To Continue or Discontinue the Project, That is the Question

Completed Research Paper

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Abstract

Information systems and technology (IS/IT) projects are perceived as ventures that are prone to failure. An evaluation as part of IS/IT governance and control is highly important for stakeholders, to lessen the risk and the failure of such projects. However, decision-makers often encounter difficulties when evaluating and making decisions regarding the continuation of their projects. This study examines equivocal situations and the antecedents of dilemmas in project evaluations. A theoretically grounded research model postulates the influence of Content, Context, and Process of evaluation on the prevailing equivocal situations. The model, which is tested using PLS analysis, shows the impacts of the Challenges of project management, the Lack of standards, and the Sophistication of Technology on the extent of equivocal situations. This study is based on a survey of 111 projects and offers early empirical evidence attesting to the importance of well-defined project charters and senior management control in IS/IT governance.

Keywords: Evaluation, decision, dilemma, equivocal

Introduction

Gartner predicts information systems and information technology (IS/IT) expenditure will grow by 2.4% worldwide this year (http://www.gartner.com/newsroom/id/2959717). The top five expenditures will be dedicated to security technology, cloud computing, business analytics, application developments/upgrades or replacements, and wireless/mobile technology as forecast by the Computerworld (http://www.computerworld.com/article/2840907/forecast-2015-it-spending-on-an-upswing.html). With the current pace of competition and technology, organizations become reliant on the success of their IS/IT investments and portfolios. To govern and instigate the investments, IS/IT program management is carried out, so that the implementation can account for the organizational strategy (Lycett et al. 2004). IS/IT portfolios typically constitute several projects such that their implementation are easily susceptible to failure (Bannerman 2008; Parent and Reich 2009). IS/IT projects are infamous for their long duration, their requisite for large resources, and their complexity (Kipp et al. 2008). It is found that the occurrence of rare and unpredictable events caused by a lack of experience during the project execution are often destructive (Buhl 2012).

Pan et al. (2006) suggest the practice of evaluation can be used to govern the risk associated with the projects. Employing effective evaluations may contribute to higher project success rate. Farbey et al. (1999) described that an evaluation of information systems and information technology (IS/IT) is "*a process, or group of parallel processes, which take place at different points in time or continuously, for searching and for making explicit, quantitatively or qualitatively, all the impacts of an IT project and the programme and strategy of which it is a part*" (p. 190). The evaluation is conducted to: (1) provide an indication of the projects' progress and likely success; (2) appraise the worthiness of continuing the projects, and; (3) allow intervention of projects which deviate from their plan (Seddon et al. 2002; Snow and Keil 2002; Thompson et al. 2007). An evaluation, as part of decision-making process, is indispensable when justifying a choice of action (Gunasekaran et al. 2006; Pan et al. 2006; Seddon et al. 2002). The projects may proceed with several possible courses of action. This may include decisions ranging from continuing the projects as planned to abandoning the projects. Yet, "*one of the most difficult management issues that can arise in connection with IT projects is deciding whether to abandon or continue a project that is in trouble*", as commented by Keil (1995) (p. 422).

Despite the importance of evaluations when making purposeful decisions, organizations are suspected of having difficulty conducting evaluations of IS/IT projects in practice as it is problematic and challenging to discern the exact progress of the projects (Abdel-Hamid et al. 1993; Mähring and Keil 2008). Information associated with the projects may suffer from multiple interpretations and a lack of clarity; hence, it may arouse disagreement among decision-makers (Irani 2002; Smithson and Hirschheim 1998a). Decision-makers may interpret the projects' worthiness from unclear indications and get trapped in dilemmatic situations due to confusion and a lack of understanding of the project condition. The event and the process of evaluation to ascertain the state of the project is a reference point when deciding the continuation of IS/IT projects. (Snow and Keil 2002; Thompson et al. 2007). Decisions hence often rely upon personal experience and judgments (Bannister and Remenyi 2000) frequently made in so-called equivocal situations. Continuation decisions, especially the strategic one, are considered as crucial decisions and are likely to suffer from different interpretations of the underlying problems and exhibit characteristics of ambiguity, uncertainty, and conflict (Brown 2005). A further examination of the relation between the practice of evaluation would be invaluable and the occurrence of equivocal situations since continuation decisions are based on project evaluations.

Discussions on how equivocal situations emerge when evaluating the projects' next course of action are scant. Research examining antecedents of equivocal situations is still limited, especially in IS/IT project evaluations. Prior studies were particularly focused on examining the project's appraisal methods and pointed to the drawbacks of traditional capital budgeting techniques, stating they are the antecedents of equivocal situations (Keil and Flatto 1999; Taudes et al. 2000; Tiwana et al. 2006; Tiwana et al. 2007). The antecedents of equivocality and thus their importance in project evaluations are not well recognized despite the significance of equivocality in affecting continuation decisions as supported by recent studies (Sleesman et al. 2012).

To address this gap, we utilize a mixed-methods research design that combines qualitative and quantitative methods to glean insights into equivocal situations and the immediate antecedents of

equivocality in project evaluations. This option is mainly for developmental purposes, i.e., qualitative findings are used to develop the research model for further quantitative analysis (Venkatesh et al. 2013). Furthermore, to compensate for any limitations inherent in the qualitative part, quantitative evidence will provide powerful insights and generalizability of the overall results. Specifically, we endeavor to address the following research question:

What are the salient antecedents driving equivocal situations in IS/IT project evaluation and what are the insights that decision-makers need to take into account before embarking on such evaluations?

This study strives to close the gap and answer the aforementioned research questions with a theoretically grounded research model built upon exploratory qualitative studies: it will reveal the antecedents of equivocal situations and also offer early evidence of equivocal situations in project evaluations, based on a survey of 111 IS/IT projects.

Theoretical Foundation

Bowen (1987) introduced the term 'equivocal information' as the information for which multiple (positive or negative) interpretations can be constructed. Based on his Decision Dilemma theory, equivocal information may lead to escalation (Bowen 1987). In equivocal situations, decisions to escalate are likely to prevail as commitments of additional resources are believed to be economically prudent. Escalations occur when decision-makers believe that the information is inadequate to suggest whether additional investments will (not) fulfill expectations. An endeavor should be abandoned when the information is unequivocally negative whereby the effect of the endeavor would be so detrimental that even additional resources would not bring success (Bowen 1987). Studies in the field of experimental psychology reinforce Bowen's conjecture on equivocality, substantiating the effects of equivocality on escalation and delayed abandonment (Bragger et al. 1998; Bragger et al. 2003). Sleesman et al. (2012) find the significance of the "information set" construct, consisting of information acquisition and decision uncertainty, drawn from Bowen's view, as the determinant of escalation. Specifically, information acquisition is found to be one of the strongest inhibitors that will reduce the likelihood of escalation based on their meta-analysis.

According to Farbey et al. (1992), evaluations are beneficial since they allow organizations to control projects and to compare the merit and worth of different projects competing for limited resources. Once the projects or a portfolio of projects are justified, evaluations are needed to assure smooth realization of the resources devoted to them. Through the use of appraisal methods and techniques, evaluations allow decision-makers to benchmark and define costs, benefits, risks, as well as the implications of the IS/IT projects (Irani et al. 2005). Bowen distinguishes between unequivocal and equivocal situations as follow: *"..situations where the decision maker(s) have or are able to construct and commit themselves to credible criteria which can be fully and satisfactorily compared to available data, versus situations where the decision maker(s) do not have or are unable to create such criteria or do not have sufficient data to fully compare against the standards.*" (Bowen 1987) (p. 61). Putting Bowen's premise into an IS/IT evaluation context, the extent to which equivocality is hampering decision-makings may be determined by how evaluations are employed.

Several IS/IT evaluation studies have indicated comparable challenges to the equivocal situations (Irani 2002; Smithson and Hirschheim 1998b) described by Bowen (1987). Inclusion of multiple criteria may enhance the evaluation; yet, it can be problematic due to difficulties in identifying and measuring the wide-ranging criteria (Farbey et al. 1995; Irani et al. 2006). A mixture of techniques or a modified/hybrid technique is required for certain cases; yet, these evaluation methods demand extra knowledge and expertise from the decision-makers. An evaluation is also highly dependent on continuous data retrieval from the on-going projects; however, the process of collecting and reproducing the data in appropriate forms for decision-makers is challenging, time consuming, and costly (Brown 2005). A dearth of such data can lessen the support of evidence-based evaluations and may abate confidence in decision-making. Moreover, particular IS/IT projects attempt to implement systems and technologies which are novel, more complex, and more risky and therefore often subject to business judgments. The strategic value of these systems can significantly influence the conduct of evaluation, in terms of its complexity and difficulty (Farbey et al. 1993; Farbey et al. 1995; Fitzgerald 1998). As a result, personal experiences and judgments are often used to justify the continuation of IS/IT projects due to the prevailing equivocal situations in project evaluations (Bannister and Remenyi 2000). The antecedents of decision dilemmas

described by Bowen (1987) may be rooted in the challenges encountered when embarking on IS/IT project evaluations.

Early attempts to investigate the antecedents of equivocal situations within IS/IT fields, for instance, evaluation using the common capital budgeting techniques, propose it may systematically underestimate the true value of IS/IT projects (Keil and Flatto 1999). The real option theory was adapted as an alternative viewpoint for IS/IT investment and suggested the traditional cost-benefit project measurement should be balanced (Tiwana et al. 2006). Hence, equivocality in project evaluations is linked to the drawbacks of traditional capital budgeting techniques. Difficult quantification of benefits associated with the projects has made these techniques sometimes inadequate and are likely to create unbalanced evaluations.

Research Design

We designed two study phases. In the first phase, we utilized qualitative studies consisting of three main steps: literature review, expert interviews, and project case studies. The literature review was conducted to (1) examine the concept of equivocality and identify typical characteristics of equivocal situations; (2) identify the issues that lead to equivocal situations; and (3) develop initial categories of the antecedents of equivocal situations. The qualitative part was done mainly through interviews and discussions with experts and knowledgeable IS/IT-professionals in practice. Seven expert interviews were examined and ten interviews were analyzed within four project case studies.

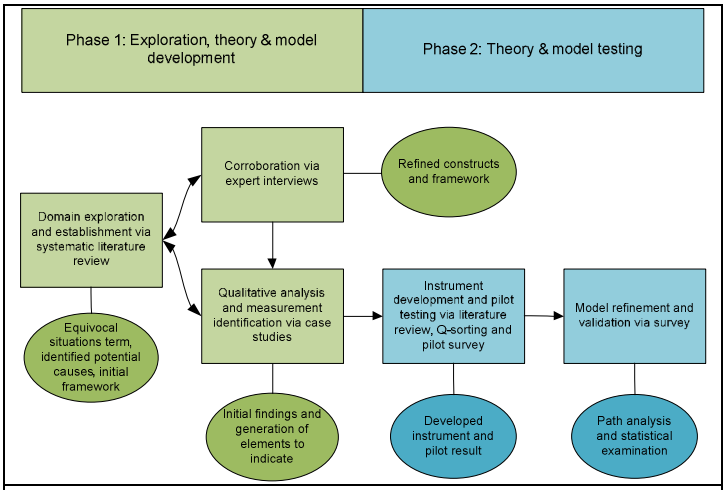

Figure 1. Research design

As depicted in Figure 1, the literature review and qualitative field studies were performed independently; however, the three steps were connected to each other as an iterative process between qualitative data collection and analysis (Eisenhardt 1989). We developed an initial framework that pulls together the characteristics of equivocal situations and the antecedents using evaluation frames based on IS/IT evaluation literature. The initial framework was used to guide the field studies and was refined as well during the iterative process. The interviews were recorded and transcribed. Identified issues were gathered in a pool and analyzed qualitatively in order to improve and align them with prior identified issues from the literature review. Throughout these steps the constructs were improved and the measurement model was developed. Additional literature was searched and examined for similar constructs. As a result, the qualitative data, combined with the insights from the literature allowed us to develop our theoretical model and hypotheses between the categories of antecedents and the equivocal situations. Following the qualitative part, we employed Q-sorting exercises and pilot testing. Then, we sampled 111 IS/IT projects. We assessed the measurement and the structural model using Partial Least

Square (PLS) analysis. Finally, we tested the hypothesized relationships and examined the results. Details of the two phases are described further in the next sections.

Exploration and Model Development

In this section we describe the first phase of our study starting with the literature review. The keywords (escalat* OR abandon*) AND (information equivocal*) were used to limit our area of interest in two databases: (1) EBSCOhost and (2) SciVerse Scopus. The chosen databases covered most of the top IS/IT and Business/Management journals (Barnes 2005; R. Kelly Rainer and Miller 2005). We perused the titles and abstracts of the publications and applied selection criteria to the search result, i.e., explanations or arguments concerning issues that lead to equivocality. We initially used twenty four publications to establish the term of an equivocal situation and a-priori antecedents of equivocal situations.

We then conducted semi-structured extensive expert interviews to corroborate our findings and enhance the priori antecedents of equivocal situations. After pilot testing the interviews to enhance the content and protocol, experts were recruited by sending invitations and initial web-based questionnaires. The experts were selected based on their involvement in IS/IT project evaluation, their experience within their industries, and their position in the organizations. The latter is required to obtain multiple perspectives from different experts. Project case studies were also conducted: interviews and discussions with knowledgeable IS/IT-professionals in practice to analyze the emergence of equivocal situations across projects and across stakeholders, and to derive potential elements as indicators of the antecedents. The project cases were selected according to the availability of particular roles, i.e., the person who monitors the project at a strategic level and the one who manages the projects at a technical level.

Brief overviews of the study and the interview content were sent to the participants before the interviews took place. We described the characteristics of equivocal situations drawn from the literature review, giving the participants an idea of equivocal situations during project evaluations. Subsequently, we asked the participants to recall a project which had encountered such problematic evaluation situations. The main question during both the expert interviews and the case studies was: why have such equivocal situations prevailed? We obtained detailed explanations for the situations and stories about the projects after interviewing them for around sixty to ninety minutes.

The recorded interviews were coded and analyzed based on the initial framework together with supplementary documents and research notes to increase the consistency of the collected information. ATLAS.ti was used to assist in the analysis and the synthesis of the qualitative studies including the literature review (Table 1 shows examples of the literature review). We interpreted the transcriptions through an iterative process in order to deeply scrutinize the issues pertaining to project evaluations. Through this process, we gained additional insights into equivocal situations and the antecedents.

Table 1. Examples of the coding process

Excerpt	Category and Code
"An equivocal situation refers to the extent that multiple and conflicting meanings exist among project participants… the existence of multiple and conflicting interpretations about an organizational situation"	Concept of Equivocality: Interpretation: Multiple and conflicting
"..large differences between the departments is a source of high equivocality based on the fact that the departments would have very different interpretations of the same ambiguous situation.."	Causes of Equivocality: Different frames of reference: Departmental difference

It is not easy to attain general consensus from the selected publications on the definition of equivocality. Most of them view equivocality to be analogous with ambiguity. For instance, Daft et al. (1987) write "*equivocality means ambiguity, the existence of multiple and conflicting interpretations about an organizational situation.*" Zack (2007) attempts to distinguish four related problems of 'knowing', these are equivocality, ambiguity, uncertainty, and complexity and describes equivocality as "*having several competing or contradictory conceptual frameworks*" and ambiguity as "*not having a conceptual framework for interpreting information.*" Additionally, Malhotra (2001) argues that the common

denominator of both terms is knowledge, as equivocality and ambiguity are both involved in managing and processing knowledge. We opt to use equivocality and ambiguity in the same manner as Bowen (1987) who states that an equivocal situation occurs "*in cognitively unstructured situations, where individuals have either insufficient or no knowledge of 'what leads to what',*" which is comparable to Zack's stance of ambiguity.

Moreover, Zack (2007) describes uncertainty as "*not having enough information*". In a competing argument, Frishammar et al. (2011) argue that uncertainty and equivocality are, to some extent, correlated and are similar as information is the vital key to reduce both problems; however, the information-processing activities are different. Uncertainty demands additional new information while equivocality necessitates the exchange of subjective information (e.g., views and judgements) among decision-makers (Frishammar et al. 2011). In his paper, Zack (2007) also points out the term complexity has "*more information than one can easily process.*" Later in our study, we postulate the potential influence of complexity, termed as Complexity in process, as the degree of equivocal situations occurring in project evaluations. This is grounded in prior studies, based on the literature review (e.g., Koufteros et al. (2005) remark that the presence of complexity in products and processes may induce confusion and ambiguity of product development) and our qualitative field studies.

An equivocal situation in IS/IT project evaluation is defined as the state experienced by decision-makers or evaluators due to lack of clarity and confusion when deciding whether to continue a project. This occurs when lack of knowledge or diverse knowledge exists regarding information surrounding the project, especially its past performance and future attainment. The situation is typically evident when multiple interpretations, conveyed meanings or perceptions toward the project, exist. Other indications of equivocal situations include the indeterminacy of analyzed data to support decision-making, the demand for 'richer' or different types of information, and the attainment of consensus by decision-makers when exchanging views and judgments through social interaction to settle disagreements.

We further underlined the characteristics of equivocal situations that can serve as indicators based on the literature review (an example of an excerpt is provided in brackets as the foundation for each indicator): (1) the existence of different interpretations toward the projects' status – ES1 ("*An equivocal situation refers to the extent that multiple and conflicting meanings exist among project participants.")* ; (2) the lack of clarity of the projects' condition – ES2 ("*Equivocality is defined as absence of clarity, or ambiguity, due to multiple interpretations of the same information.*"); and, (3) the indeterminacy of analyzed data to evaluate the projects – ES3 ("*Problems of ambiguity, subjectivity, and different frames of reference cannot be resolved simply by analyzing objective data.*"). Next, we adapted the items from Carson et al. (2012), Watts Sussman and Guinan (1999), Daft and Macintosh (1981), and Lim and Benbasat (2000) to align our items with the extant studies.

We examined IS/IT evaluation literature for evaluation constituents and their interactions to develop the theoretical model of equivocal situations, using content, context, and process (CCP) framework (Serafeimidis and Smithson 2000; Stockdale and Standing 2006). This idea was introduced by Symons (1991) who posited that conducting effective evaluation would require an understanding and a management of linkage between elements of content, context, and process of evaluation.

By reflecting on the CCP framework, Stockdale and Standing (2006) stated that "*evaluation is guided by addressing the questions: why is the evaluation being done? What is being evaluated? Who affects the evaluation? When is the evaluation taking place? And how is the evaluation to be carried out?*" (p. 1090). Additionally, Goldkuhl and Lagsten (2012), through their conceptual practice model of evaluation (CPME), describe that "*evaluation is conceived as a purposeful study of some evaluation object (evaluant) comprising 1) the generation of data of and from this object, 2) the selection and formulation of appropriate criteria to be used as yardsticks and 3) the matching of data and criteria in order to formulate evaluative statements and conclusions about the evaluation object*" (p. 6).

The above give a broad view of the typical frameworks employed by organizations for their decision-making. These frameworks suggest evaluation is a practice and a process to acquire additional knowledge related to an object that consists of several elements, for instance the criteria, the people, and the procedure, within the 'content', the 'context', and the 'process' of evaluation (Goldkuhl and Lagsten 2012). The broad view of these frameworks provides useful insights into the constituents of evaluation and the guidelines to establish key issues during evaluations (Stockdale and Standing 2006).

In the first phase, the categories of equivocal situation antecedents were developed through an iterative process between qualitative data collection and analysis. Codes and categories were developed, extended, and merged to improve the scope of the categories of the antecedents that serve as constructs in the quantitative examination (the second phase). The breadth of the constructs was redefined iteratively during this process. This resulted in a set of eight categories of antecedents of equivocal situations. Additional literature was also searched and reviewed for similar constructs and measurements to assist in the operationalization of the constructs. The terms, the characteristics, the antecedents, and the elements indicating equivocal situations reflect both the literature review and the results of the qualitative studies. It should be stressed that the development of the constructs and their measurements are limited to the issues that were identified during the qualitative studies and supported by the literature review.

We mapped the constructed categories of equivocal situations antecedents into the evaluation frame. Figure 2 depicts the connection between the evaluation frames and their corresponding categories of antecedents that potentially lead to equivocal situations. Through this perspective, we constructed a model that can be used to differentiate which evaluation constituents are substantially affected by the antecedents. Figure 3 presents the proposed research model. The model can reveal which evaluation constituent has the highest association with the occurrence of equivocal situations as well as the salient antecedents.

We modeled the Equivocal Situations construct as a dependent variable which is affected by the antecedents arranged in the Content, Context, and Process of evaluation. The Equivocal Situations (ES) construct refers to the extent to which evaluation of the project is hampered by equivocality. The frames of evaluation (Content, Context, and Process) are conceived as second-order constructs comprised of eight first-order constructs, i.e., the antecedent categories. Then, each identified issue of equivocality serves as a measured variable. Our prime objective was to substantiate the applicability of the theoretical model in predicting the occurrence of equivocal situations in IS/IT project evaluations given the extent of various antecedents within the Content, Context, and Process of evaluation. The hypotheses development is described in the following subsections.

Content	
Evaluation frame	**Identified cause**
• Object of evaluation	• Complexity in process • Sophistication of technology • Challenges in project management
• Establishment of evaluation criteria	• Lack of standards
Context	
Evaluation frame	**Identified cause**
• Influences from external environment	• Changes in external state
• Involvement of people as evaluators/decision-makers	• Different frames of reference
Process	
Evaluation frame	**Identified cause**
• Utilization of appraisal techniques and tools	• Failure of evaluation methods
• Making sense of the data	• Lack of evaluation data

Figure 2. Mapping the antecedents of equivocal situations

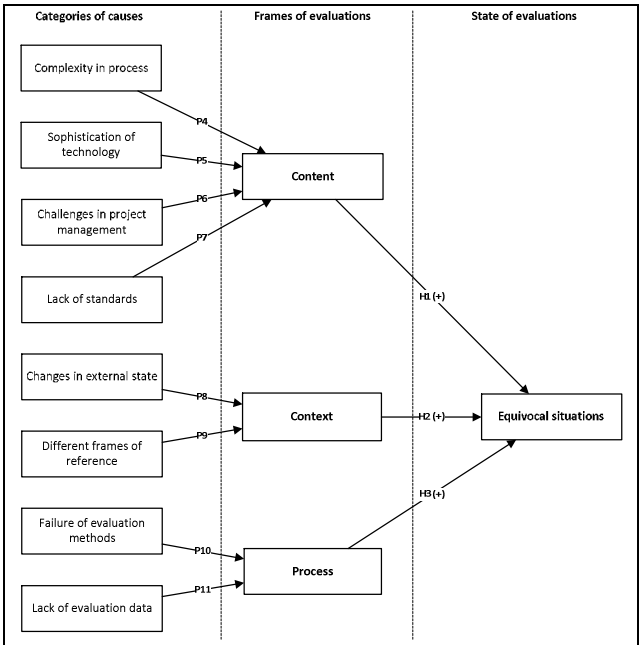

Figure 3. Theoretical model of equivocal situations

Content of Evaluation

On employing evaluation, a group of people or stakeholders who act as decision-makers or evaluators will define the object of the evaluation (i.e., an IS/IT project) and will use particular criteria to assess the object. This is termed as the content of evaluation or the constituents within the "*what*" of evaluation. The criteria could range from efficiency, effectiveness, to a more strategic consideration (Smithson and Hirschheim 1998b). We identified four problems related to equivocality within the content of evaluation. The first, the second, and the third problems are connected to IS/IT projects as the object of evaluation. Firstly, substantial intricacy in IS/IT developments could make it hard to estimate the precise status or progress of the projects. Secondly, the sophistication of the technologies or the systems being implemented could hinder evaluators in their ascertainment of the projects, for instance due to the lack of experiences or benchmarks. Thirdly, poorly managed projects could cause considerable difficulties in evaluations, for instance, due to the lack of proper reports from or monitoring by management teams. Moreover, the fourth problem is related to the use of particular evaluation criteria, for instance if there are neither clear evaluation criteria nor any agreements on such criteria among decision-makers. The constructed categories of equivocal situation antecedents within the Content of evaluation are:

1. *Complexity in process* (CP), defined as the extent to which the process of developing the intended IS/IT involves substantial intricacy. Most of the participants in the qualitative studies referred positively to the importance of this category during the interviews. We highlight several issues within this category; such as the large number of stakeholders involved in the project and the numerous sub-projects conducted. The latter implies a substantial inter-connection among projects and information systems as well. For instance, one of the project managers admitted *"[The situation] actually [occurred because] the [number] of stakeholders is too big to organize in that certain time limit."* Aligning with extant studies, we opted to use items which indicate multiple stakeholders involvement (CP1) and extensive information systems integration (CP2) (Ahmad et al. 2013; Watts Sussman and Guinan 1999; Weidong and Lee 2005). We hence propose that:

   P4: Complexity in the process has a significant positive contribution to the Content of evaluation.

2. *Sophistication of technology* (ST), defined as the extent to which the design of IS/IT products or solutions is considered innovative or advanced. Most of the qualitative studies' participants referred to this category during the interviews. They felt that the category had an effect on their situations; however they thought the category would be have been of less importance. We highlight some issues within this category such as involvement of novel concepts within the information systems and not well-proven information systems. As underlined by one of the project managers *"..no other project [is] comparable [to] our project in [the] whole [name of a region] [in terms of a theme of information systems]."* In line with extant studies, we opted to use items which indicate the involvement of novelty (SP1) and immaturity of technology (SP2) within the projects (Han and Huang 2007; Martinsuo and Poskela 2011; Wallace et al. 2004b) We hence propose that:

   P5: Sophistication of technology has a significant positive contribution to the Content of evaluation.

3. *Challenges in project management* (CPM), referring to the extent to which the IS/IT project encounters substantial management challenges. Most of the participants in the qualitative studies pointed to this category as the antecedent of the situations they had encountered. Almost all of the participants expressed agreement with and the importance of this category. We highlight some issues within this category; such as undefined project charters and lack of senior management control. For instance, one of the participants illustrated "*We [didn't have] very specific goals; such specific goals were not set." "..along the way [we saw] how it evolved, so [they] weren't very smart goals to start with."* In another part *"I made several attempts [at] the [project] to make [the] goals more specific, there are [a number of] reports about it, but it [did] not [really become] specific, no, it was still a bit [of a] vague project.*" According to extant studies, we opted to use items which indicate the project planning (CPM1) and monitoring (CPM2), communication among the project team (CPM3), and the clarity of the project charter (CPM4) (Keil et al. 2003; Schultz et al. 2013). We hence propose that:

   P6: Challenges in project management has a significant positive contribution to the Content of evaluation.

4. *Lack of standards* (LS), defined as the extent to which evaluators/decision-makers utilize evaluation criteria to ascertain the project value. Not all of the participants supported this category, both in terms of agreement and importance. However, participants in the expert interviews felt, to a certain extent, the presence of equivocal situations when evaluating the risks and benefits compared to evaluating costs. For instance, one of the project managers emphasized *"..the outcome of the project was not [easy to measure] [in terms of] the right outcome, because it was quite [an] innovative project. When you [are] working on [a name of information systems theme], you cannot make a simple decision based on money, because your return of investment in this certain moment is quite unclear; that is the problem with innovation, based on which outcome you [will] make your decision to [either] stop the project or to go along with it?"* Following Bowen's (1987) argument concerning the Lack of standards in equivocal situations and in line with extant studies, we opted to use items which indicate the clarity of decision criteria (LS1), the credibility of the criteria (LS2), and the agreement of such criteria (LS3) (Hammedi et al. 2013; Martinsuo and Poskela 2011; Schultz et al. 2013). We hence propose that:

   P7: Lack of standards has a significant positive contribution to the Content of evaluation.

Thus, we hypothesize that, in the context of project evaluations, H1: the antecedents within the Content of evaluation are positively associated with the occurrence of an Equivocal situation.

Context of Evaluation

The CCP framework also suggests that evaluations will be influenced by the contextual setting, such as the projects' external environment and the people who handled the evaluations. This is termed as the context of evaluation. IS/IT projects are sometimes conducted to fulfil diverse objectives; the context within the evaluation frame captures the external environment dynamics and the various decision-makers' influences toward the projects, which could hinder insightful evaluations. We identified two problems related to equivocal situations within the context of evaluation. Firstly, substantial changes or environmental dynamics surrounding the projects could confound the evaluations and the subsequent decisions. Secondly, different perspectives of people as evaluators may further complicate the evaluations. The constructed categories of equivocal situations antecedents within the Context of evaluation are:

1. *Changes in external state* (CES), referring to the extent to which the project is affected by organizational environmental dynamics. The qualitative studies' participants supported this category a little, as the antecedent of problematic situations they had experienced. We highlight some issues within this category; such as corporate politics and substantial external changes. For instance, one of the corporate managers expressed "*..there is a lot of political pressure also in the project [which] makes people quite nervous.*" Aligning with extant studies, we opted to use items which indicate the external changes within the law or regulations (CES1), organizational structure (CES2), and resources allocation (CES4) as well as political dynamics during the project (CES3) (Carson et al. 2012; Han and Huang 2007; Wallace et al. 2004a; Wallace et al. 2004b). We hence propose that:

   P8: Changes in external state has a significant positive contribution to the Context of evaluation.

2. *Different frames of reference* (DFR), referring to the extent to which evaluators/decision-makers have diverse viewpoints when evaluating the project. Many of the qualitative studies' participants implied this category is the antecedent of problematic situations. Yet, they did not support this category so much as one of the antecedents in the discussion, both in terms of agreement and importance. We highlight some issues within this category; such as difference in background, skill and ability. For instance, one of the project boards stressed *"The project was a big project with a lot of stakeholders from different companies with different approaches and different views."* In line with extant studies, we opted to use items which indicate the background of the decision-makers (DFR2) and the decision-makers' complementary skill or ability when conducting an evaluation (DFR2) (Lee and Xia 2010; Van Doorn et al. 2013). We hence propose that:

   P9: Different frames of reference has a significant positive contribution to the Context of evaluation.

Thus, we hypothesize that, in the context of project evaluations, H2: the antecedents within the Context of evaluation are positively associated with the occurrence of an Equivocal situation.

Process of Evaluation

Furthermore, the term 'process of evaluation' refers to the constituents within the "*how*" of evaluation. The process represents the utilization of techniques and tools and the analysis of the extracted data in order to formulate verdicts regarding the evaluation object. The methods, together with the data, play an important role in suggesting the next course of action. The identified problems of equivocality within this frame are the failure of evaluation methods and problems with the evaluation data. For instance, the absence of evaluation procedures or adequate data to support decision-making would increase the likelihood of equivocal situations emerging. The constructed categories of equivocal situations antecedents within the Process of evaluation are:

1. *Failure of evaluation methods* (FEM), referring to the extent to which evaluators/decision-makers apply techniques or tools to evaluate the projects. The participants did not support this category so much in general, both in terms of agreement and importance. We found minimum use of formal evaluation methods. For instance, one of the project managers admitted "*..so I tried to balance it, actually it's a combination of the impact of the problem and the size of the problem, it's not an official tool but that's what I did*." Another participant stated "*Yeah, so we have ways to assess the planning, ways to assess, uhm, function points, so this influences [the situation we had] and [the methods are] also quite important, of course the method how you gain your information determines, uhm, its quantifiability, its robustness*." While we could not reveal the issues fully within this category, we suspect that the absence of evaluation methods can induce an equivocal situation. We decided to maintain this antecedent since the category was revealed from the thematic inductive method in our previous literature review. Aligning with extant studies, we opted to use items which indicate the application of a predefined procedure to evaluate the projects (FEM1) and the application of specific evaluation techniques or tools (FEM2) (Martinsuo and Poskela 2011). We hence propose that:

   P10: The failure of an evaluation method has a significant positive contribution to the Process of evaluation.

2. *Lack of evaluation data* (LED) referring to the extent to which evaluators/decision-makers use data surrounding the project to support decision-making. The qualitative studies' participants supported this category to a degree as the antecedent of problematic situations they had encountered. We highlight some issues within this category; such as availability, sufficiency, and the provision of data/information. For instance one of the corporate managers stressed "*..there was an evaluation moment but there [were] really very [few] materials available to make the, uhm, that you could use to make a decision*." Further to extant studies, we opted to use items which indicate the accuracy (LED1), the availability (LED2), and the level of detail of the data (LED3) when evaluating the projects (Gattiker and Goodhue 2005; Karimi et al. 2004). We hence propose that:

   P11: Lack of evaluation data has a significant positive contribution to the Process of evaluation.

Thus, we hypothesize that, in the context of project evaluations, H3: the antecedents within the Process of evaluation are positively associated with the occurrence of an Equivocal situation

It is important to highlight that the above description of our hypotheses development is complemented by an illustration of constructs-measurement development and the references to operationalize the constructs. The provided quotations in each category of equivocal situation antecedent are by no means exhaustive but intended to provide exemplars of the development process.

Model Examination

We constructed the measurement items by adopting the scales that were aligned with our qualitative findings and relevant within our constructs' definitions. The existing scales were reworded to ensure suitability with the research domain. We utilized two rounds of Q-sorting exercises to assess validity of our constructs by following the procedure set by Moore and Benbasat (1991). These steps were chosen to derive proper measurement items in terms of their reliabilities and validities for each antecedent category.

An online card sorting website was used to conduct the exercises so that they could be conducted remotely and simultaneously. After a brief introduction of the study, the participants sorted or grouped the randomized-items into categories. A discussion took place after around 20 to 30 minutes of doing the exercises per participant. The raw data was downloaded from the website and analyzed according to the procedure. Several items, which were frequently misplaced and deemed as indeterminate, were reworded. Several items were flagged as well due to their potential lack of distinctiveness and convergence. The final modifications were employed in the second round.

An average "hit ratio" of 86 per cent, an average raw agreement of 85 per cent, and an average Kappa of 83 per cent were attained after the second round. A Kappa value of 0.65 or higher is considered as an acceptable agreement according to Moore and Benbasat (1991). The results of these sorting exercises suggest the items tap adequately into the intended constructs. This also ensures substantive validity to continue to the next pilot test.

We developed a survey questionnaire based on the results of the Q-sorting exercises. The research team examined the initial draft of the questionnaire and made several modifications to make sure that the content was clear and easy to understand. A pilot study was performed to obtain feedback and initial analysis of the measurements. No substantial changes were made during this pilot. Moreover, the initial analysis indicated good measurement quality. The aforementioned processes, i.e., the qualitative part and the instrument development, provide substantial content validity to the constructs and the instrumentation before testing them empirically. The final questionnaire was distributed as a web link and answered using an online tool. We approached potential participants by (1) sending an invitation to personal contacts; (2) sending the invitation to several relevant LinkedIn groups; and (3) requesting IS/IT professional organizations to partake in our survey. Two IS/IT professional organizations agreed to post invitations on a website and sent invitations via newsletters/emails. Since we distributed the survey mainly over the internet to unconfined groups, the actual response rate is hard to calculate. Based on a report from the survey's web link, around 252 people accessed the survey and 111 participants (44%) filled in the survey fully. Calculating Cohen's power of regression analysis at $\alpha=0.05$ with a medium effect size ($f^2=0.15$) and a power level of 0.8, a sample of at least 84 was needed (Hair et al. 2014).

The survey asked participants to recall a recent review or evaluation of a challenging IS/IT project they had been involved in and to keep this one project in mind throughout the questionnaire. We assessed the extent of the equivocal situation and each of the antecedents using the items discussed in the qualitative part. We employed the 7-point Likert scale that ranges from (1) Not at all and (7) Very great extent, to each of the measurements.

The profiles of the survey respondents are described as follows: mostly senior IS/IT managers or CIO (23%), project managers (21%), IS/IT managers (19%), and the rest includes non-senior or non- IS/IT managers (e.g., marketing, finance) and other roles such as consultants, auditors, etc. The top three sectors the respondents work for are: banking (financial) (16%), IT services (14%), and Government (13%). More than half of the respondents (52%) work in organizations which are considered larger than average. The respondents mostly have more than 10 years of experience in their industries (58%). The projects profiles are as follows: the top two primary purposes of the projects are business transformation (20%) and strategic system (19%). The project types consist of packaged software implementation (35%), in-house new development (30%), and enhancement of existing software/systems (15%). 69% of the projects are considered larger and 70% are of longer duration than other IS/IT projects undertaken by the organizations. Concerning the decision of evaluation, 18% of the projects are suffering total and substantial abandonment. 51% of the projects are categorized as escalated, and another 26 % of the projects are continuing as planned. Around 40% of the projects are not over budget, 23% are not behind schedule, and 32% are not lacking in requirements or required specifications. Most of the projects are, to a certain extent, suffering from over budget (60%), behind schedule (77%), and lack expected requirements or specifications (68%).

Considering the nature of our study, we utilized PLS analysis using SmartPLS 2.0 (M3) (Ringle et al. 2005). The PLS technique is well suited for theory building and prediction as well as handling mixed reflective and formative measures (Ringle et al. 2012). PLS analysis was used to test the measurement model and to analyze the direction and strength of each relationship. We modeled the indicators of equivocal situations as reflective measures. Regarding the antecedents of equivocal situations, we modeled the indicators as formative measures. This was decided for the following reasons: (1) the

antecedents of equivocal situations are grounded using a thematic inductive method by means of a literature review followed by exploratory qualitative studies. The employed thematic method results in constructs that are comprised of varied observable elements; (2) the indicators are, to a reasonable extent, expected to cause variance in the latent constructs since the antecedents of equivocal situations are conceived to be composite constructs that give, when bundled, sets of different detailed facets of particular antecedents (Cenfetelli and Bassellier 2009); (3) it is beneficial to use formative constructs since the contribution of individual indicators can be further assessed by evaluating their path weights (Esposito Vinzi 2010). Furthermore, we expected that the indicators of the antecedents of equivocal situations will have less covariation within the same latent constructs.

As to the reflective construct, the suggested threshold values of the indicator loadings, the average variance extracted (AVE), composite reliability, and Cronbach's alpha are 0.70, 0.50, 0.70, and 0.70, respectively (Hair et al. 2010; Hair et al. 2011). All the constructs of the equivocal situation (ES) values are higher than the suggested threshold (Table 2). This suggests a good quality of measurement. We analyzed the measurements of the formative constructs by means of examining the threat of multicollinearity. We generated the variance inflation factor (VIF) and the matrix of construct correlation values. None of the correlations between constructs are above 0.71 (Andreev et al. 2009). Table 3 shows the maximum variance inflation factor (VIF) is 2.73. The result suggests that multicollinearity is not a problem in our study, even with a more restrictive VIF value of 3.30 (Hair et al. 2010; Hair et al. 2011; Petter et al. 2007). The aforementioned correlation result gives, to a certain extent, discriminant validity to the constructs (Andreev et al. 2009).

We assessed the formative measurements by examining the indicator weights (obtained by running the PLS algorithm) and their statistical significance. The setting of this procedure was as follow: using the path weighting scheme, using the z-standardizes data metric option, setting the maximum number of iteration to 300, setting the stop criterion to 1·10-5, and setting +1 as initial value for all outer weights. To assess the statistical significance of the measurements in the model, we set the number of bootstrap samples to 5000 and the number of cases was equal to the original sample as suggested by Hair et al. (2011). We set for 'individual sign changes' in the bootstrap setting (Henseler et al. 2009). Table 3 provides the weights of each item and their statistical significance.

Several items were reported as not significant. Following Hair et al.'s (2014) recommendation when assessing formative indicators, we examined the outer loadings of the items further. It was found that nearly all the outer loadings were equal or above 0.5 and significant, except for CP1. The outer loading for CES3 was also slightly below 0.5 but it was significant. We decided to retain CP1 since the item represents different facets of the construct of interest and its removal would also compromise the construct's content validity. Finally, we opted to maintain the indicators since their existence and relevance to the constructs resulted from/ were empirically supported by extensive qualitative studies.

The weights show the importance of each of the indicators in establishing the associated latent constructs. In the analysis, within the Content of evaluation, equivocal situations are rooted in: (1) the Complexity in process; this antecedent is highly associated with projects which involve extensive integration with other systems (CP2); (2) the Sophistication of technology; this antecedent is highly associated with projects which involve novel concepts (ST1); (3) the Challenges in project management; this antecedent is highly associated with projects which lack adequate control by senior management (CPM2); (4) the Lack of standards; this antecedent is highly associated with the lack of credibility of the evaluation criteria (LS2). Within the Context of evaluation, equivocal situations are rooted in: (1) the Changes in external state; this antecedent is highly associated with the shift in organizational priorities (CES4); (2) the Different frames of reference; this antecedent is highly associated with the lack of complementary skills/abilities among decision-makers (DFR2). Within the Process of evaluation, equivocal situations are rooted in: (1) the Failure of evaluation methods; this antecedent is highly associated with the absence of predefined evaluation procedure(s) (FEM1); (2) the Lack of evaluation data; this antecedent is highly associated with the unavailability of essential data to support decision-making (LED2).

Furthermore, we found the CES1 (changes in law, rules or regulations) and FEM2 (application of evaluation method or tool) weights have negative signs (CES1 has a significant weight). We examined the correlations between the CES and FEM indicators. We found that the correlations were all positive. The highest CES and FEM correlations are 0.31 (CES1 and CES4) and 0.80 (FEM1 and FEM2) respectively. According to Cenfetelli and Bassellier (2009), co-occurrence of negative and positive indicator weights

can take place when a suppressor effect is involved. A change in sign might be the result of the magnitude of correlations among the formative indicators and a negative CES1 sign can be expected when CES2 (changes in organizational structure), CES3 (negative effect of politics), and CES4 (changes in organizational priorities) are equal; increased amounts of CES1 (changes in law, rules or regulations) will reduce the degree of the CES construct. A similar interpretation can be applied to FEM as well.

Table 2. Loadings and quality criteria for reflective measure

Construct	Item	Standardized Loading	AVE	Composite reliability	Cronbachs Alpha
Equivocal situation (ES)	ES1	0.81	0.67	0.86	0.76
	ES2	0.86			
	ES3	0.78			

Table 3. Variance Inflation Factor (VIF) and weights for formative measures

Construct	Item	VIF 1st Order	VIF 2nd Order	Weight	Outer loading
Complexity in process (CP)	CP1	1.06	1.13	0.22	0.44
	CP2	1.06		0.93***	0.98***
Sophistication of technology (ST)	ST1	1.12	1.18	0.89***	0.97***
	ST2	1.12		0.25	0.54*
Challenges in project management (CPM)	CPM1	1.46	1.37	0.22	0.70***
	CPM2	1.44		0.56***	0.84***
	CPM3	1.44		0.22	0.70***
	CPM4	1.27		0.34**	0.65***
Lack of standards (LS)	LS1	1.96	1.37	0.04	0.70***
	LS2	2.53		0.74**	0.98***
	LS3	2.69		0.28	0.87***
Changes in external state (CES)	CES1	1.13	1.11	-0.45**	-0.12
	CES2	1.24		0.36*	0.66***
	CES3	1.13		0.23	0.48**
	CES4	1.33		0.74***	0.80***
Different frames of reference (DFR)	DFR1	1.00	1.11	0.50**	0.54***
	DFR2	1.00		0.84***	0.86***
Failure of evaluation methods (FEM)	FEM1	2.73	1.07	1.06**	0.99***
	FEM2	2.73		-0.08	0.76***
Lack of evaluation data (LED)	LED1	2.10	1.07	0.23	0.68***
	LED2	1.26		0.78***	0.95***
	LED3	1.05		0.16	0.64***

Bootstrapping results (n = 5000)
*Significant at the 0.10 level (two-tailed)
**Significant at the 0.05 level (two-tailed)
***Significant at the 0.01 level (two-tailed)

We modeled the Content, Context, and Process within the evaluation frames as second-order superordinate constructs. These second-order aggregate constructs were treated as hierarchical components using repeated indicators from their respective constituent antecedents of equivocal situations. Thus, we ran the PLS algorithm to directly measure the higher-order constructs by employing all the items of their lower-order constructs (Cenfetelli and Bassellier 2009) and examined threat of multicollinearity as well. The maximum VIF is 1.37, which is still below the 3.30 threshold. Figure 4 summarizes the path coefficients and their significance within the structural model. This specifies that all the hypotheses are supported.

R^2 (coefficient of determination) is one of the criteria used to assess the structural model. We ran the PLS algorithm with the aforementioned settings and obtained a value of 0.47 for the endogenous latent variable of equivocal situation (ES). This value suggests a fairly moderate level (Hair et al. 2011). Moreover, we ran the blindfolding procedure to compute the cross-validated redundancy index for the equivocal situation construct (ES). The omission distance was set to 7, so that the computation would not yield an integer. The Stone-Geisser Q^2 for this construct is 0.31. A value above 0 (zero) indicates the model's overall predictive relevance and an acceptable model performance (Hair et al. 2011).

We computed effect size (f^2) and predictive relevance (Q and q^2). The Content of evaluation has moderate to strong effect size and fairly moderate degree of predictive relevance. Conversely, the Context and Content of evaluation have rather weak effect size and predictive relevance. The effect size f^2 and the relative impact of latent variables on the predictive relevance substantiate the impact of Content of evaluation, which consists of ST, CPM and LS, toward an equivocal situation (ES). At this point, the model and the measurements have undergone the assessment procedure. The results indicate that the measurement model and the structural model are reliable and valid. The model underlines the provision of a conceivable explanation for the equivocality antecedents and the possibility to predict equivocal situations during IS/IT project evaluations. Accordingly, proper implications which explain and forestall the occurrence of an equivocal situation can be derived from the results.

The use of formative measurements allowed us to determine the impact of each separate antecedent on the endogenous construct of an equivocal situation. A combination of this impact with the index value of each indicator produces a so-called importance-performance matrix (Hair et al. 2014). Given a certain endogenous latent variable, this analysis produces a priority map, for organizations, of different project evaluation areas that need attention (Hair et al. 2014). The analysis was conducted by rescaling the indicators to a range of 0 to 100. This step produced the performance score of each latent construct. The next step was combining the performance score with the total effects of each latent construct in the structural model and plotting these two scores as a matrix. Figure 5 visualizes the relative performance and importance among antecedents of equivocal situations. To lessen the equivocal situation level, actions should be taken along the lines of relatively high importance and performance. An importance score in the matrix indicates a change in equivocal situation as a result of an increase of one point within the antecedents. The performance score indicates the potential for improvement. In our case, the higher the performance score, the more room for further improvement. CPM, which lies on the furthest right side of the plot, indicates a high-impact antecedent to the occurrence of an equivocal situation; thus, it is important to devote exceptional attention to this antecedent. ST, on the other hand, indicates organizations may need to improve the evaluation and prevent equivocal situations by unraveling the issues within this antecedent.

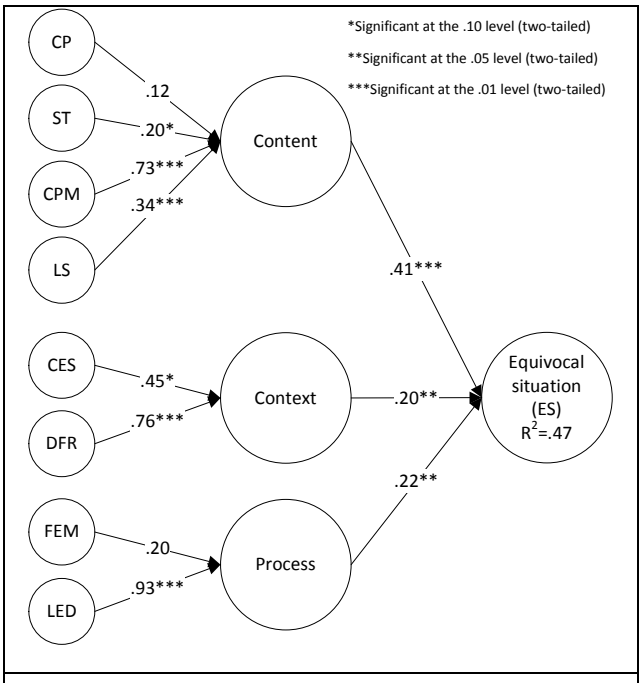

Figure 4. PLS results (N=111)

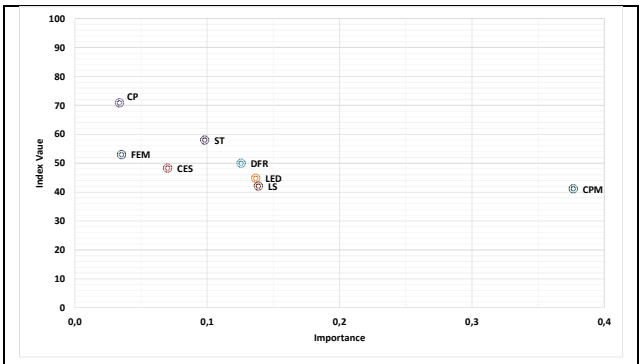

Figure 5. Importance-performance matrix

Discussion

Our empirical examination shows three interesting points. First, the theoretical model seems to be fairly robust in predicting the occurrence of an equivocal situation since all the hypotheses are supported by the empirical data. The empirical findings from our quantitative part indicates significant positive relationships between the evaluation frame constructs of Content, Context, and Process (comprised of eight antecedents) and the equivocal situation construct. Moreover, nearly all the antecedents have significant positive contributions to their corresponding evaluation frame constructs, except for P4 (Complexity in process – CP) and P10 (Failure of evaluation methods – FEM). These two antecedents have positive contributions but not significant according to our data. The result implies that the antecedents within our evaluation framework lead to the occurrence of equivocal situations during IS/IT project evaluations. Conceivably, we recommend these antecedents should be taken into account as an early warning sign of an equivocal situation before embarking on or during an evaluation. Employing project evaluations that suffer from these signs will result in decision-makers encountering dilemmas and they will be hindered in making informative and purposeful decisions.

Second, we further reveal distinct impacts by different categories of antecedents on the occurrence of an equivocal situation. The strongest source of an equivocal situation within the Content of evaluation is the Challenges of project management. This category includes (1) inadequate senior management control over project execution (CPM2) and (2) the vagueness of the project charter as the basis for managing the project (CPM4). CPM2 and CPM4 are the two-top issues based on the weights. The strongest source of an equivocal situation within the Context of evaluation is the Different frames of reference. This category includes (1) difficulty in gaining mutual perception due to different backgrounds (DFR1); and, (2) the lack of complementary skills/abilities among decision-makers to proceed with effective evaluation (DFR2). DFR2 is the top issue based on the weights. The strongest source of an equivocal situation within the Process of evaluation is the Lack of evaluation data. This category includes the unavailability of data to support the evaluation and decision-making (LED2). LED2 is the top issue based on the weights.

The emergence of Challenges in the project management category reminds us of the importance of (basic) IS/IT project management. Although it may be seen as an old problem, the process of managing IS/IT projects still seems to be a tough practice such as the lack of senior management commitment toward

IS/IT investment (CPM2). Yet, these issues have severe consequences for project evaluations and subsequent decisions. Quoting Nolan and McFarlan (2005), "*A lack of board oversight for IT activities is dangerous; it puts the firm at risk in the same way that failing to audit its books would.*" This underlines the urgency to raise the awareness and attention amongst top management toward critical IS/IT investments, especially projects which involve: (1) novel concepts and technologies (ST1) and (2) extensive integration with other systems (CP2), as well as to increase the understanding of their role in attaining unequivocal evaluations. This could be realized by setting the details of the project charter (CPM4) properly, together with the people within the project management structure and by improving the effectiveness of the utilized framework or tools to control such projects.

Improving the governance framework, like COBIT, which integrates value generation and risk management with IT governance and management, and of IS/IT development methodologies like Agile, can enhance monitoring, evaluating, and delivery of IS/IT projects (De Haes et al. 2013; Nelson and Morris 2014). Wu et al. (2011) suggest the utilization of untraditional project management practices for innovative and large IS/IT projects which involve high levels of uncertainty. A dual project management life-cycle process is proposed to effectively manage the 'radical innovation points' and to achieve project success (Wu et al. 2011).

In relation to the antecedent of Different frames of reference, studies related to top management teams stress the potential problems of increasing diversity in a group of decision makers (e.g., Knight et al. (1999). Despite the advantages of diversity, such as providing wide-ranging alternative actions for the projects, diverse backgrounds, such as functional backgrounds, could complicate a decision-making process if it is not handled carefully (Knight et al. 1999). Moreover, studies within group decision-making may offer useful techniques for enhancing group decisions when facing equivocal situations, to support or as an alternative to: Dialectical Inquiry, Devil's Advocacy, and Consensus. Several studies suggest the use of Dialectical Inquiry to provide critical evaluations and solve ambiguous problems (Priem and Harrison 1995; Schweiger et al. 1986). This technique could also be used to bring out concrete alternatives for certain project decisions such as project modification.

Third, we demonstrate from the analysis that the model shows a moderate level of R^2 and acceptable predictive relevance and performance. The applied formative measurement allows for individual item assessment that identifies the salient issues within each of the categories of antecedents. The performance-importance matrix shows the importance of different antecedents of equivocal situations and the potential antecedents that warrant remediation and improvement. Positive antecedent effects means that lessening specific issues within the identified antecedents will help organizations to forestall the prevalence of equivocal situations when employing project evaluations.

The revealed antecedents of equivocality in project evaluations inform us on the potential issues surrounding project executions and evaluations which may lead to ill-defined situations. The situations are posited to hinder purposeful decisions; however, the actual impacts of equivocal situations in project evaluations toward decisions and project implementation remain a puzzle and need solving. Despite experimental studies which address the relation between equivocal information and decisions to escalate or to delay abandonment (e.g., Pfeiffer et al. (2007)) very little is known about equivocal situations in project evaluations and their consequences. Moreover, there is still a lack of theory to support the relation between equivocal situations and project outcome.

Conclusion

This study offers a meaningful contribution to research and practice. Although it is recognized that equivocality plays an important role in affecting the continuation of IS/IT projects, the immediate antecedents of this phenomenon are not well established. To address this gap, this study focuses on developing a model that can be used to predict an equivocal situation when evaluating and deciding on the continuation of an IS/IT project and to identify the salient drivers. By subscribing to Bowen's decision dilemma theory, this study contributes by synthesizing and consolidating extant literature on IS/IT project continuation decisions and equivocality. The study starts with an exploratory phase aimed at inductively deriving the antecedents of equivocal situations. Current knowledge is advanced by using an evaluation frame drawn from IS/IT evaluation literature; a conceptual model is explicated that captures the key issues of project evaluation and aligning these issues with the identified antecedents of equivocal

situations. The thorough literature review and the complementing qualitative field studies provide firm foundations for the proposed theoretical model. From a theoretical perspective, this study contributes to the development and validation of the instruments to measure equivocal situation and their antecedents.

The quantitative analysis shows the path coefficients and their significance for each of the antecedents. It is revealed that the salient drivers of equivocal situations lie within the Content, Context, and Process of evaluation. Specifically, this points to the involvement of sophisticated technologies in the projects and the challenges to implement the projects. These issues make IS/IT projects, as evaluation objects, harder to evaluate and hinder decision-makers in achieving the evaluation goals. Likewise, within the Content of evaluation, the establishment of evaluation criteria is also found to be one of the salient drivers inducing equivocality. Within the Context of evaluation, the influences from the external environment and the involvement of diverse people in an evaluation are shown to confound project evaluations as well. Within the Process of evaluation, 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.

Additionally, we offer invaluable insights for practitioners who conduct IS/IT project evaluations. The weights of the individual items show the importance of individual issues within each antecedent category that can lead to equivocal situations. The matrix provides an insight of the highly relevant antecedents and the potential areas which could be remedied and improved by organizations in order to lessen the emergence of an equivocal situation when embarking on project evaluations.

A limitation entailed in this study concerns heterogeneity that may hamper PLS analysis. Additional studies should focus on analyzing the potential heterogeneous groups within the data. Furthermore, the data collected via the survey may be biased; therefore, conclusions based on this study must be interpreted with caution. Finally, this study sheds some light on the underlying mechanisms of equivocal situations and helps practitioners to assess and forestall equivocal situations when evaluating and deciding on the continuation of their IS/IT projects.

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