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THE IMPACT OF RISK CHECKLISTS ON PROJECT MANAGER’S RISK PERCEPTION AND DECISION-MAKING PROCESS

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ABSTRACT
Risk checklists are often used to assist project managers to identify the potential risks in software projects. Previous study found that the checklists can help managers identify more risks, but the number of risks identified doesn’t significantly correlate with managers’ decision. This might because some risk items could play more important role than other risk items in manager’s decision-making process. This paper uses a survey-based research method to investigate the weight of different risk items on project manager’s risk perception and decision-making. This research will be carried out in two phases: 1) Pilot study. A questionnaire will be developed and administrated to college students. The result will be analyzed and research instrument will be modified based on the feedback. 2). Formal study. A group of IT project managers will be recruited and the revised instrument will be sent to them for participation. A detailed research design is presented.

Keywords
Software project management, risk checklists, risk perception, decision making.

INTRODUCTION
Software projects have posted many challenges to project managers. Based on the Standish report (StandishGroup 2001), while the success rate of projects increased from 16% to 28% from 1994 to 2000, the failed and challenged projects still account for 72% of all projects. One particularly disturbing form of failure is escalating projects in which managers become committed to a failing course of action despite negative information about the project and its prospects for success (Keil et al. 2000).

Effectively managing risks has been promoted as one approach to reduce software project failure (Boehm 1991; Ropponen and Lyytinen 1997). If software practitioners or project managers perceive the risks associated with a particular project, they would be less willing to commit themselves and their organizations to failing courses of action and hence make better decisions concerning project continuation.

There are various tools for software risk management, including risk lists, risk-action lists, risk-strategy models, and risk-strategy analyses (Costa et al. 2007; Jiang et al. 2001; Li and Liao 2007; Na et al. 2007; Ngai and Wat 2005). The simplest form is the risk checklist that software practitioners or project managers can use to quickly identify and assess risks in their projects. Such risk checklists contain a set of generic risk items with brief descriptions that help identify possible sources of risk and develop awareness of the specific risks associated with a project. The expectation is that checklists will help software practitioners identify more risks and make better continuation decisions.

There have been a number of studies offering a variety of checklists for software projects (Boehm 1991; Ropponen and Lyytinen 2000; Schmidt et al. 2001; Wallace and Keil 2004). Keil et. al 2008 conducted an empirical study on how risk checklist (Schmidt et al. 2001) influence software practitioners’ perception and decision-making. They found that risk checklists can help project managers identify more risks in the projects. However, number of risks identified didn’t affect the managers’ decision making. This paper argue that a risk item may weight more than another risk item, thus number of risks identified may not correlate with project managers’ decision. This paper extends Mark et.al 2008’s study to investigate the impact of the weight of risk items on project manager’s decision making.

The next section presents relevant literature in the area of software risk management, especially focusing on risk checklists. Following this, we present our research hypotheses. We introduce the proposed research design in the next section.

SOFTWARE RISK MANAGEMENT
Risk management advocates claim that actions can be taken to reduce the chance of failure by identifying and analyzing project risks. Software risk management attempts to identify, address, and eliminate risks before they become threats to a
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project. Practitioners are generally advised to follow two stages: risk assessment and risk control (Boehm 1991). Wallace et al. (Wallace et al. 2004) identified six dimensions of software project risk which provided better understanding of software project risks and how they can affect project performance. Software risk assessment requires identification of the risk items (or factors) that must be controlled to keep the project on track (Boehm 1991; Fairley 1994; Schmidt, Lyytinen et al. 2001). Subsequently, software practitioners apply various risk resolution tactics to address and control the identified risks (Boehm 1991; Fairley 1994).

Theoretically, a risk is composed of two components: (1) the likelihood that a loss will occur, and (2) the significance or magnitude associated with the possible loss (Barki et al. 1993; Boehm 1991; Keil et al. 2000). The ways in which the two risk components are assessed vary between approaches. At one extreme are highly quantitative approaches that seek to arrive at probabilistic estimates of risk and absolute magnitudes of potential losses (Boehm 1991). At the other extreme are purely subjective assessments of risk (Sitkin and Weingart 1995) which may or may not be expressed in numeric terms (e.g., a 5-point scale for the likelihood of a risk materializing) as the involved practitioners consider, assess, and prioritize risks without use of formal metrics. Independent of which approach practitioners adopt, risk assessments may affect both their perception of a project and their subsequent decision about whether and how to continue (Lyytinen, Mathiassen et al. 1998).

Risk identification is an important part of risk assessment concerned with finding risks that might influence a project (Heemstra and Kusters 1996). A risk checklist provides generic risk items that practitioners can use as a vocabulary to identify and classify risky events and states in their projects (Lyytinen, Mathiassen et al. 1998). Checklists should ideally offer comprehensive coverage of relevant risk items and thereby help software practitioners effectively scan their environment (Lyytinen, Mathiassen et al. 1998) to determine project-specific risks (Heemstra and Kusters 1996). Various risk checklists have been proposed in the literature to facilitate risk identification. Table 1 offers a summary of some of the most frequently referenced (adapted from Keil et al. 2008).

**TABLE 1 Risk Checklists in the Literature**

<table>
<thead>
<tr>
<th>Checklist</th>
<th>Risk</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boehm 1991 (Boehm 1991)</td>
<td>10 risk categories</td>
<td>Survey of experienced project managers</td>
</tr>
<tr>
<td>Barki, Rivard et al. 1993 (Barki, Rivard et al. 1993)</td>
<td>23 risk items; 5 categories</td>
<td>Systematic literature review</td>
</tr>
<tr>
<td>Heemstra &amp; Kusters 1996 (Heemstra and Kusters 1996)</td>
<td>36 risk items 9 categories</td>
<td>Literature combined with experiences</td>
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<tr>
<td>Moynihan 1997 (Moynihan 1997)</td>
<td>21 construct themes relating to risk</td>
<td>Interviews with 14 application developers</td>
</tr>
<tr>
<td>Schmidt et al. 2001 (Schmidt, Lyytinen et al. 2001)</td>
<td>53 risk items; 14 categories</td>
<td>International Delphi study with experienced project managers</td>
</tr>
<tr>
<td>Hang and Huang 2007 (Han and Huang 2007)</td>
<td>6 dimensions of risk comprising 27 risks</td>
<td>Analysis of 115 software projects</td>
</tr>
</tbody>
</table>

Boehm (Boehm 1991) offered a top-ten checklist of risks on software projects based on a survey of experienced project managers. Heemstra and Kusters (Heemstra and Kusters 1996) combined literature studies with practical experience to develop a checklist consisting of 36 risk factors grouped into 9 categories. Moynihan (Moynihan 1997) surveyed 14 experienced application developers in Ireland and identified 21 construct themes which could be related to risk. Ropponen and Lyytinen (Ropponen and Lyytinen 2000a) developed a questionnaire based on Boehm’s (Boehm 1991) checklist and extracted 6 risk components based on a survey of project managers covering nearly 1100 projects. Schmidt et al. (Schmidt, Lyytinen et al. 2001) conducted a Delphi study with experienced project managers in Hong Kong, Finland, and the United States. They identified 53 unique risk items which they grouped into 14 categories. Barki et al. (Barki, Rivard et al. 1993) developed an instrument to measure software project risks based on a literature review. Using a survey, they identified a final set of 23 risk variables in 5 categories. Based on a comprehensive review of the literature and a rigorous instrument development process, Wallace and Keil (Wallace, Keil et al. 2004) identified 6 dimensions of software project risk and...
introduced a model showing how these relate to project performance. Analyzing 115 software projects, Han and Huang (Han and Huang 2007) studied the impact of 6 dimensions comprising 27 software risks on project performance. Extensive efforts have in this way been invested in understanding software risks and in aggregating risk items and categories into comprehensive lists that can inform software practitioners.

RESEARCH HYPOTHESIS

A risk checklist can be used to provide project managers a comprehensive risk profile and bring their attention to risks that might otherwise be neglected (Schmidt, Lyytinen et al. 2001). Thus, a checklist is expected to help practitioners identify more risk factors than they would otherwise be able to identify without the help of such a tool. Prior studies have demonstrated that such the checklists can also influence decision makers’ risk perception (Du et al. 2006; Keil et al. 2000). Keil et al. 2008 conducted an empirical study on the influence of risk checklists on software practitioners’ risk perception and decision making. They found that the checklist helped subjects identify more risks than they would identify without the aid of a checklist. However, the number of risks identified doesn’t significantly affect the participants’ decision. Keil et al.’s study assumed each risk item has the same influence on the decision makers. We argued that such assumption may not hold true and some risk items carry more weight than other risk items in the checklist. In addition, the research subjects in Keil et al.’s paper are software practitioners and many of them aren’t project managers. It would be more convincing to duplicate their study in a group of real project managers.

This paper continues investigation on the impact of risk checklists on decision makers’ risk perception and decision making. We will first validate the findings of Keil et al. in a different setting. Then we continue to study how each individual risk item in the checklist would affect project managers’ risk perception and decision making process. This leads to following research hypotheses.

\[ H1 \] Project managers who use a risk checklist will likely identify more risk items than those who do not use a checklist.

\[ H2 \] In a risk checklist, some risk items will play more important role than other risk items in project managers’ decision making process.

RESEARCH DESIGN.

This paper uses a survey based method to investigate the research hypotheses. To enhance the external validity of our study, we plan to recruit project managers. The participants will be drawn from two large companies whose main business is in financial and insurance industry. They are fortune 500 companies and each company has its own IT department developing large variety of in-house software projects. The author has contact with senior management of those two companies and will and asked for their assistance in recruiting managers with more than 1 year of software project management experience. The participation will be totally voluntary, but a cash reward in term of gift card will be award to a lottery winner to improve the response rate.

The study will have two phases: 1) Pilot study. A questionnaire will be developed and administrated to college students. The result will be analyzed and research instrument will be modified based on the feedback. 2). Formal study. A group of IT project managers will be recruited and the revised instrument will be sent to them for participation.

In the formal study, there are two parts. Part one is the questionnaire. A web-based survey will be developed and administrated to the participants. The subjects will randomly be divided into two groups: treatment group in which risk checklist tool will be used and control group in which risk checklist will not be used. This research use the risk checklist developed by Schmidt et al. (Schmidt, Lyytinen et al. 2001). This is the same checklist used in Keil et al. (Keil et al. 2008). Thus finding of this study will be comparable with their results.

In the questionnaire, the participants will be asked to read a scenario and answer a series of questions. The scenario illustrates a dilemma associated with an online banking system developed by an in-house IT department of a bank. The online banking system was approaching the planned release date when the testing team found that the system lacked a key feature of the functionality originally specified. The subjects were asked to assess the risks associated with the project and make a decision on whether the system should be released as scheduled or delayed for further testing. The scenario was seeded with seven risks taken from the adopted risk checklist (Schmidt, Lyytinen et al. 2001).

After reading the scenario, the participants will be asked to identify the potential risks presented in the scenario. The subjects in the treatment group will be asked to identify the risks presented in the scenario by checking the risk items listed on the checklist. They will also have the option to enter additional risks item which aren’t present in the checklist. The subjects in the control group will be asked to enter as many risks as they could identify in the scenario by typing them into a text box.
After subjects finished identifying risks, a summary of their input will be presented to them and they could iteratively modify their risk identification. After identifying risk items in the scenario, all participants will be asked to rank the risks they identified by perceived importance. Finally, the subjects were asked to make a decision (on an 8 point scale) either to continue with or delay the previously scheduled launch.

Since subjects in the control group could enter risk items freely, their responses will be coded in order to meaningfully compare their results with those of subjects in the treatment groups. In addition to the original fourteen risk categories of the risk checklist (Schmidt, Lyytinen et al. 2001), an “other” category will be added to capture any suggested risks that did not fit neatly into one of the fourteen categories. Two coders will independently analyze the risk items generated by the subjects in the “no risk checklist” treatment groups and coded them into the risk factors specified by the risk checklist. If there is difference, the coder will discuss the time until an agreement is reached.

The survey data will be collected and will be analyzed by running regression of each risk item on the subjects’ final decision. The importance of its risk item will also be examined to see if certain risk items will be consistently perceived as more important than other risk item.

Part one of the study focuses on the quantitative part of the project risk analysis. We are also interested in the participants’ perception of the risk checklist and the role of the list in their decision making process. In the part two of the study, several participants from the treatment group will be selected for a short interview. The interview will be recorded and be analyzed following qualitative research method.

DISCUSSION

This paper investigates the impact of risk checklists on decision makers’ risk perception and decision making. We will first validate the findings of a previous study in a different setting. Then we continue to study how each individual risk item in the checklist would affect project managers’ risk perception and decision making process. This research will be carried out in two phases: 1) Pilot study. A questionnaire will be developed and administrated to college students. The result will be analyzed and research instrument will be modified based on the feedback. 2) Formal study. A group of IT project managers will be recruited and the revised instrument will be sent to them for participation. Based on our knowledge, no research has studied the impact of the weight of risk checklist yet. Upon completion, this research could make significant contribution to the field of software risk management.

REFERENCES