24]
Prior history of success/*self-efficacy**	[8,10,11,12,29,30]
Completion effect*	[7,17,21,22,32]
Deaf effect/escaping blame*	[9,18,19,25]
Emotional attachment*	[12,31,33,42]
Framing	[15,26,28,39]
Need for achievement/"can do" mentality*	[6,24,30]
Information-processing errors*	[8,12]
Reinforcement traps/*substantial personal rewards/self-serving reasons**	[8,40]
Selective perception*	[5,13]
Blame culture*	[41]
Decision-makers' creativity*	[38]
Information load*	[38]
Ego	[29]
Project leaders' authority*	[27]
Social factors	
Public decision context/public identification with the project	[6,29,31,33]
Norms for consistency	[8,12,29]
Competitive/political rivalry	[8,12]
Job insecurity/*security**	[29,39]
Models of persistence	[8,42]
Mum effect*	[18,19]
Need for external justification*	[12]
Preservation of relationship*	[34]
Prior resistance*	[39]
Uncertainty avoidance cultures (high/low)*	[20]
Structural factors	
Top-management support/*political-/strong advocate* support*	[6,8,12,17,22,29]
Institutionalization	[6,8,29,35]
Empire building*	[12]
Slack resources/loose management control*	[12]

Table 3: Main findings

escalated projects alternatives are simply rejected as not feasible [29], and some projects might face legal or regulatory requirements to complete [42].

Escalation can follow from small and seemingly innocent deviations from plans that tend to be accepted without further actions, while larger deviations are more often addressed [36, 37]. Setbacks can sometimes be explained as temporary [29] as also found in [12, p. 430]: "*project setbacks appeared to be temporary problems.*" This can potentially lead to situations whereby risks are not treated with the deserved diligence. Rather than waiting for assumed temporary problems to go away, researchers have found that decision-makers throw additional resources at escalated projects as efficacious resources are believed to turn the situation around [29].

Equivocality has been reported to cause unfortunate decisions in relation to escalation and abandonment of IS projects. Equivocal conditions are characterized by the presence of information that can have several interpretations (see, for example, Bowen (1987)). "*When decisions are required in equivocal conditions, project escalations are likely to occur, caused by the belief that commitment of additional resources are economically prudent*" [4], referencing experiments in the field of psychology (Bragger et al., 1998; Bragger et al., 2003). [1] report several causes of such ambiguity grouped into three categories: (1) Content: Complexity in process, sophistication of technology, challenges in project management, lack of standards; (2) Context: Changes in external state, different frames of reference; (3) Process: Lack of evaluation data, failure of evaluation methods. Similar findings were reported in [2, 3], although in [2] less pronounced relations were found between factors such as failure of evaluation methods and equivocality. To exemplify how equivocality can be caused, we refer to [3] who state that "*the unavailability of data to support evidence-based evaluations is shown to lead project evaluations into equivocal situations by steering decision-makers away from making purposeful decisions*" (p. 17). Equivocality was reported, for example, in a case study from the health sector [8]; in [15] a project started drifting due to ambiguity related to the project goal and direction; [5] had a lack of clear project scope; [28] report that "*[w]ithout a clear sense of direction, the first phase of the project was characterized by drift and confusion*" (p. 250); [30] found that "*[d]ecision-makers face the dilemma of whether to persist with a troubled project in the situation where information on past performance is equivocal and does not clearly indicate failure*" (p. 1167). Information asymmetry [32, 41] is a related issue where, for example, project managers and leaders have different information about the status of a project. Information bias [34] is also a potential issue, for example, between project team and end users where end users are reluctant to give suggestions about the system for fear of impinging on supervisors' authority. Further, contract ambiguity such as ambiguous terms of reference has also been reported in relation to project escalation [34], and also a lack of clarity on responsibilities for stopping a project [42].

A number of project management aspects have been reported to contribute to escalation of projects. Such aspects include a lack of project management control [6]. Misreporting is another aspect reported in [14], where a self-reinforcing cycle of distrust between project management and project auditors results in less accurate reporting due to defensive tactics. Project management aspects have been reported not only to contribute to escalations but to be a key determinant of escalation [17]. [22] report several project management aspects related to project escalation, of which the most prominent ones were the underestimation of the time required to complete the project, senior management not monitoring the project closely enough, the underestimation of necessary resources, size or scope of project underestimated, inadequate project control mechanisms, system specifications continuously changing, and inadequate planning (Section 4.6, Table 4).

Psychological Factors

Personal responsibility for failure has been found to drive escalation [26]. We find examples of this in several studies, such as in [8, 12, 29] where decision-makers felt personally responsible for the project outcome. A related factor is that failure can have a negative impact on primary decision-makers [22]. Standing up to the momentum of a project can be difficult and stopping a project can be seen as a sign of failure [42]. Personal responsibility for failure can take many forms related to escalation, as illustrated in [31, p. 1147]: "*What were we going to tell everybody if the project did not succeed? The stakes were very high and we could not disappoint them*" (same case study also reported in [33]). Related to this, [38] found that "*decision makers who receive negative feedback after an initial funding decision allocate significantly more resources to the initial project than those who receive positive feedback*" (p. 10). Further, [39] report that "*[a] decision maker is more committed to an IS project when they have supported it in the past and the decision is framed positively than when they have opposed it in the past and the decision is framed negatively*" (p. 792). A similar tendency was found in [26], who report that people are more likely to escalate their commitment given decisions framed positively (rather than negatively). Framing as a potential driver for escalation has also been reported

in studies such as [15, 28] where projects were framed as "*necessary and urgent.*" In [28] this created momentum even though the project plan gave insufficient guidance.

Sunk cost (a cost that has already been incurred and cannot be recovered) is another major psychological factor found to promote escalation, as exemplified in a case study [15]: "*[W]e had already committed 35 or 40 million into the project, we already had the hardware… I'd be the first person to say, I probably wasted 6 to 12 million tax dollars trying to save that first investment*" (p. 20). Sunk cost effects have been suggested in a number of studies [7, 21, 29, 30, 31, 32, 33] and also found to be affecting escalation decisions across several countries and cultures [16, 20].

Studies have found that decision-makers with a history of success can contribute towards the escalation of commitment [8, 12, 29], and people with high task-specific self-efficacy (e.g., built on past successes) have been found to have a more optimistic view of project risk [10, 11]. Further, the decision-maker's ego is also a factor that can promote escalation [29]. A decision-maker's emotional attachment to a project can be a driver for escalation [12, 33], as illustrated in [31]: "*The project was his baby. He would never give it up*" (p. 1147), and in [42] where people can be afraid of the potential impact of stopping a senior manager's "*pet*" project. Strong attachments to a project can also follow from high personal reward associated with successful project delivery [8], and [40] found that "*[t]he institutional environment may also contain legitimate competing logics that are frequently employed by actors with vested interests. Their self-serving actions could lead to an extended period of underperformance*" (p. 708).

Sometimes projects seem closer to completion than they are. Such completion effects are reported in case studies [7, 32] and found to drive escalation [17, 21]. [30] suggest that "*[d]ecision makers face the dilemma of whether to persist with a troubled project due to the desire to achieve task completion*" (p. 1167). The need for achievement has been reported to indirectly promote intent to continue [24]. An "*[i]mplementation mindset*" [24] and "*can do*" mentality [6] have also been found in escalated IS projects. This can drive decision-makers' focus toward solving the problems and not questioning their existence [6]. The tendency to underestimate the time to complete a project is suggested to be one of the key project management aspects related to escalation [22], as also illustrated in a case study [5]. Information processing errors can lead to a wrong picture of the situation [12], and people can be misled by themselves or others. [8] observed "*.. the IT project director became convinced that things do not look so bad after all*" (p. 538). People sometimes have an illusion of control [5, 6, 13, 24] as well as a tendency to employ selective perceptions of situations [5,13], which can both be associated with the intent to continue a project. Decision-makers have been found to consider project risk higher when exogenous risks are present (rather than endogenous risks) [10, 11].

Intuitively, fear of blame can be a factor that promotes escalation and blame coping strategies such as sharing blame can limit the impact on escalation [9]. Even IT auditors have been found to be affected by fear of reprisals [18]: "*Although responsible for exposing project ills, IS auditors (and other potential whistle blowers) often remain mum due to fear of reprisals*" (p. 90). Further, executives might adopt deaf strategies as reported in [18]: "*By remaining deaf to warning signs, executives may insulate themselves from having to deal with problems in the short run. They may also disassociate themselves from a failing endeavor, thereby escaping blame*" (p. 91) (also reported in [19]). Related to this, one study [25] found men to be more likely to turn a deaf ear and thus cause IS project escalation than women, and that people typically turn a deaf ear to bad news when it is put forward by a person viewed with less credibility. Whether bad news is likely to result in reward or punishment has also been found to influence commitment [41].

Social and Structural Factors

We found social and structural factors to be reported to a somewhat less extent than project factors and psychological factors. We do not suggest social and structural factors are less important in promoting escalation, but fewer studies have investigated such factors. Public decision context is among the most frequently reported social factor, and among the structural factors, top-management and political support is a dominating factor. We refer to Table 3 for references to the relevant papers.

VALIDITY AND LIMITATIONS

We are aware of several limitations that should be considered when reading our findings, and in this section, we will highlight some important limitations.

The search string has limitations: We have not covered all relevant publications to help us answer the research question, and we have only searched one – albeit significant – source (SCOPUS). Papers that might be of interest in shedding light on the research question might be excluded from our search results, because the search string does not cover all relevant search words. Further, errors might have happened in our filtering process – even though it was done carefully. For example, we might have excluded relevant papers that do not clearly provide information in the title and/or abstract that we find of enough relevance to our research question. Another potential threat we have considered when crafting the review protocol is paper selection consistency. In searching for additional empirical studies to include in our review, we used the snowballing technique (exploratory, not systematic). This did not result in additional empirical studies being included in our review; however, snowballing helped us uncover some valuable papers referenced as part of the introduction and background sections. A number of empirical studies related to our research question were based on methods of experiments (such as student experiments). Experiments can be beneficial in probing causality, however interpreting results from experiments with student subjects needs to be done while taking into consideration ecological validity. Further, caution should be exercised when comparing results from studies that have taken place in different contexts (e.g., different countries, different time, different industry, etc.) and that sometimes also use slightly different terms and, for example, ask survey questions in a slightly different way. We have tried to mitigate such risks by introducing each study with a short context description, and we have often used quotations to make sure the exact wording from the original papers comes across. In regard to our research question, we have only included some relevant aspects of the referenced papers and we encourage the interested reader to review the respective papers in full.

CONCLUSION

We have systematically reviewed literature related to IS project escalation from the early days of computing to the present. We have analyzed the papers for empirical evidence of factors that promote IS project escalation, grouped in four categories: project, psychological, social, and structural factors. Project and psychological factors are most often referenced in the empirical literature. Among project factors, equivocal factors and project management-related factors appear to be most frequently reported. Among psychological factors, personal responsibility for failure and sunk cost are often mentioned. The social factor most often reported is public decision context, and among the structural factors, top-management and political support is the dominant factor. In total, we found 43 factors to promote escalation of IS projects, and even though they all fit into the categories proposed by Staw and Ross (1987b), several of them are additional factors that go beyond Staw and Ross's original list of factors. We observe that researchers keep finding evidence of the factors suggested by Staw and Ross, however new factors appear to keep emerging in the context of IS projects. The sheer number of factors illustrates the complexity of the phenomenon of IS project escalation. To the best of our knowledge, this is the first study to systematize such evidence.

We contribute to practice by offering organizations a comprehensive list of factors that can be of help in avoiding project escalation in the first place, and also help uncover already escalated situations so that proper de-escalation can be initiated. We have not found evidence to suggest that some factors are more important than others as few studies compare more than a fraction of the 42 factors. We suggest that organizations can benefit from keeping an eye on the factors we have identified, especially in situations where projects are considered to be of critical importance and no alternatives are easily imaginable.

The collection of factors can also be of help for researchers as most of the studies reported in this review have focused on a limited set of factors that potentially can drive escalation. When researchers are investigating just one or a few factors, one can benefit from our longer list of factors to help identify confounding factors in their analysis.

We propose further research of social and structural factors. For example, public decision context, political support, empire building and job insecurity intuitively seem important and they appear to have attracted somewhat less attention from researchers compared with project and psychological factors. Further, we propose that further research is needed to better understand how the various factors play together and contribute to project escalation. Few studies take a broader perspective and analyze how a longer list of potential factors contribute and interplay towards escalation. We suggest that further studies on project escalation should take this into account by seeking to provide knowledge on how a mix of project, psychological, social and structural factors potentially contribute to project escalation.

ACKNOWLEDGEMENTS

REFERENCES

In this section we first list papers included in the literature review before listing the other papers referenced. We have used the square bracket "[]" reference style for papers included in the review to make it convenient for the reader to distinguish between papers that are included in the review and other papers referenced.

Papers Subject to Literature Review

[1] Arviansyah, A., Spil, T. and Van Hillegersberg, J. (2013) Evaluating IS/IT projects: Emergence of equivocality in practice, *Paper presented at the 19th Americas Conference on Information Systems, AMCIS 2013 - Hyperconnected World: Anything, Anywhere, Anytime*, 2 1480-1492. Retrieved from www.scopus.com

[2] Arviansyah, A., Spil, T. and Van Hillegersberg, J. (2013) Evaluating IS/IT projects: Revealing the causes of equivocality, *Paper presented at the Proceedings - Pacific Asia Conference on Information Systems, PACIS* 2013, Retrieved from www.scopus.com

[3] Arviansyah, A., Spil, T. and Van Hillegersberg, J. (2015) To continue or discontinue the project, that is the question, *Paper presented at the 2015 International Conference on Information Systems: Exploring the Information Frontier, ICIS* 2015, Retrieved from www.scopus.com

[4] Arviansyah, A., Ter Halle, Y., Spil, T. and Van Hillegersberg, J. (2015) Project evaluation: A mixed-method study into dilemmas in continuation decisions, *Paper presented at the Proceedings of the Annual Hawaii International Conference on System Sciences*, 2015-March 4436-4445. doi:10.1109/HICSS.2015.531 Retrieved from www.scopus.com

[5] Chakravorty, S.S., Dulaney, R.E. and Franza, R.M. (2016) ERP implementation failures: A case study and analysis, *International Journal of Business Information Systems*, 21, 4, 462-476. doi:10.1504/IJBIS.2016.075256

[6] Drummond, H. (1996) The politics of risk: Trials and tribulations of the Taurus project, *Journal of Information Technology*, 11, 4, 347-357. doi:10.1057/jit.1996.8

[7] Granlien, M.S., Pries-Heje, J. and Baskerville, R. (2009) Project management strategies for prototyping breakdowns, *Paper presented at the Proceedings of the 42nd Annual Hawaii International Conference on System Sciences, HICSS*, doi:10.1109/HICSS.2009.357 Retrieved from www.scopus.com

[8] Guah, M.W. (2008) IT project escalation: A case analysis within the UK NHS, *International Journal of Information Management*, 28, 6, 536-540. doi:10.1016/j.ijinfomgt.2008.08.004

[9] Heng, C. -., Tan, B.C.Y. and Wei, K (2003) De-escalation of commitment in software projects: Who matters? What matters?, *Information and Management*, 41, 1, 99-110. doi:10.1016/S0378-7206(03)00030-2

[10] Jani, A. (2008) An experimental investigation of factors influencing perceived control over a failing IT project, *International Journal of Project Management*, 26, 7, 726-732. doi:10.1016/j.ijproman.2008.06.004

[11] Jani, A. (2011) Escalation of commitment in troubled IT projects: Influence of project risk factors and self-efficacy on the perception of risk and the commitment to a failing project, *International Journal of Project Management*, 29, 7, 934-945. doi:10.1016/j.ijproman.2010.08.004

[12] Keil, M. (1995) Pulling the plug: Software project management and the problem of project escalation, *MIS Quarterly: Management Information Systems*, 19, 4, 421-443. Retrieved from www.scopus.com

[13] Keil, M., Depledge, G. and Rai, A. (2007) Escalation: The role of problem recognition and cognitive bias, *Decision Sciences*, 38, 3, 391-421, doi:10.1111/j.1540-5915.2007.00164.x

[14] Keil, M., Jeff Smith, H., Iacovou, C. L. and Thompson, R.L. (2014) The dynamics of IT project status reporting: A self-reinforcing cycle of distrust, *Journal of the Association of Information Systems*, 15, 12, 879-912. Retrieved from www.scopus.com

[15] Keil, M. and Mähring, M. (2011) Is your project turning into a black hole?, *California Management Review*, 53, 1, 6-31. Retrieved from www.scopus.com

[16] Keil, M., Mixon, R., Saarinen, T. and Tuunainen, V. (1994) Understanding runaway information technology projects: Results from an international research program based on escalation theory, *Journal of Management Information Systems*, 10, 4, 65-85. Retrieved from www.scopus.com

[17] Keil, M., Rai, A., Mann, J.E.C. and Zhang, G.P. (2003) Why software projects escalate: The importance of project management constructs, *IEEE Transactions on Engineering Management*, 50, 3, 251-261. doi:10.1109/TEM.2003.817312

[18] Keil, M. and Robey, D. (2001) Blowing the whistle on troubled software projects, *Communications of the ACM*, 44, 4, 87-93. doi:10.1145/367211.367274

[19] Keil, M. and Robey, D. (1999) Turning around troubled software projects: An exploratory study of the deescalation of commitment to failing courses of action, *Journal of Management Information Systems*, 15, 4, 63-87. doi:10.1080/07421222.1999.11518222

[20] Keil, M., Tan, B.C.Y., Wei, K. , Saarinen, T., Tuunainen, V. and Wassenaar, A. (2000) A cross-cultural study on escalation of commitment behavior in software projects, *MIS Quarterly: Management Information Systems*, 24, 2, 299-323. Retrieved from www.scopus.com

[21] Keil, M., Truex, D. P. and Mixon, R. (1995) The effects of sunk cost and project completion on information technology project escalation, *IEEE Transactions on Engineering Management*, 42, 4, 372-381. doi:10.1109/17.482086

[22] Keil, M. and Mann, J. (1997) Understanding the nature and extent of IS project escalation: Results from a survey of IS audit and control professionals, *Paper presented at the Proceedings of the Hawaii International Conference on System Sciences,* 3, 139-148. doi:10.1109/HICSS.1997.661582 Retrieved from www.scopus.com

[23] Khan, S.S., Kumar, R., Zhao, K. and Stylianou, A. (2017) Examining real options exercise decisions in examining real options exercise decisions in investments information technology investments, *Journal of the Association of Information Systems*, 18, 5, 372-402, Retrieved from www.scopus.com

[24] Korzaan, M. and Morris, S.A. (2009) Individual characteristics and the intention to continue project escalation, *Computers in Human Behavior*, 25, 6, 1320-1330, doi:10.1016/j.chb.2009.05.005

[25] Lee, J.S., Cuellar, M.J., Keil, M. and Johnson, R.D. (2014) The role of a bad news reporter in information technology project escalation: A deaf effect perspective, *Data Base for Advances in Information Systems*, 45, 3, 8-29. doi:10.1145/2659254.2659256

[26] Liang, T., Yen, N., Kang, T. and Li, Y. (2013) Escalation of commitment in software projects: An examination of two theories, *Paper presented at the Proceedings − Pacific Asia Conference on Information Systems, PACIS* 2013, Retrieved from www.scopus.com

[27] Little, D. and Little, A. (1999) Escalation of commitment in systems development: A study of tendencies in matrix and functional organizations, *Journal of Computer Information Systems*, 40, 2, 7-13. Retrieved from www.scopus.com

[28] Mähring, M. and Keil, M. (2008) Information technology project escalation: A process model, *Decision Sciences*, 39, 2, 239-272. doi:10.1111/j.1540-5915.2008.00191.x

[29] Mähring, M., Keil, M., Holmström, J. and Montealegre, R. (2004) Trojan actor-networks and swift translation: Bringing actor-network theory to IT project escalation studies, *Information Technology & People*, 17, 2, 210-238. doi:10.1108/09593840410542510

[30] Pan, G. (2006) The hidden dilemmas in software development project decision-making: Persist or desist*?, Paper presented at the PACIS 2006 − 10th Pacific Asia Conference on Information Systems: ICT and Innovation Economy*, 1159-1171. Retrieved from www.scopus.com

[31] Pan, G, and Pan, S.L. (2006) Escalation and de-escalation of commitment to information systems projects: Insights from an approach-avoidance process model, *Paper presented at the ICIS 2006 Proceedings − Twenty Seventh International Conference on Information Systems*, 19-34. Retrieved from www.scopus.com

[32] Pan, G., Pan, S. L. and Newman, M. (2009) Managing information technology project escalation and de-escalation: An approach-avoidance perspective, *IEEE Transactions on Engineering Management*, 56, 1, 76-94. doi:10.1109/TEM.2008.922638

[33] Pan, S.L., Pan, G.S.C., Newman, M. and Flynn, D. (2006) Escalation and de-escalation of commitment to information systems projects: Insights from a project evaluation model, *European Journal of Operational Research*, 173, 3, 1139-1160. doi:10.1016/j.ejor.2005.07.009

[34] Parinyavuttichai, N. and Lin, A. (2013) Understanding the nature of project escalation: An exploratory study from an IS risk perspective, *Paper presented at the 19th Americas Conference on Information Systems, AMCIS 2013 − Hyperconnected World: Anything, Anywhere, Anytime*, 5 3803-3809. Retrieved from www.scopus.com

[35] Park, K.J. and Berente, N. (2012) Institutionalization, embedded rationality, and the escalation of commitment to IT projects, *Paper presented at the Proceedings of the Annual Hawaii International Conference on System Sciences*, 4924-4933. doi:10.1109/HICSS.2012.329 Retrieved from www.scopus.com

[36] Paul, J. (2007) Tolerance of escalating commitment to troubled projects, *Paper presented at the Association for Information Systems −13th Americas Conference on Information Systems, AMCIS* 2007: Reaching New Heights, , 7 4925-4931. Retrieved from www.scopus.com

[37] Paul, J. and O'Connor, M. (2007) Where do we draw the line? Tolerance of escalating commitment to troubled projects, *Paper presented at the Association for Information Systems − 13th Americas Conference on Information Systems, AMCIS 2007: Reaching New Heights*, 4 2308-2316. Retrieved from www.scopus.com

[38] Roetzel, P.G. (2015) The impact of creativity and information load on escalation of commitment, *Paper presented at the 23rd European Conference on Information Systems, ECIS 2015*, May Retrieved from www.scopus.com

[39] Sabherwal, R., Sein, M.K. and Marakas, G.M. (2003) Escalating commitment to information system projects: Findings from two simulated experiments, *Information and Management*, 40, 8, 781-798, doi:10.1016/S0378-7206(02)00104-0

[40] Sandeep, M.S. and Ravishankar, M.N. (2014) The continuity of underperforming ICT projects in the public sector, *Information and Management*, 51, 6, 700-711, doi:10.1016/j.im.2014.06.002

[41] Tan, B.C.Y., Smith, H.J., Keil, M. and Montealegre, R. (2003) Reporting bad news about software projects: Impact of organizational climate and information asymmetry in an individualistic and a collectivistic culture, *IEEE Transactions on Engineering Management*, 50, 1, 64-77. doi:10.1109/TEM.2002.808292

[42] Thornley, C.V. and Crowley, C.A. (2018) Developing the capability to terminate IT projects when they can no longer deliver business value: A discussion of key insights from practitioners, *International Journal of Managing Projects in Business*, 11, 2, 406-431 doi:10.1108/IJMPB-06-2017-0060

Other Papers Referenced

Ababneh, H., Shrafat, F. and Zeglat, D. (2017) Approaching information system evaluation methodology and techniques: A comprehensive review, *International Journal of Business Information Systems*, 24, 1, 1-30.

Arrow, K. J. (1985). The economics of agency. in John W. Pratt and Richard J. Zeckhauser (Eds) Principals and agents: The structure of business Boston, Harvard Business School Press, 37-51.

Awazu, Y., Desouza, K.C. and Evaristo, J.R. (2004) Stopping runaway IT projects, *Business Horizons*, 47, 1, 73-80, doi:10.1016/j.bushor.2003.11.011

Biffl, S., Aurum, A., Boehm, B., Erdogmus, H. and Grunbacher, P. (2006) Value-based software engineering, Springer, ISBN 978-3-540-25993-0

Boehm, B. (1984) Software engineering economics, *IEEE Transactions on Software Engineering*, SE-10, 1, 4-12.

Boehm, B. and Huang, L. (2003) Value-based software engineering: A case study, *IEEE Computer*, March 2003, 21-29.

Boehm, . and Sullivan, K. (1999) Software economics: A roadmap, in *ICSE '00 Proceedings of the Conference on The Future of Software Engineering*, Limerick, Ireland, June 04 - 11, 2000, 319-343.

Bowen, M.G. (1987) The escalation phenomenon reconsidered: Decision dilemmas or decision errors?, *The Academy of Management Review*, 12, 1, 52-66.

Bragger, J.D., Bragger, D., Hantula, D.A. and Kirnan, J. (1998) Hyteresis and uncertainty: The effect of uncertainty on delays to exit decisions, *Organizational Behavior and Human Decision Processes*, 74, 3, 1998, 229-253.

Bragger, J.D., Hantula, D.A., Bragger, D., Kirnan, J. and Kutcher, E. (2003) When success breeds failure: History, hysteresis, and delayed exit decisions, *Journal of Applied Psychology*, 88, 1, 6-14.

Breese, R., Jenner, S., Serra, C.E.M. and Thorp, J. (2015) Benefits management: Lost or found in translation, *International Journal of Project Management*, 33, 7, 1438-1451.

Brereton, P., Kitchenham, B.A., Budgen, D., Turner, M. and Khalil, M. (2007) Lessons from applying the systematic literature review process within the software engineering domain, *Journal of Systems and Software*, 80 4, 571-583.

Brockner, J. and Rubin, J.Z. (1985). Entrapment in escalating conflicts, New York, Springer-Verlag.

Budzier, A. and Flyvbjerg, . (2013) Making sense of the impact and importance of outliers in project management through the use of power laws, *Proceedings of IRNOP (International Research Network on Organizing by Projects)*, Oslo, 2013.

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

Cunha, J.A.O.G., Moura, H.P. and Vasconcellos, F.J.S. (2016) Decision-making in software project management: A systematic literature review, *Paper presented at the Procedia Computer Science*, 100 947-954. doi:10.1016/j.procs.2016.09.255 Retrieved from www.scopus.com

Festinger, Leon. (1962) A theory of cognitive dissonance, Stanford University Press, Stanford, California, ISBN 0-8047-0131-8

Flyvbjerg, B. and Budzier, A. (2011) Why your IT project might be riskier than you think, *Harvard Business Review*, September 2011.

Holgeid, K.K. and Thompson, M. (2013) The governance of large-scale projects: Linking citizens and the state, The Hertie School of Governance and the *Journal for Political Consulting and Policy Advice*, NOMOS 2013, p. 219-243. ISBN 978-3-8329-7879-2.

Huang, X., Zhang, H., Zhou, Xin., Babar, Muhammad A., Yang, S. (2018) Synthesizing qualitative research in software engineering: A critical review, In *Proceedings of ICSE '18: 40th International Conference on Software Engineering*, Gothenburg, Sweden, May 27-June 3, 2018 (ICSE '18), 12 pages. https://doi.org/10.1145/3180155.3180235.

Iacovou, C. L., Jeff Smith, H. and Thompson, R.L. (2005) The linkage between reporting quality and performance in information systems projects, *Paper presented at the Association for Information Systems − 26th International Conference on Information Systems, ICIS 2005*: Forever New Frontiers, 409-422. Retrieved from www.scopus.com

Jørgensen, M., Dybå, T., Liestøl, K. and Sjøberg, D.I.K. (2016) Incorrect results in software engineering experiments: How to improve research practices, *Journal of Systems and Software*, ISSN 0164-1212. 116, 133-145. doi:10.1016/j.jss.2015.03.065.

Kahneman, D. and Tversky, A. (1979) Prospect theory: An analysis of decision under risk, *Econometrica*, 47, 263-291.

Kahneman, D. and Tversky, A. (2013) Prospect theory: An analysis of decision under risk, Handbook of the Fundamentals of Financial Decision Making, Chapter 6, World Scientific Handbook in Financial Economics Series. 99-127 (2013)

Kauppinen, M., Savolainen, J., Lehtola, L., Komssi, M., Tohonen, H. and Davis, A. (2009) From feature development to customer value creation, 2009 *17th IEEE International Requirements Engineering Conference.*

Keil, M. (1995) Pulling the plug: Software project management and the problem of project escalation, *MIS Quarterly*, 19, 421-447.

Keil, M., Mixon, R., Saarinen, T. and Tuunainen, V. (1994) Understanding runaway information technology projects: Results from an international research program based on escalation theory, *Journal of Management Information Systems*, 10, 4, 65-85. Retrieved from www.scopus.com

Kitchenham, B.A. (2007) Guidelines for performing systematic literature reviews in software engineering, Version 2.3, EBSE Technical Report EBSE-2007-01, Software Engineering Group School of Computer Science and Mathematics Keele University Keele, Staffs ST5 5BG, UK and Department of Computer Science University of Durham Durham, UK.

Mähring, M. and Keil, M. (2008) Information technology project escalation: A process model, *Decision Sciences*, 39, 2, 239-272. doi:10.1111/j.1540-5915.2008.00191.x

Simon, H.A.(1972) Theories of bounded rationality, in McGuire, C. and R. Radner (Eds), Decision and Organization, North-Holland, Amsterdam, 1972.

Sleesman, D.J., Lennard, A.C., McNamara, G. and Conlon, D.E. (2018) Putting escalation of commitment in context: A multilevel review and analysis, *Academy of Management Annals*, 12, 1, 178-207, doi:10.5465/annals.2016.0046

Snow, A.P. and Keil, M. (2002) A framework for assessing the reliability of software project status reports. *EMJ - Engineering Management Journal*, 14, 2, 20-26, doi:10.1080/10429247.2002.11415158

Staw, B.M. and Ross, J. (1987a) Knowing when to pull the plug, *Harvard Business Review*, March 1987.

Staw, B.M. (1976) Knee-deep in the big muddy: A study of escalating commitment to a chosen course of action, *Organizational Behavior and Human Performance*, 16, 1, 27-44.

Staw, B.M. and Ross, J. (1987b) Behavior in escalation situations: Antecedents, prototypes, and solutions. *Research in Organizational Behavior*, 9, 39-78.

Stingl, V. and Geraldi, J. (2017) Errors, lies and misunderstandings: Systematic review on behavioural decision making in projects, *International Journal of Project Management*, 35, 2, 121-135, doi:10.1016/j.ijproman.2016.10.009

Stray, V.G., Moe, N. B. and Dybå, T., Escalation of Commitment: A Longitudinal Case Study of Daily Meetings, in Agile Processes in Software Engineering and Extreme Programming, Springer Berlin Heidelberg, pp. 153-167, 2012. doi:10.1007/978-3-642-30350-0_11

Wang, J. and Keil, M. (2007) A meta-analysis comparing the sunk cost effect for IT and non-IT projects, *Information Resources Management Journal*, 20, 3, 1-18. doi:10.4018/irmj.2007070101

Ward, J., De Hertogh, S, and Viaene, S. (2007) Managing benefits from IS/IT investments: An empirical investigation into current practice, *System Sciences, 2007. HICSS 2007. 40th Annual Hawaii International Conference on System Sciences*, 206a-206a, IEEE, 2007.

Ward, J., Taylor, P. and Bond, P. (1996) Evaluation and realisation of IS/IT benefits: An empirical study of current practice, *European Journal of Information Systems*, 4, 4, 214-225, Taylor & Francis, 1996.

Wohlin, C. and Aurum, A. (2005) What is important when deciding to include a software requirement in a project or release? in *Proceedings International Symposium on Empirical Software Engineering*, 246-255, Noosa Heads, Australia, 2005.

APPENDIX

Appendix 1

Ref	Source[a]	Study type[b]	Context
[1]	C	CS	Case studies with expert interviews with ten IT professionals to study equivocal situations.
[2]	C	CS	Case studies with expert interviews with seven IT professionals to study equivocal situations.
[3]	C	S	Case studies with expert interviews with, and survey of, IT professionals (111 respondents) to study equivocal situations related to IT projects.
[4]	C	S	Survey of IT professionals (108 respondents) analyzing three factors hypothesized to have an association with equivocal situations.
[5]	J	CS	Case study of an ERP implementation located in the US that was abandoned in 2010. Data gathered through document analysis, archival records of financial data etc., and interviews.
[6]	J	CS	Case study of an escalated project in UK (Taurus) that was terminated in 1993. Data gathered through media, document analysis, and interviews.
[7]	C	CS	Case study of an escalated prototyping project in the Danish health sector. Data gathered by observation, interviews, and document analysis.
[8]	J	CS	Case study of the health service in UK using semi-structured interviews.
[9]	J	E	Experiment involving 360 students playing the role of project manager.
[10]	J	E	Experiment where 36 students and 35 professionals in the US played the role of software project manager in a failing IT project.
[11]	J	E	Same context as [10].
[12]	J	CS	Case study of escalated project (1981-1992) through interviews (197), observing meetings, and document study.
[13]	J	E	Experiment with 178 US students in a role-playing exercise where the student was put in the role of a software project manager.
[14]	J	S	118 interviews with people involved with 9 US government IT projects.
[15]	J	CS	Case studies of escalated projects.
[16]	J	E	Several experiments from 1992 through 1994 involving US students and students from Finland.
[17]	J	S	Survey of US IT audit and control professionals. 579 responses, 26% response rate. Conducted in 1995.
[18]	J	CS	Interviews with 42 IT auditors.
[19]	J	S	Same context as [18].
[20]	J	E	Experiment involving 536 students from Finland, the Netherlands, and Singapore faced with decision to continue or stop a software project.
[21]	J	E	Experiment involving 313 students (participation rate 97.2%) faced with a decision to continue or stop an IT project.
[22]	C	S	Same context as [17].
[23]	J	S	Survey of IT professionals from several countries (331 responses (310 complete), 18.2% response rate) to investigate hypothesis related to execution of real options in IT projects.

Ref	Source[a]	Study type[b]	Context
[24]	J	S	Survey of people involved with IT projects (232 respondents) investigating the intention to continue project escalation.
[25]	J	E	Experiment involving 105 students simulating the role of IT project manager, examining relationships between characteristics of a "bad news reporter" and willingness to continue a troubled project.
[26]	C	E	Experiment involving 162 participants (mainly students), playing the role of IT manager of a company.
[27]	J	E	Experiment involving 144 students simulating the role of IT project leaders, studying tendencies of escalation of commitment in matrix and functional organizations.
[28]	J	CS	Case study of a project that experienced escalation. The project was completed in the 1990s. Data were collected through 31 interviews.
[29]	J	CS	Case study of computerized baggage handling project at Denver International Airport, applying actor-network theory to IT project escalation (late 1980s to mid-1990s).
[30]	C	CS	Case studies of two UK IT projects that experienced escalation. Data collected through interviews.
[31]	C	CS	Case study of an electronic procurement project in UK. Data collected in 2002 mainly through semi-structured interviews and informal discussions.
[32]	J	CS	Case study of an IT project in a large UK utility provider. Data collected in 2002 through field research (observations, interviews, and document reviews).
[33]	J	CS	Same context as [31].
[34]	C	CS	Case study of outsourced IT project in the public sector in Thailand. Data collected in 2008 through interview of five project members and document analysis.
[35]	C	CS	Reinterpretation of cases previously reported, to explore institutionalized fields and how commitment may become legitimized.
[36]	C	CS	Experiment with participation from Australian students.
[37]	C	CS	Same context as [36].
[38]	C	E	Experiment involving 230 students in Germany, replication of prior experiment. Students to make decisions on investments in IT R&D initiatives.
[39]	J	E	Experiments involving students (one experiment 86 students, another 122 students).
[40]	J	CS	Case study of a public IT project in India. Main data source was 39 semi-structured interviews.
[41]	J	E	Experiments in an individualistic and a collectivistic culture studying aspects of bad news reporting. Data gathered from 354 students in US and Singapore.
[42]	J	S	Focus groups (11 practitioners participated), as well as questionnaire with 91 respondents.

[a]J=Journal; C=Conference, [b]CS=Case Study; S=Survey; E=Experiment

Table 4: Papers Included in this Literature Review

Appendix 2

Conference	Number of papers
Americas Conference on Information Systems, AMCIS	4
Annual Hawaii International Conference on System Sciences, HICSS	4
European Conference on Information Systems, ECIS	1
International Conference on Information Systems, ICIS	1
Pacific Asia Conference on Information Systems, PACIS	3

Table 5: Number of Conference Papers Included in this Literature Review

Journal	Number of papers
California Management Review	1
Communications of the ACM	1
Computers in Human Behavior	1
Data Base for Advances in Information Systems	1
Decision Sciences	2
European Journal of Operational Research	1
IEEE Transactions on Engineering Management	5
Information and Management	3
Information Technology & People	1
International Journal of Business Information Systems	1
International Journal of Information Management	1
International Journal of Managing Projects in Business	1
International Journal of Project Management	2
Journal of Computer Information Systems	1
Journal of Information Technology	1
Journal of Management Information Systems	2
Journal of the Association of Information Systems	2
MIS Quarterly: Management Information Systems	2

Table 6: Number of Journal Papers Included in this Literature Review