Does Adoption of Knowledge Management Process Validate Risk Identification Information Technology Projects

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KEYWORDS

Knowledge Management, Knowledge Process, Risk, Risk Management, Risk Identification.

ABSTRACT

Companies turn to IT for innovative solutions in order to be competitive. Organizations must arm themselves with comprehensive knowledge to concentrate on the risks introduced by this unstable environment promptly.
This study extends previous researches on the impact when executing risk management processes in Information Technology (IT) projects by examining the effects of knowledge management support for risk management processes that has caused many project failures in the past and encountered unanticipated resistance and never met expectation.
Based on the extensive review of literature grounded in knowledge management and Risk management, a research model is proposed. The proposed model is validated by a survey of 350 practitioners involved in IT projects. The findings confirm that perceived that Knowledge Management processes has significant effects on risk identification for IT project. Moreover, this study identified the relationship knowledge processes between risk identification for IT project.
This study expands the existing body of knowledge on the adoption of knowledge processes, and benefits on Risk identification for IT project.

هل اعتماد عمليات إدارة المعرفة تحقق صحة مشاريع تحديد مخاطر المعلومات التكنولوجية

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المُستلخص

تتحول الشركات إلى تكنولوجيا المعلومات لإيجاد حلول مبتكرة من أجل أن تكون قادرة على المنافسة. يجب على المنظمات تسليح أنفسها بامتلاك معرفة شاملة للتركيز على المخاطر التي أدخلتها هذه البيئة غير المستقرة على وجه السرعة.
هذه الدراسة تستكمل الأبحاث السابقة حول التأثير عند تنفيذ عمليات إدارة المخاطر في مشاريع تكنولوجيا المعلومات (IT) من خلال دراسة آثار دعم إدارة المعرفة لعمليات إدارة المخاطر التي تسببت في فشل العديد من المشاريع في الماضي، وواجهت مقاومة غير متوقعة ولم تطابق التوقعات.
وبناء على مراجعة شاملة للأدب في إدارة المعرفة وإدارة المخاطر، يقترح نموذج للبحث. يتم التحقق من صحة النموذج المقترح من خلال مسح من 350 الممارسين العاملين في مشاريع تكنولوجيا المعلومات.
وتؤكد النتائج أن عمليات إدارة المعرفة لها آثار كبيرة على تحديد المخاطر في مشروع تكنولوجيا المعلومات. وعلاوة على ذلك، حددت هذه الدراسة عمليات معرفة العلاقة بين تحديد المخاطر لمشروع تكنولوجيا المعلومات.
هذه الدراسة توسع المجموعة الموجودة من المعرفة على اعتماد عمليات المعرفة، والفوائد على تحديد المخاطر لمشروع تكنولوجيا المعلومات

Introduction

The existing environment is confronted with growing complexity, globalization and vivacity in all levels; improving and retaining the inner skills and competences, and altering both the existing knowledge within the firm and the way is being utilized to compete is vital (Singh and Sharma 2011). By considering that, organizations can generate accessible and improved knowledge content in the advancement of products and services to the managers and to all levels inside the firm, to realize a reduced amount of cycles in the new product development to enable and manage the organization learning and improvement (Lancioni and Chandran 2009). A change in the surrounding environment might introduce a threat to the process in organizations. Disasters and complete surprises changed the way risk was managed back in 1970s and 1980s. Therefore, Risk Management (RM) has arisen as a distinctive discipline in the companies since the 1990s (Gupta, 2011). Many scholars studied risk since the seventeenth century (Frosdick, 1997), and several risk research was adapted by the business back in the 1950's (Snider, 1991).

One of the main problems in current approaches is that the Risk Management Process (RMP) is dealt with as a stand-alone process, and not as an integral part of the general project process. Also, the needed RM information can be obtained from a large number of available resources, such as expert judgment, sessions and brainstorming, data from current and prior projects, commercial databases containing infrastructural and environmental data (Sharmak et al., 2007).

Knowledge Management (KM) processes as well have turned out to a strategic resource for the organizations. KM can have a great influence on reducing organizations' risks (Karadsheh, et al., 2009). Many studies have concentrated in the past on identifying and classifying the risk factors in the software development projects (Barki, 1993; Ropponen and Lyytinen, 2000; Tiwana and Keil, 2004; Wallace et al. 2004; Kappelman et al. 2006; Tesch et al. 2007). Furthermore, Alhawari et al., (2012) noted that risks is as a barrier to success and may lead negative impact on achieving project goal.

Risk management is becoming significantly an important influence inside organizations, since it can minimize the probability and impact of IT project threats and capture the opportunities that could occur throughout the IT project life cycle. Project manager need to perform appropriate action if a risk assessment ascertains IT dwindling projects by identifying and controlling those risk factors that may lead to cost and schedule overruns, unmet user requirements, and the inability to deliver business value.

Few scholars paid attention to the risk assessment processes in the IT project management (Boehm and Bose, 1994; Bakker et al., 2010). They have suggested a complete theoretical framework, which considers the effect of project, personal, informational, and organizational matters on risk insight, which might affect the enthusiasm to maintain a failing project (Cule, et al., 2000). However, the need to explore empirically certain factors, which may affect the risk perception of IT project managers, is justified.

The common of the empirical literatures are founded upon the risk management, which highlighted the research focus on what value the risk management will add to the firms and how they should be involved in the activities of risk management (Aabo et al., 2011). Therefore, the personnel's conclusion and knowledge within the intellectual capital will affect the risk identification and response (Jafari et al., 2011).

The purpose of this study is to identify the relation between KM processes and Risk Identification (RI) by introducing Knowledge-Based Risk Identification (KBRI), and to obtain the most inclusive, completed and relevant information about risks ability to react quickly to the environment surrounding the organization. In addition, to provide with comprehensive knowledge to be able to face the risks with the surrounded turbulent environment, since organizations are always pre-occupied with the risk in terms of its evaluation, description and management. In addressing the challenges, issue experienced when carries out risk Identification in information

technology projects. Therefore, this study also aims exploring "how knowledge process to assist risk identification to avoid IT projects failure.

To answer this question, and based theoretical background, a research model is developed to find out the role of the knowledge process (Knowledge-Based Risk Identify Source, Knowledge-Based Risk Verify Source, Knowledge-Based Risk Capture, Knowledge-Based Risk Discovery, and Knowledge-Based Risk Education) on Risk Identification.

In the following, a review of the theoretical background on the impact of knowledge process on risk identification then, based on knowledge management and risk management concepts a research model is designed. In the third section, methods to collect required data to examine the hypotheses are described. The fourth section presents the result and discussion, accordingly. Finally, conclusion, limitations of the study and suggestions for future research are presented.

Literature Review and Hypotheses Development

1. Knowledge Management

The IT society we live in today is becoming a knowledge society. To attain a new knowledge economy and business; many establishments are facing key challenges because of the external pressures and the type of the workplace. Clearly, the mission is to move beyond information management and into the area of knowledge, management is a complex. Undertaking involving the development of structures that allows the company to recognize, create, transform and distribute knowledge (Davenport and Prusak, 1998; Drucker, 2000).

The use of KM in organizations is now widely recognized and expected to be an important part of organizational practices in the future. Firm growth today depends upon innovation and innovation depends on knowledge (Neef, 1997). Thus, the firm's knowledge has become the major competitive advantage (Nonaka,1994). The recognition of the importance of knowledge results is the significant issue of "knowledge management". Knowledge management is managing the corporation's knowledge through the processes of creating, sustaining, applying, sharing and renewing knowledge to enhance organizational performance and create values (Davenport and Prusak, 1998). Thus, KM has instigated to be proactively presented in the strategy, policy, and application processes of corporations and governments (Malhotra, 2005). This increases the need to enhance the strategic, holistic, and comprehensive and adoption of KM to improve processes and to gain the competitive advantage (Nehari-Talet et al., 2010). One of the main driving forces of organizational change and value formation since the early 1990s is knowledge management. As with several growing managerial conception, knowledge management has permanently and gradually becomes more and more complex. There is a junction of associated concepts that link with KM such as academic capital, organizational learning and numerous learning concepts, insubstantial assets, neural network, social network, market or competitive intelligence, community of practice, change management, creativity, corporate culture, competitive strategy, information technologies (such as decision support system, and expert system) and finally performance management.

Many researchers suggested different knowledge management frameworks. Wiig (1993) proposes the three KM pillars that represent the major functions needed to manage knowledge. The pillars are based on a broad understanding of knowledge creation, manifestation, use, and transfer. While the model Leonard-Barton (1995) brought to light that KM framework which comprised of four core capabilities and four knowledge-building activities, which are crucial to a knowledge-based organization (KBO). Another model has been developed comprised of seven KM processes that can operate on an organization's knowledge: create, identify, collect, adapt, organize, apply, and share (Andersen, 1996). Another framework identified a cycle of four knowledge management stages: conceptualize, reflect, act, and retrospect (Van der Spek et al., 1997). Another proposed research model integrated the previous frameworks, which, consists of three major aspects: (1) knowledge resources; (2) knowledge management activities;

and (3) knowledge influences (Lai and Chu, 2002). Furthermore, there are many approaches planned to support the execution of KM approaches in organizations. In order for KM practitioners to seriously reflect on the practice and manage KM risks, they need both a conceptual framework and tools (Zyngier, 2008). The technology has an essential role to play in storing and distributing of knowledge, but has tiny or no part in producing a new knowledge, enhancing its use or in supporting a culture of learning (Singh and Sharma, 2011).

Recently, the importance in organizational knowledge has stimulated the subjects to manage it to the organization's advantage. Therefore, information systems designed to support and augment organizational KM require complementing and enhancing groups understanding about the environment (Alavi and Leidner, 2001). For this reason, the organization's capacity to produce a new knowledge and to expand it requires a discipline in operating knowledge to develop an organization' learning capability. Therefore, KM could be considered as a systematic approach, which incorporates people, technology, content and processes to empower knowledge and information to be formed and flow to the right people, at the right time, so that their decisions and work will add value to the organization's mission (APQC, 2002). It was also described as a methodical and integrative process of managing organization-wide activities by obtaining, generating, storing, allocating, dispersing evolving, and positioning knowledge by individuals in search of major organizational goals (Rastogi, 2000). Many system designs attempt to seize and capitalize on the present explicit, implicit and occasionally the existing tacit knowledge within organizations. The focus on technology by itself will hide the knowledge accessible in the organization and operational processes that enable knowledge flow. Therefore, the need to develop an integrated approach to KM with all possible components of knowledge and utilizes certain strategic components affiliated to their business objectives. Furthermore, organizational knowledge has long been known as being a major resource of tactical importance (Davenport and Prusak, 1998).

KM focuses mainly on discovering the appropriate solution to the problem which necessitates a thorough understanding by finding the appropriate expert at the right time, or safeguarding the proposed solution to a difficult problem which can be applied several times. KM focuses on the process about knowledge, which includes four processes (Alryalat and Alhawari , 2008):

The first stage is the need for knowledge. This process drives many people and organizations to seek knowledge anywhere and anytime.

The second stage is identifying the source of knowledge. Knowledge can be expressed either in form of ideas or experiences taken from numerous resources such as reports, books, documents, artifacts and the Internet.

The third stage is verifying the source of Customer Knowledge. Verification of the sources is essential to verify the reliability and correctness of either the tacit or the explicit knowledge for further processing.

The fourth stage is knowledge capture, which is concerned with capturing the tacit and the explicit knowledge within people. Knowledge Acquisition is a process used to find and acquire the knowledge from its various sources.

2. Risk Management

The raison d'être of an organization is moving from pure support to focus more strategically on innovation and development. The availability of proper Information technology (IT) made such renovation possible. Information systems take a long time to develop, with high cost to execute and maintain, and often not perceived to provide the benefit that were originally planned by business (Love et al., 2004). At present, IT system is being implemented by organizations to run their information to deliver an improved support of their missions, while risk management plays an essential role in safeguarding an organization's assets and mission from risks (Stonebumber et al., 2002).

The term Risk management is used in a wide variety of disciplines, which combines concepts and techniques from different fields such as economics, statistics, and decision theory and information technology (Mees, 2007). For example,

RM provides control and practical decisions and actions to monitor what goes wrong in the data warehouse projects, what important and relevant risks to consider and what approach should be followed to deal with these risks (Bruckner et al., 2001). Risk management can make an important contribution to effective project management. Further a threat orientation is not the only concern, it is recommended that a threat and event-based perspective can result in a lack of attention to several important areas of project related uncertainty including variability arising from lack of knowledge, the basis of estimates, the treatment of assumptions about operating conditions, and the development of appropriate objectives and associated tradeoffs. RM is a separate discipline, which incorporates knowledge and practices from several other business fields to accept on a specific problem. It permits IT managers to balance the functional and monetary costs of control measures and attain improvements by securing the IT systems and data that support the organizations' missions (Stonebumber et al., 2002). RM is the process of recognizing risk, evaluating risk, and taking the appropriate steps to mitigate the risk to a satisfactory level (Stonebumber et al., 2002). It is described as a systematic and iterative process of identifying, analyzing, and responding to project risks in order to reduce the potential negative events and maximizing the positive events in terms of consequences and probabilities (Kasap and Kaymak, 2007). RM process goal is to protect the organization and its aptitude to execute the mission, but not only its IT assets. Therefore, the RM processes would not be considered as a technical means executed by the IT experts managing the IT system, but as a crucial management function within the organization (Stoneburner et al., 2002). Finally, RM provides the capability to recognize risks, establish risk emergence's characteristics, permit measurement through control systems, and apply an improved project management method to achieve project and stakeholder goals.

Project management literature has classified project outcomes into two types: product and process (Nidumolu, 1996; Wallace et al., 2004). Product performance is defined as the extent to which the designed system contains adequate design or can reflect users' needs Wallace et al. (2004) to have high product performance, the project team should possess mature analyzing knowledge and methodological tools to capture users' actual requirements (Faraj and Sproull, 2000; Nidumolu, 1995). Another essential function of project management is to ensure that the project is successful in meeting with all objectives from expenses to functionality. Also, it ensures that different roles within the project execution process attain its goals (Nielsen, 2006).

The purpose of implementing risk management is to permit the organization to achieve its mission(s) by:

(1) Enhancing the security of IT system, which used to store, execute, or transmit information;
(2) Allowing management to make an educated risk management conclusion to defend the expense during IT budgeting; and
(3) Supporting management in accrediting the IT systems based on the result of supported documentation obtained from the risk management's performance.

Additionally, RM can be referred to plans, approaches and supporting tools to recognize, and control risk to a satisfactory level (Bruckner et al., 2001). In a study by Standish Group, 32% of all projects succeeded and delivered within the time, cost and requirements, which reflect a noticeable decrease in project accomplishment rates (Standish Group, 2009). Furthermore, around 44% of projects were late, over budget, with less than the compulsory features and functions, and 24% failed prior to completion and never been approved. However, the failure of IT projects has been well documented and the reasons behind these failures are cost, time and performance or quality issues (Tesch al., 2007). They indicated that there are ninety-two risk factors were presented to followers of the PMI for classification. This resulted in the categorization and importance of each risk applicable to systems development. IT projects' failure in UK continues to occur and these failures are not exclusively impacted Government, but also the citizens lose out both as taxpayers and as customers. (Doughty, 2005)

In a Western Australia, several interviews were conducted with IT professionals to determine how IT risks being accomplished in their projects. The respondents categorized 27 IT risks in terms of probability and consequences to recognize the most significant risks. The top five classified risks were personnel deficits, perverse project schedule and budget, impractical hopes, and incomplete requirements. Furthermore, the respondents tremendously used the treatment strategy of risk reduction to manage these risks. Additionally, these strategies were mainly project management processes and not technical processes. This indicated that the project management is a RM strategy with focus on managing stakeholders' expectation in a precise risk conduct, which supports managing several key IT risks (Baccarini et al., 2004).

A study conducted at the National Defense claims that projects suffer from risks in technical challenges, unstable system requirements, missing schedule milestones, unpredictable funding and cost overruns (Na and Jinlin, 2007). A national Defense Project Risk Management System (NDPRMS) is a risk information-centric system that is used to benefit the National Defense project manager. The NDPRMS contains five essential components: database, knowledge base, method base, model base, case-database and above all the bases, nine diverse functions designed to help users making the decisions.

Project failures can be the result of not capturing the appropriate knowledge at the right time, or discovering needed knowledge. Inappropriate or lack of KM implementation or sharing will result in lack of understanding the goal and objective of projects, which translate into execution failure. In fact, without KM as a tool to communicate risks among members of a project team, RM might suffer from ineffectiveness and inefficiencies. Therefore, if companies are serious about both mitigating the effects of the threats their operations encounter and seizing the opportunities that are passed their way, KM in turn must sit right at the heart of their RM strategy (Scott, 2002).

3. Knowledge Management and Risk Identification

Organizational risk management is a complex and important task for managers particularly as the consequence of poor RM is becomingly observable through financial loss. Managers must be aware of the risks related with their organization's activities and have in place ways to manage unwanted events. RM has become the main part of the organization activity and its main objective is to help all other activities to reach the organizations aim directly and efficiently. RM is a continuous process that depends directly on the change in the internal and external environment require continuous attention for identification and control of risk (Tchankova, 2002).

A proposed an integrated risk management model for financial banks with knowledge management considers the risks before a project or an investment, assesses and calculates the risks using all kinds of ways, adjusts the operation according to the changeable environment and feeds back timely (Shao and Wu, 2010). They recommend that the financial banks should set up the incentive mechanism to urge the staffs to learn more knowledge, and at the same time, banks should train knowledgeable staffs to construct a whole system to assess and calculate the potential risks and counter-measures to reduce risks and feedback.

The literature of knowledge management recognizes the importance of two concepts: relating knowledge management to business goals, and analyzing existing knowledge and information management practices to identify gaps. Like other business processes, knowledge management needs to address the business needs within an organization and to encompass set goals and priorities for delivering benefits (Jones, 2005). The new field of knowledge risk management (KRM) offers managers ways to use knowledge to make sure decision makers is informed and can anticipate and respond to risk events (Massingham, 2010).

Risk identification (RI) is the first step in the proactive RM process. It provides the opportunities, indicators, and information that allow an

organization to raise major risks before they adversely affect operations and then the business determines the strategy to address them throughout the transformation. Project managers can take appropriate action if proper risk assessment leads to early identification of a failing project.

Risk identification covers the identification within the established context of uncertain events that could cause harm or benefits, associated causes and the potential consequences (Williams et al., 2006). RI is the process of determining risks that could potentially prevent the program, enterprise, or investment from achieving its objectives. It includes documenting and communicating the concern; or it can be the process of identifying probable effective risk factors in relation to project goals, determining their features, and finally documentation of findings. In addition, it is defined as obtaining the right information for the right people at the right time to help them in problem-solving (Holm, 2001).

A case study research was conducted to strengthen KM strategies by using RM as a function of governance (Zyngier, 2008). This can make sure through developing RM reporting templates and procedures to guarantee appropriate feedback into KM system. In other words, RM can be used as an organized feedback to deal with cultural and structural risk factors to KM policy. Additionally, the knowledge risk management (KRM) is an emerging field that offers a solution to the problems related with conventional risk management methods. Individuals not knowing enough about the risk to anticipate its likelihood and consequences manifest the problem of environmental complexity and it creates uncertainty (Massingham, 2010).

The globalization and the technological development in the business sector forced business organizations to cooperate on a broader scale. The knowledge of cooperation and the risks into cooperation have become fundamental to business success (Ehrengren, 2011). In addition, correct risk identification ensured risk management effectiveness. According to a study a company cannot manage its risks effectively if it cannot manage its knowledge (Neef, 2005). Many projects failed due to lack of knowledge among the project team or lack of knowledge sharing during project progress. A project failure can be the result of capturing the appropriate knowledge at an inappropriate time of the project (Fuller, et al., 2008). In fact, without KM as a tool to communicate risks among members of a project team, RM might suffer from ineffectiveness and inefficiencies (Schwalbe , 2011). It appears that is not sufficient to augment current Information Security Risk Assessments (ISRAs) methodologies merely by including the identification of "knowledge assets" in the form of databases, or even key people (Shedden, et al., 2009).

Certainly, a complex organizational process tends to rely on both explicit and tacit knowledge of various individuals and networks of experts. Therefore, understanding the full spectrum of risks associated with a particular process extends considerably beyond individuals and information assets alone. This line of thought suggests that if we wish to consider knowledge as a possible source of risk, the asset-based risk identification approach is likely to be insufficient (Shedden, et al., 2009). Information security is the dominant to organizations, so ISRAs enable organizations to identify their key information assets and risks in order to develop effective and economically viable control strategies (Braber, 2007).

Therefore, risk intelligence is the alignment of information governance and information risk management to business priorities. Not only does this alignment help mitigate the risks to business goals, but it also leads to direct savings in legal and compliance costs, especially when knowledge management (KM) principles are applied. Three core KM principles related to RM have been noted namely:

(1) business focus,
(2) accountability and
(3) operational support. The three KM principles can be applied to information RM in order to generate risk intelligence and to maximize the return on value from information. Business focus includes five steps:

1) Start with key business risks,
2) Prioritize the business risks based on their importance to the business strategy,

3) Identify information sources for the high-business risk areas,
4) Identify at-risk information sources through establishing what information is critical to the business process, and
5) Establish risk-mitigation strategies (Caldwell, 2008).

In order to be effective, RM should involve the following stages:

1) Risk Identification: used to identify project, product and business risks.
2) Risk Analysis: to assess the likelihood and consequences of these risks.
3) Risk planning: to draw up plans to avoid or minimize the effects of the risk.
4) Risk Monitoring: to guarantee the effectiveness of the methods followed and to monitor the risks throughout the project (Sommerville, 2010).

In addition, in RM process, the team shares their knowledge on selecting the best alternative for risk treatment in risk action requests. Whenever a risk treatment alternative is recommended in a risk action request, an evaluation should be made by the stakeholders to determine if the risk is acceptable, then a risk treatment alternative should be implemented, supported by the necessary resources, monitored and coordinated with other project activities.

A framework of the knowledge-based supply chain risk management system was developed which includes four modules: basic database, knowledge database management, and supply chain risk early warning and risk management strategies module (Bing-hua and Guo-fang 2009). To achieve the process concerning RI, five sub stages have to be taken into account as shown in Table 1.

In conclusion, RI is as important as the risk process itself, since it identifies and documents risks that might affect the project. Project managers, team members, subject matter experts, customers, end users, stakeholders, and risk management experts should be involved in risk identification to ensure their survival in today's knowledge savvy and competitive marketplace environment. It is often described as a strategy or a set of activities the organizations employ to minimize risk and its success will depend upon it.

Table 1: Classification of Processes of Risk Identification

References	Sub dimension/ parts of process	Main dimension/ Risk identification Process
Risk Identification	Knowledge-Based Risk Identify Source	(Boehm and Bose, 1994); (Caldwell, 2008); (Karadsheh, et al. 2008); (Alryalat and Alhawari, 2008); (Sun, and Gang, 2006); (Sommerville, 2010); (TOGAF, 2009). (Cantner, et al., 2011.)
	Knowledge-Based Risk Verify Source	(Cornford, 1998); (Karadsheh, et al. 2008); (Alryalat and Alhawari, 2008); (Alryalat and Alhawari, 2008); (Bouthillier and Shearer, 2002); (Teoh, and Case, 2004). (Qi, 2008).
	Knowledge-Based Risk Capture	(Lamsweerde and Letier, 2000) (Farias, et al. 2003) ; (Becerra-Fernandez, et al. 2004); (Sun and Gang, 2006) ; (Karadsheh, et al. 2008);(Alryalat and Alhawari, 200)8. (Grawe, et al. 2011).
	Knowledge-Based Risk Discovery	(Becerra-Fernandez, et al. 2004); (Royer, 2000) (Sun and Gang, 2006) ; (Ying-Hsun, et al. 2007) ;(Karadsheh. et al. 2008).
	Knowledge-Based Risk Education	(Lai and Chu 2000) ; (Bruckner, et al. 2001); (Malhotra, 2005); (Karadsheh, et al. 2008) ; (Alryalat and Alhawari, 2008.)

4. Research Models

4.1 Research Model 1

Based on literature review the first research model figure 1 is developed in order to capture five major variables as follows:

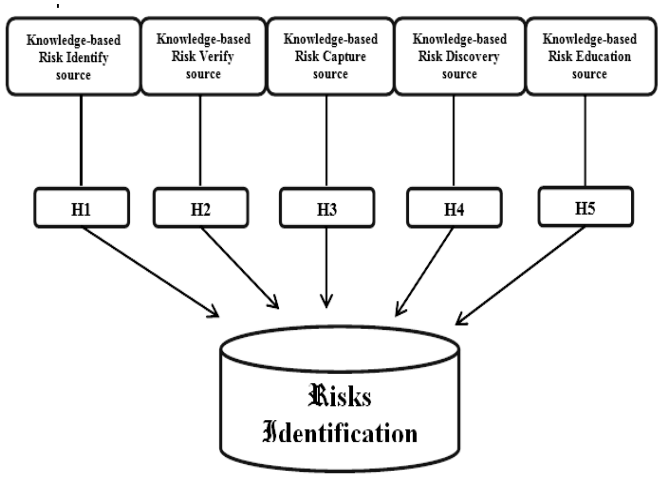

Figure 1: Research Model 1

4.2 Research Model 2

In order to have a deeper understanding of this theoretical framework, all the above five factors were combined into a single one named ***Knowledge Based Risk.***

The research model 2 was developed as presented in Figure 2.

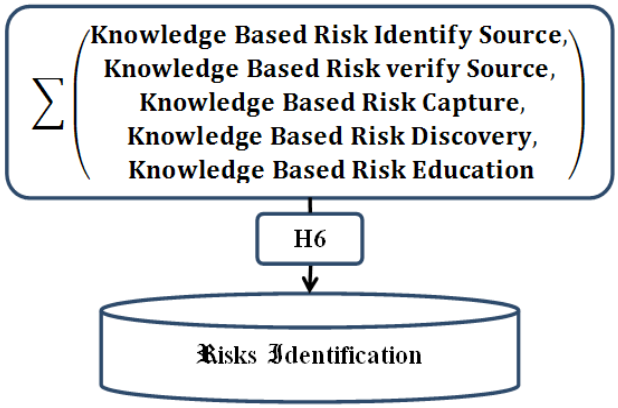

Figure 2: Research Model 2

5. Research Variables

5.1 Independent Variables

To operationalize independent variables respondents were asked to evaluate these following items in a five point Likert-type scale.

5.1.1 Knowledge-Based Risk Identify Source:

- Does interviewing key personnel facilitate identifying the precise source of identified risk?
- Do you consider common sense as a reliable source of risk identification?
- Can case studies be considered as a reliable source for risk identification?

5.1.2 Knowledge-Based Risk Verify Source

- Data authenticity verification is an important method of verifying the source.
- Utilizing available explicit knowledge of risk requires verifying the original source.
- The result of experiments or tests from previous literature should be verified before adapting.
- Expert opinions should be considered as a verification process of identified risks.

5.1.3 Knowledge-Based Risk Capture

- Knowledge Capture stage focuses on capturing both the explicit and tacit knowledge exists within the employees.
- Does capturing previous project information play an important role in enriching the project?
- Capturing risk information from previous reports, helps in identifying risks more efficiently?
- Risk Identification and Knowledge Capture are iterative processes

5.1.4 Knowledge-Based Risk Discovery

- The purpose of Knowledge Discovery is to obtain a tacit or explicit knowledge.
- Knowledge Discovery attempts to identify IT project information by sharing of tacit knowledge.
- Knowledge Discovery uses data mining techniques and tools to access stored IT projects in the repository.
- Techniques such as brainstorming team dialog and checklists can be used for Knowledge Discovery that can be used to unleash hidden risks.

5.1.5 Knowledge-Based Risk Education

The stored collection of knowledge of risks in the repository can serve as training, education and awareness tool to current and future employees.

ii. Knowledge Education is aimed on providing a list of previous encountered risk cases or projects stored in the repository to teach existing and/or new employees.

iii. Training and education help employee to deal with any risk that might occur in future project?

5.2 dependent Variable

The dependent variable for this study is Risk Identification Respondents were asked to indicate on a five point Likert-type scale.

6. Risk Identification

- Risk identification is a process of identifying the threats on the business.
- Risk identification purpose is to develop a list of risks that can adversely impact the project outcome?
- Risk Identification identifies the risks and then determines the strategy to address them?
- Risk Identification determines which risks might affect the project and determine their characteristics.
- Risk Identification is studying a situation to realize what could go wrong in the product design.

7. Research Hypothesis

To address the research question, we calculated a composite score for all the selected independents variables above each one separately and the same for the dependent variable with respect to the impact on Risk Identification. Five hypotheses address the associations between Knowledge processes and Risk Identification

H1: There is direct positive relationship between Knowledge-Based Risk Identify Source and Risk Identification.

H2: There is direct positive relationship between Knowledge-Based Risk Verify Source and Risk Identification.

H3: There is direct positive relationship between Knowledge-Based Risk Capture and Risk Identification.

H4: There is direct positive relationship between Knowledge-Based Risk Discovery and Risk Identification

H5: There is direct positive relationship between Knowledge-Based Risk Education and Risk Identification.

Additionally, Hypothesis 6 was developed because this approach helps us to identify how these combined factors affect Risk identification. Our study is therefore distinctive in that, it highlights a new approach, which has not been addressed by the literature. It seeks to contribute to this field by addressing one of the concerns related to the area of risk management in IT projects.

H6: There is direct positive relationship between Knowledge-Based Risk and Risk Identification

Research Methodology

1. Research Instrument

According to the International Organization for Standardization Systems and Software Engineering and IEEE Computer Society (2006) the probability of occurrence and consequences of each risk identified shall be estimated. The estimates can be quantitative or qualitative depending on the organization. The stakeholders should share their knowledge in determining which risks will be analyzed using a qualitative or quantitative scale.

To confirm the consistency and robustness, numerous decisive factors have been respected when designing a questionnaire survey. The questionnaire started with a brief description of the meaning of the main concepts, and it gave instructions on how to answer the question each section.

The survey questionnaire is divided into two parts. The first part includes the demographic information of the respondents. The second part includes the questions related to variables that affect the integrated KM process and RI.

The structural questionnaire design was applied to develop the survey instrument. All items were on five-point Likert scale from scale where 1 = "strongly agree", and 5 = "strongly disagree" to represent whether each individual perceived the item to be true. Correction and clarification to the instrument were made based on professional and experts' feedback and a pilot test to assure the content validity.

The construct was subjected to the scale reliability procedure of SPSS 16.0, using the Cronbach's Alpha Cronbach (1951) criterion to assess the internal consistency of the studied construct. The Cronbach's Alpha coefficient is in

all construct ***.858*** the value exceeds the accepted cut-off value of ***.70,*** as suggested by Nunnally (1978). This indicates that each individual item is internally consistent and highly reliable.

2. Data collection

The research accepted the premise that even though all the relevant variables could not be studied simultaneously nor rigorously controlled, it must plunge in somewhere. All researchers operate under assumptions that enable them to see some things while preventing them from seeing others (Bernard, 1988). Furthermore, observation that behavior will depend on the respondent's definition of the situation seems to be valid one (Van Maanen, 1988).

This study relied on a quantitative approach of collecting information from the respondents. The research focused on how the organizations understand and view the purpose and importance of the knowledge process for the enhancement of RI based on their experience and/or understanding. The quantitative approach supplied a suitable research data collection strategy, allowing the collection of a large amount of data from a sizeable population in a highly economical way. ANOVA analysis was adopted to test construct validity to determine the relationships between variables.

The initial work for this survey began in the September 2012 when the research objectives were formulated. The research instrument was designed during the end of January 2013 and a small pilot study was conducted. The main survey took place during February- April 2013.

Survey packages were sent out through regular mail in early February, 2013, and a reminding letter was then sent to those who did not return the survey after one month. Because the rate response was very low and in order to expedite the data collection process and receive high response rate, the researcher handed the questionnaires personally by visiting the companies, and requested to fill them immediately. However, there several respondents preferred to fill the questionnaire during their free time and returned them back to a contact person who was assigned to collect and return the questionnaires to the researchers.

3. Sample

Eight hundred questionnaires were distributed to the respondents in three different job positions working in companies of small, medium, and large sized companies, which are investing in IT: (1) Top management, (2) Middle management (3) Operational management. Three hundred fifty questionnaires were used for the statistical analysis as shown in table 2.

Table 2: Summary of the Sample Size

Category	Number of Questionnaire Distributed	Number of Usable Questionnaires
Small Size companies	100	28
Medium Size companies	200	132
Big Size Companies	500	190
Total Rate		43,75%

Research Findings and Discussions

1. Demographics

This study sample consists of 310 males with a percentage of 88.6% and 40 females with a percentage of 11.4 %. The reported figure is in line with previous literature (Igbaria and Toraskar 1994).

The aim is to expose gender distinctions, not to explain or theorize why these distinctions have arisen and continue to exist. Examples of this include investigations of women's vs. men's use (adoption, acceptance, etc.) of IT (Gefen and Straub, 1997) and women's participation rate in the IS profession Truman and Baroudi, 1994. The reason for the substantial percentage difference of respondents' gender is due to the male dominance of managerial and executive positions generally found throughout organizations in Saudi Arabia,

The largest group of respondents (184 or 52.6%) indicates that their area of specialization was Information Technology (IT). Additionally, the largest group of respondents (128 or 36.6 %) indicates that their years of experience are more than 10 years). The other of demographic information about the sample is detailed in Table 3.

Table 3: Demographic data (N=350)

Measure	Categories	#	%	Measure	Categories	#	%
Gender	Male	310	88.6	Company Size	Small	28	8.0
	Female	40	11.4		Medium	132	37.7
					large	190	54.3
Educational Background	Postgraduate (Masters & Doctoral)	132	37.7	Company Activity	Production	37	10.6
	Undergraduate (Bachelor)	157	44.9		Services	286	81.7
	High school	16	4.6		Trading	15	4.3
	Other	45	12.9		Retailing	12	3.4
Area of specialization	Information Technology	184	52.6	Department	Human Resource	62	17.7
					IT	163	46.6
	Business	74	21.1		Accounting & Finance	76	21,7
	Engineering	48	13.7		Marketing	36	10,3
	Other	40	11.4		Production	13	3,7
Working Experience (year)	Less than 1 year	32	9.1	Position	Top Management level	28	8
	Between 1-5 years	95	27.1		Middle Management level	132	37.7
	Between 5-10 years	95	27.1		Operation Management level	190	54.3
	More than 10	128	36.6				

2. Statistical analysis

This paper examined the effects of (Knowledge-Based Risk Identify Source, Knowledge-Based Risk Verify Source, Knowledge-Based Risk Capture, Knowledge-Based Risk Discovery, and Knowledge-Based Risk Education) on risk identification. The findings and insights of the constructs that were proposed in the research model 1 are presented as follows in table 3. ANOVA was used to test of the hypotheses based on the significant level of (0.05).

Table 4: ANOVA test for Knowledge processes based Risk and Risk identification

Dependent Variable	Independent variable	R	R Square	Adjusted R Square	F	Sig
Risk Identification	Knowledge-Based Risk Identify Source	0.211	0.044	0.042	15.765	0.00
Risk Identification	Knowledge-Based Risk Verify Source	0.291	00.85	0.082	31.819	0.00
Risk Identification	Knowledge-Based Risk Capture	0.241	0.058	0.056	21.242	0.00
Risk Identification	Knowledge-Based Risk Discovery	0.295	0.087	0.084	32.583	0.00
Risk Identification	Knowledge-Based Risk Education	0.397	0.0157	0.0154	64.264	0.00

Referring to Table 4, 4.4% of the variance in Risk Identification accounted by Knowledge-Based Risk Identify Source, the F value is 15.765 with a significance equal 0.00. In this case, we accept the hypothesis **H1** that indicates that there is significant direct relationship between Knowledge-Based Risk Identify Source and Risk Identification in identifying project, product, and business risks (Sommerville, 2010) supports this finding.

Additionally, 8.5 % of the variance in Risk Identification accounted by Knowledge-Based Risk Verify Source, the F value is 31.819 with significance equal 0.000. Therefore, there is a significant effect of Knowledge-Based Risk Verify Source on Risk Identification as indicated in **H2**, which is consistent with previous research (Cornford, 1998).

Another important finding, 5.8 % of the variance in Risk Identification accounted by Knowledge-Based Risk Capture the F value is 21.242 with significance equal 0.00. Thus **H3** is accepted which indicates that there is significant effect of Knowledge-Based Risk Capture on Risk Identification. This finding supported the view of previous research, which suggest accessing to such a knowledge means that the tool is capable of enabling the use of past successes and failures captured to minimize risks in project management (Kayis et al., 2007).

H4 predicted that Knowledge-Based Risk Discovery has an effect on Risk Identification. The result shows 8.7 % of the variance in Risk Identification accounted by Knowledge-Based Risk Discovery the F value is 32.583 with significance equal 0.00. As stated in the literature, given the profile of a new project, it is possible to collect information about any other project that has similarities with the current one, be aware of people that are interested in the same subject, or identify documents that talk about the same argument (Agostini, et al. 2003).

Finally, 1.54 % of the variance in Risk Identification accounted by Knowledge-Based Risk Education the F value is 64.264 with significance equal 0.00. We accept the hypothesis **H5**, which strongly suggested that the lack of knowledge access could create failures, and the stored knowledge of risk in the repository can serve as a training, education and awareness tool (Rodriguez-Montes and Edward, 2008; Malhotra, 2005).

Based on previous analysis, the results of the study offered empirical support for the existence of a positive and statistically significant influence of KM process on Risk Identification. Our study presents support for the hypothesized positive effects of KM process on RI.

The findings validate the research questions by answering them as follows:

1. Knowledge-Based Risk (KBR) Identify Source has a positive impact on scope establishment and the Risk Identification Therefore, the integration of KM and RM processes can form a valid KBR Identification
2. Knowledge-Based Risk (KBR)Verify Source has a positive impact on scope establishment and the Risk Identification Therefore, the integration of KM and RM processes can form a valid KBR Identification
3. Knowledge-Based Risk (KBR) Capture has a positive impact on scope establishment and risk identification. Therefore, the integration of KM and RM processes can form a valid KBR Capture.
4. Knowledge-Based Risk (KBR) Discovery has positive impact on scope establishment and risk identification. Therefore, the integration of KM and RM processes can form a valid KBR Discovery.
5. Knowledge-Based Risk (KBR) Education has a positive impact on RM processes and employees. The integration of KM and RM repository provides better training, education and awareness. Therefore, the integration of KM and RM can form a valid KBR Education.

To extend our understanding about this phenomenon **H6** combined all the above five variables named as "***Knowledge-Based Risk***". The data in table 5 clearly indicates that the Knowledge-Based Risk have a high significant positive impact on the Risk identification. The integration of all the factors will give a higher coefficient of correlation 44.8%, than correlation for each factor related independently with RI ranges from 21.11% to 39.7% as shown in table 4.

This means that all factors need to be merged together in order identify any risks arising from the IT projects and to generate a comprehensive list of risks that could affect the objectives.

Table 5 ANOVA test for Knowledge based Risk and Risk identification

Dependent variable	Independent variable	R	R Square	Adjusted R Square	F	Sig
Risk Identification	Knowledge-Based Risk Identify Source + Knowledge-Based Risk Verify Source + Knowledge-Based Risk Capture + Knowledge-Based Risk Discovery + Knowledge-Based Risk Education	0.448	0.201	0.198	82.579	0.00

The overall results of this study are supported by the previous research. For instance Neef (2005) claimed that the key to proactive RM processes lies in the company's ability to mobilize the knowledge and expertise of its employees regarding risk mitigation so the key decision makers in the organization can receive accurate and timely information about potential harmful incidents, as an example. The rationale for applying KM techniques to risk programs is stated in the following:

- Sensing and responding to risks in an organization is directly dependent on the knowledge and judgment of employees at all levels.
- Key decision makers need to mobilize this employee knowledge and the large amount of information available concerning potentially threatening situations in a way that will allow them to respond quickly and appropriately to threatening risks.
- Utilizing KM techniques through opening communication channels to provide a system of incentives for managers and to encourage employees to uncover potentially dangerous issues could be beneficial to the organization.
- Finally, capture lessons learned, apply proven RM techniques and create decision support systems to assist in developing preventive RM policies and avoid costly repetition of errors.

Three core KM principles related to RM, namely business focus, accountability and operational support. Business focus includes five steps: (1) start with key business risks, (2) prioritize the business risks based on their importance to the business strategy, (3) identify information sources for the high-business risk areas, (4) identify at-risk information sources through establishing what information is critical to the business process, and (5) establish risk-mitigation strategies. It is stated that KM accountability requires that domain experts be assigned to work with knowledge managers to maintain various information sources, and finally, operational support is required to obtain the value (Caldwell, 2008).

Conclusion

This paper has addressed the challenges facing organizations in the area of RM in IT projects. Understanding the scope, objectives and the deliverables of the project will considerably affect the possible risks to consider and on the substitute strategy for dealing with the risks. This should help IT managers to identify any risks arising from the IT projects to generate a comprehensive list of risks that could affect the objectives.

Risk Identification has become critical for today's competitive markets. The results from this study demonstrate clearly that the selected factors (Knowledge-Based Risk Identify Source, Knowledge-Based Risk Verify Source, Knowledge-Based Risk Capture, and Knowledge-Based Risk Discovery, Knowledge-Based Risk Education and Knowledge-Based Risk have a considerable effect on Risk Identification. The study recommends considering risk management and knowledge management to take out systemic measures to manage risks to gain sustainable rewards. In support of the hypotheses, the research validates the integration of KM in support of RM processes

when applied to IT projects that improves the organization's ability to manage risk response.

Certainly, these findings will contribute to the understanding of the KM, RM and processes as a strategic input in making decision making to develop RI and will guide policy makers to incorporate knowledge processes to enhance RI in Saudi companies.

Even if the findings are encouraging and useful, the present study has certain limitations. First, although we believe that RM is a universal fact and most countering approaches have common effects the results cannot be generalized because it considered only one developing country. Data from multiple geographical areas are still recommended to exclude potential biases caused by cultural issues. Therefore, future studies would be geared towards reproducing this study across several other countries for comparative purposes. Second, the variables used show that the correlation between KBR and RI is not very high, we need to consider other variables for future studies such as the organization's ability to manage KM tools, techniques, technologies and the culture of risks in IT projects. Finally, interview has not been considered as a research instrument in this study, future research could be included to attain robust findings.

The findings of this research will suggest an adequate level of interest from both the KM and RM communities in the field of IT, and encourage further investigation to address RM using KM tools and techniques. Implications will certainly help both academia researchers and practitioners to get a better understanding about the knowledge processes on RI.

These research findings open up multiple avenues for future investigations in academia research: (1) Extend Knowledge-Based Risk Management System and (2) Providing a comprehensive framework and methodology for the integration of RM processes with KM processes in IT projects.

This study identified several determinants the challenges facing organizations in the area of RM in IT projects. It t is important for practitioners to consider: (1) create formal mechanisms that allow the integration of KM in support of RM processes when applied to IT projects which improves the organization's ability to manage risk response planning by enhancing R; (2) Develop Knowledge-Based Risk Management System.

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