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A Conceptual Framework to Discover IT Project Risks in Developing Economies: An Application to Cambodia and Uganda Contexts

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Abstract

Background: *The information technology (IT) project environment in developing economies is complex and dynamic due to their unique social, technological, cultural, and political contexts. However, the unique risk factors involved in IT projects in developing economies have seldom been discussed in the literature. This study proposes a conceptual framework for identifying risks in IT projects by considering the unique characteristics of project management in developing economies.*

Method: *17 project cases were examined via a series of expert interviews in Cambodia and Uganda. The interview results were coded into a total of 257 risk incidents, which were used to validate the proposed framework. Particularly, the risk incidents of each economy were matched with 16 risk categories under the proposed framework. The matched results were conceptualized into unique risk factors of each economy.*

Results: *Our results reveal that the most critical risks in both economies involve the lack of structured and standardized project management (PM) processes, and misunderstanding and poor decision-making due to the lack of project experience and technical knowledge in local stakeholders. In addition to these shared risk factors, the two economies show distinct risk granularities. Particularly, IT projects in Cambodia are more vulnerable to cultural uniqueness while IT projects in Uganda suffer more with complex stakeholder structures.*

Conclusions: *The proposed framework serves as guidance to identify IT project risks in developing economies. Furthermore, the identified risk factors using the framework proposed by this study help project managers or stakeholders recognize and mitigate the unique IT project risk factors in the two developing economies.*

Keywords: IT project, Project Risk, Developing Economies, Cambodia, Uganda.

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Introduction

Many information technology (IT) project managers working in developing economies either partially or completely fail to achieve their project goals, i.e. scope, time, cost, and/or quality goals (Dada, 2006; Olawumi & Chan, 2019; United Nations, 2014). This is mainly because they do not have a sufficient understanding of the complexity and unique context involved in their project environment (Heeks, 2002, 2010; Muriithi & Crawford, 2003). Developing economies are generally classified as such based on their poor economic performance, high poverty level, high corruption rate, lack of critical infrastructure, and high inequality of wealth and access to quality education (Adeoye & Islam, 2019; World Bank, 2014). Although these social, cultural, political, and financial contexts are the most important components of projects in developing economies (Avots, 1972; Ndou, 2004; Yanwan, 2012), many IT project managers do not understand their unique work environment and relevant risks. In 2010, for example, the Maji Matone (water drops) program was established in rural Tanzania to enable a mobile-based reporting system on faulty water pumps. However, the project failed due to cultural and economic issues, such as 1) presence of strong social ties among individuals, who were not willing to use the system to report negative incidents due to fear of those in higher authority, 2) inadequate target users, specifically women who did not have access to mobile phones, and 3) immature technological infrastructure where mobile access was limited due to poor network coverage (Taylor, 2013). The risks associated with the Maji Matone program clearly show the need in addressing the cultural and economic challenges of IT project management in developing economies.

Project risk management is essential to the success of IT projects. A risk refers to a condition that can pose serious threats to the successful completion of a project (Wallace et al., 2004a). Effective project managers need to assess risk factors and try to bring them under control. Thus, identifying and understanding unique risk factors are the first step to study IT project management in developing economies. Though researchers have discussed some potential factors leading to high failures in IT projects in developing economies, e.g., immaturity of project management (PM) practices, social and political inefficiency, cultural diversity, and financial weakness (e.g. Abbasi & Al-Mharmah, 2000; Heeks, 2002; Muscatello & Parente, 2006; Rasmy et al., 2005; Walton & Heeks, 2011; Wang et al., 2007), extant project risk management theories and practices primarily focus on research and experiences in the developed, Western economy contexts (e.g. Kappelman et al., 2006; Keil et al., 2002; Schmidt et al., 2001). The best practices derived from the developed economies cannot be directly applied in developing economies due to distinct challenges imposed by unique environments (Muriithi & Crawford, 2003). However, context-specific risks in developing economies have not been sufficiently investigated in the literature. Furthermore, extant literature lacks a systematic approach to identify IT project risks in developing economies. Therefore, the risk factors in IT projects in developing economies have been ill understood, and the strategies to manage them remain blurred to both practitioners and academics.

The objectives of this study are two-fold: (1) to propose a conceptual framework for identifying IT project risk categories in developing economies, and (2) to apply this framework to specific developing economies and identify their context-specific IT project risk factors. To achieve these objectives, first, we develop a conceptual framework that investigates the effects of the unique characteristics of project management in the context of developing economies, i.e. complex stakeholder groups, unprecedented technology and project, infrastructural immaturity, and cultural uniqueness, on the key elements of IT projects, i.e. people, process, technology, and external environment. Second, we validate the framework by applying it to the empirical data collected via a series of expert interviews in two developing economies, Cambodia in South East Asia and Uganda in East Africa. The application results are used to identify unique risk factors of IT projects in each of the two economies.

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The rest of the paper is organized as follows; in the next section, we discuss previous studies pertinent to the topics of IT project risks and characteristics of developing economies. Based on them, we develop a conceptual framework for identification of IT project risks in developing economies. Next, we validate the proposed framework by applying it to Cambodia and Uganda IT project cases and identifying their unique IT project risk factors. Finally, we discuss our findings, potential contributions, and future directions of this study.

Conceptual Framework Development

In this section, we propose a conceptual framework for IT project risk factors in developing economies drawing upon the following two research areas: (1) IT project risks and (2) project characteristics of developing economies.

IT Project Risks

Project risks are generally understood as uncertainties that deviate from the expected or planned outcomes of a project (Barkley, 2004). Risks can pose a serious threat to the successful completion of an IT project (Liu, 2016; Wallace et al., 2004a). If not properly managed, they can increase the likelihood of project failure (Lyytinen et al., 1998). Thus, risk management has been considered a top priority in IT project management to ensure project success (Schmidt et al., 2001).

Because IT projects have long been recognized as high-risk tasks due to their volatile and intangible nature, prior studies have investigated and proposed various risk factors in IT projects. The numerous risk lists proposed by various sources served as checklists in IT project risk management (e.g. Kappelman et al., 2006; Keil et al., 2002; Nakatsu & Iacovou, 2009; Schmidt et al., 2001; Silveira et al., 2018). To further understand and classify risk factors, some studies proposed analytical frameworks to cluster and categorize similar risk factors (e.g. Barki et al., 1993; Keil et al., 1998; Liu, 2016; Liu et al., 2010; Wallace et al., 2004a, 2004b). Such frameworks describe multiple dimensions of IT project risks and provide a systematic, comprehensive approach to define and identify each risk category. For example, Wallace et al. (2004a) differentiated various risk factors into three dimensions, i.e. social subsystem risk that includes organizational environment and user risks, technical subsystem risk that includes requirements risk and project complexity risk, and project management risk that includes planning and control risks and team risk. Keil et al. (1998) proposed a framework that divided risks into four groups including environment, customer mandate, execution, and scope and requirements. Barki et al. (1993) classified numerous risks into technological newness, application size, lack of expertise, application complexity, and organizational environment. Similarly, Liu (2016) clustered risks into organization, requirement, user, technology, team, and market and competition.

Though these risk categories have slightly different definitions and scopes, they share common underlying elements in their classifications. The first element is people-related that involves teams, users, management, and other stakeholders. The second element is process-related that include risks in project planning, execution, and controlling. The third element is technology-related, such as project complexity, technological newness, and special requirements. Consistent with these elements, Berkun (2005) proposed a people-process-technology framework to understand project management challenges. In addition, the fourth element that is concerned with project environments, such as market competition, legal environment, and culture has also been discussed in the literature. The fourth element is especially important in the contexts of global IT projects (e.g. Krishna et al., 2004; Lee & Baby, 2013; Persson et al., 2009).

Our study adopts the people, process, technology, and environment as the common underlying elements of IT project risks that are also suitable for the contexts of developing economies (Lee & Baby, 2013; Lee & Namayanja, 2019). The *people* element of an IT project refers to all participating teams and their members at various locations and positions. The *process* element refers to the operational and strategic dimensions of project management, such as procedures, policies, methodologies, and strategic plans. The *technology* element refers to technological means, such as services, development, infrastructure, and platforms that support the people and process elements in an IT project. Lastly, the *environment element* refers to a project's external environments, such as political and legal contexts, which are frequently beyond a project team's control (Lee & Baby, 2013; Persson et al., 2009). Table 1 shows examples of relevant risk areas for each of the project elements.

Table 1 - Relevant Risk Areas Per Project Element

Elements	Relevant Risk Areas
People	Relationships among project members and groups, sharing of project goals, levels of knowledge, individual backgrounds, etc.
Process	PM practices, organizational structures, roles, rules and policy, operational processes, etc.
Technology	Accessibility to IT resources, such as hardware, software, and human IT resources, technology standards and requirements, etc.
External Environment	Legal and compliance requirements, external support, financial resources and stability, etc.

IT projects in developing economies involve these project elements and their relevant risk areas. However, they have a unique set of risks due to their distinctive characteristics.

Project Characteristics of Developing Economies

Many IT project management theories and practices were developed primarily based on experiences in developed Western economies. The culture and economic assumptions of developed economies are embodied in the standard processes, tools, techniques, and guidance, known as *best practices* (Muriithi & Crawford, 2003). However, IT projects in other settings may face more complex, unique challenges (e.g. Feng et al., 2011; Lee & Baby, 2013; Liu et al., 2010; Philp et al., 2010). Specifically, IT projects in developing economies can impose barriers to project success that cannot be easily solved using best practices derived from developed economies (Lee & Namayanja, 2019). Thus, it is crucial to understand the unique aspects of IT projects in developing economies.

Many external factors such as culture and economic development can affect risks in IT projects and the stakeholders' perceptions about these risks (Liu et al., 2010; Prasad et al., 2013; Schmidt et al., 2001). The characteristics of developing economies include inadequate technology and capital, varying dependence on international trade, low literacy levels, unskilled labor, poorly developed economic and political institutions, to mention a few (Nafziger et al. 2012). These characteristics can have significant impacts on the challenges faced by IT projects. Prior studies in developing economies and global project management have highlighted several characteristics of projects in developing economies. They can be classified into four categories, i.e. *complex stakeholder groups, unprecedented technology and project, infrastructural immaturity, and cultural uniqueness* (e.g. Frimpong et al., 2003; Lee & Baby, 2013; Lee & Namayanja, 2019; Muriithi & Crawford, 2003; Nafziger et al., 2012; Persson et al., 2009; Schmidt et al., 2001). These categories present unique characteristics of IT projects in developing economies.

First, projects in developing economies typically have diverse, multiple key stakeholders who can significantly influence a project's operations and outcomes. For example, government,

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local and foreign organizations, non-governmental organizations (NGOs), private or public sectors, financial institutions, media, and various international communities usually play a critical role in a project's success. Therefore, such projects often have great public visibility and government involvement (Abbasi & Al-Mharmah, 2000; Avots, 1972; Muriithi & Crawford, 2003). Each group has its goals, values, processes, practices, and expectations, which are not necessarily compatible. The interactions within and between such subgroups increase complexity of these projects. This broad, diverse setting of stakeholder groups generates new types of challenges for projects in developing economies associated to high bureaucracy and inefficiency (Yanwan, 2012).

Second, projects in developing economies are often unprecedented in terms of project scope, requirements, and technologies involved, thus requiring new approaches (Avots, 1972). This unprecedented dimension refers to the state of newness of technology and IT projects to developing economies. With limited exposure to advanced technologies, many project stakeholders involved in IT projects have inadequate knowledge about both the technologies being developed and used in projects. They also have limited experience in planning, managing, and controlling these projects (Frimpong et al., 2003). These projects often lack well-established practices and procedures that govern the project setting. Additionally, the projects are incapacitated due to lack of well-trained and efficient human resources, appropriate technologies, and external support, such as financial resources. Overall, the newness of these projects to stakeholders and lack of experience in developing economies imposes risk to the attainment of project goals (Yanwan, 2012).

Third, developing economies face a shortage of the appropriate infrastructures to support the operation of projects (Adeoye & Islam, 2019; Avots, 1972; Ndou, 2004). There are various infrastructures required for IT projects, involving both tangible and intangible. According to Fourie (2006), infrastructures can be categorized into each of economic and social infastructures. The economic infrastructure is mainly to promote economic activity, such as roads, electricity, and telecommunications, while the social infrastructure is mainly to promote "the health, education, and cultural standards of the population" (p. 531). Services or supports provided by these infrastructures are particularly crucial to the success of IT projects (Yanwan, 2012). Technological infrastructure (as an economic infrastructure), such as secure web servers, data centers, and broadband internet connections, provide foundations for the development and operations of information systems. Without such technical foundations, information systems cannot be successfully developed and deployed. However, a large percentage of the population in developing economies are still out of reach of such technological infrastructure (Kapurubandara & Lawson, 2006; Moertini, 2012; Ndou, 2004). New technologies needed for IT projects are also frequently unmatched with the existing technological infrastructure due to the digital divide in developing economies (Dewan & Riggins, 2005; James, 2002). The lack of appropriate social support (as a social infrastructure) also impose challenges to IT project success. For example, the lack of public education infrastructure in developing economies (as a social infrastructure) usually results in limited IT experts and educated users who can adopt advanced technologies.

Lastly, each developing economy has its own unique culture and needs. Therefore, it is important to understand the role of culture in information systems projects (Liang, 2009). Culture consists of prevailing and shared values, norms, assumptions, belief systems, languages, and behavioral patterns in a society or cultural group (Aycan, 2004). Previous literature has been called to understand the cultural dimension of projects that can distinguish developing from developed economies (e.g. Hofstede & Bond, 1988; Krishna et al., 2004; Lee et al., 2020; Muriithi & Crawford, 2003). Because culture and economic factors can influence determine people's norms, values, beliefs and behaviors, transferring project management theories and practices originated from developed economies directly to developing economies, resulted in many inefficiencies and failures. Muriithi and Crawford (2003), for example, argue that project team members from developing economies are more likely to accept an unequal

distribution of power and authority within their team. They also argue that project team members from developing economies tend to have stronger emotional resistance to change. With such societal disparities, project collaboration suffers due to different work processes, perceptions, needs, and values across diverse cultural groups within a project (Krishna et al., 2004).

Table 2 summarizes the four characteristics of projects in developing economies. We believe these project characteristics of developing economies shape the unique risks in IT projects.

Table 2 - Characteristics of Projects in Developing Economies

Characteristics	Definitions
Complex Stakeholder Groups	The complex mesh network of diverse stakeholders that exist in projects in developing economies, usually involving government, public, local, and foreign organizations as prime interest groups.
Unprecedented Technology and Project	The state of newness of technologies and projects in developing economies and the limited knowledge, experience, and relevant resources regarding them.
Infrastructural Immaturity	The immature and limited infrastructures to support projects, such as social, physical, organizational, operational, and technological.
Cultural Uniqueness	The unique behavioral patterns of individuals and groups that are shaped by the cultural identities, values, and societal norms to which they belong.

A Conceptual Framework for Identification of IT Project Risks in Developing Economies

Based upon the above conceptual bases of the project elements and the project characteristics of developing economies, we propose a conceptual framework for identification of IT project risk factors in developing economies as shown in Table 3.

Table 3 - A Conceptual Framework for Risk Identification

Characteristics of Developing Economies / Project Elements	Complex Stakeholder Groups	Unprecedented Technology and Project	Infrastructural Immaturity	Cultural Uniqueness
People	RC1. Conflicting Group Interests	RC2. Insufficient IT Knowledge and Skills	RC3. Low Project Value Cognition (Lack of Social Infrastructure)	RC4. Clashes between Foreign and Local Cultures
Process	RC5. Inconsistent Work Processes among Diverse Stakeholders	RC6. Lack of Appropriate Project Processes	RC7. Inadequate Operational Infrastructure to Support Projects	RC8. Ineffective Work Processes Influenced by Local Cultures
Technology	RC9. Discrepancy in IT Resources and Preferences	RC10. Limited Access to Needed IT Assets	RC11. Insufficient Technological Infrastructures	RC12. Unexpected Local Technology Preferences
External Environment	RC13. Heterogeneous External Environments	RC14. Lack of External Commitment on Project	RC15. Lack of Educational Infrastructure	RC16. Misuse of Sensitive Cultural Elements

RC: Risk Category

Risk Category 1. Conflicting Group Interests

This category defines the risk factors caused by complex interests, project goals, and desired outcomes among multiple stakeholder groups with diverse backgrounds. Many IT projects in developing economies are high profile projects that involve stakeholders with various

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backgrounds, such as foreign consultants, IT vendors, sponsors from developed countries, and stakeholders from local governments (Abbasi & Al-Mharmah, 2000; Muriithi & Crawford, 2003). The goals and expectations of each stakeholder are greatly influenced by their interests, knowledge, and experiences. The goals and expectations of stakeholders from industrialized countries are likely to mismatch those from local organizations due to the distance between the two contexts (Heeks, 2002). Stakeholders from public sectors may have different priorities from private investors. Hence, complex interests and expectations among stakeholders in these projects are usually difficult to reconcile, causing confusion, and conflicts.

Risk Category 2. Insufficient IT Knowledge and Skills

This risk category describes the risk factors caused by insufficient knowledge and skills in technology and IT projects. In general, IT professionals and stakeholders in developing economies have limited exposure to current technologies and inadequate experiences with IT projects (Abbasi & Al-Mharmah, 2000). They lack expertise in new techniques, development skills, application domain, project management, and user experiences and support (Addison, 2003). As a result, technologies might not be fully leveraged and qualified IT professionals may not be available. Such lack of talents and essential knowledge among local stakeholders could slow down project progress and prevent the successful implementation of an IT project.

Risk Category 3. Low Project Value Cognition (Lack of Social Infrastructure)

This risk category is associated with the local people's low value cognition of IT products and services, especially software, in developing economies. This value system falls into the category of social infrastructures that promote common social values among local communities (Fourie, 2006). Social values can affect people's attitudes toward a product or phenomenon (Cicourel 1973). In developing economies, people have limited understanding of benefits of IT products and services such as convenience, better communications, reduced service cost, accessibility, and citizen engagement (Kshetri, 2010; Prasad et al., 2013). Thus, overall values shared by local society underestimate the importance of IT-based services and fail to appreciate IT projects. Such overall low level of value toward IT may prevent the successful adoption of IT products and services in the society.

Risk Category 4. Clashes between Foreign and Local Cultures

This category defines the risks arising from conflicts between foreign and local cultures. Prior studies have shown that the cultural differences between developing and developed economies, e.g. their attitudes towards power distribution, authority, and changes, have impacts on system development, project management, and technology adoption (Muriithi and Crawford, 2003; Krishna et al., 2004). Their cultural background consciously and unconsciously influences people's decisions and actions while collaborating in IT projects (Heeks, 2002). It is common for foreign stakeholders with different cultural backgrounds to make decisions or take actions that are contradictory to local customs. Such cultural clashes can generate conflicts among them (Lee et al., 2020).

Risk Category 5. Inconsistent Work Processes among Diverse Stakeholders

This category defines the risk factors caused by inconsistent work processes among diverse stakeholder groups. IT projects in these developing economies typically involve many influential stakeholder groups that belong to different organizations, such as government, public, local, and foreign organizations (Abbasi & Al-Mharmah, 2000; Avots, 1972; Muriithi & Crawford, 2003). Each of these organizations has its own business processes, protocols, requirements, and reporting structures. IT projects need to coordinate these stakeholders and involve them in decision-making and development processes. The complexity of coordinating diverse, heterogeneous processes can pose challenges in project management.

Risk Category 6. Lack of Appropriate Project Processes

This risk category defines the risk factors due to lack of formal, professional project management processes and methods in place to support new technologies and projects. The scopes and technologies in modern projects are usually unprecedented to developing economies, requiring up-to-date processes and methodologies to manage them. However, current knowledge on project management processes that is derived from experiences in developed economies may not be suitable for IT projects in developing economies (Feng et al., 2011; Lee & Baby, 2013). Thus, work processes in developing economies for such projects are usually ad-hoc instead of well planned. The lack of planning, monitoring, and controlling increases uncertainties and challenges for these new, innovative IT projects. As a result, the quality of outcomes is usually hard to control, which hurt the performance of the project.

Risk Category 7. Inadequate Operational Infrastructure to Support Projects

This category defines the risk factors associated with inadequate organizational operations and structures to support IT projects. A successful IT project relies on the support from its organizational environment and business operations (Wallace et al., 2004a, 2004b). Project development units need to cooperate with other non-IT operations both within and beyond an organization (Liu et al., 2010). Particularly, project teams need to collaborate with other business functions and get effective operational support from their partners, frequently including government in developing economies. However, many organizations in developing economies do not have effective operational infrastructures for such business procedures and economic developments in place to support efficient and effective interactions and collaborations. Low level of operational efficiency generates negative effects on the productivity of a project.

Risk Category 8. Ineffective Work Processes Influenced by Local Cultures

This risk category describes the risks in PM work procedures influenced by unique local cultures. Developing economies have their cultural characteristics, such as relationships superseding rules, interrelated work and family lives, harmony in work performance, emphasis on non-confrontational interaction, and respecting “authority” (Aycan, 2004). Such cultural characteristics have significant influence on local people’s decisions and needs. Failing to consider local needs in developing and decision-making processes can cause failure of a project. Further, some of the cultural factors can intervene with PM processes when conflicts arise between processes and customs. Cultural considerations may have priority over process efficiency and productivity, which poses risks in project processes.

Risk Category 9. Discrepancy in IT Resources and Preferences

This category defines the risk factors associated with discrepancy in IT resources and preferences possessed by various stakeholder groups. Stakeholders that belong to different organizations have access to different IT resources. For example, foreign partners and sponsors may have access to more advanced technologies and tools than local organizations (Prasad et al., 2013). They also have different perceptions and preferences on technologies and standards (Heeks, 2002). Such discrepancy in IT can cause technological incompatibility challenges in collaboration. Such incompatibility in technologies may lead to difficulties in system design, implementation, or integration, which affect the progress of a project.

Risk Category 10. Limited Access to Needed IT Assets

This category defines the risks factors associated with the limited access to needed IT assets (hardware and software). IT projects usually require or target up-to-date technologies. However, developing economies have limited access to modern hardware and software.

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Adoption of new technologies in both IT organizations and users' communities in developing economies is typically slower than that in developed ones. Lack of these IT assets in organizations and in society can obstruct the progress of the project and prevent target users from achieving full benefits from information systems (Hoque & Boateng, 2017).

Risk Category 11. Insufficient Technological Infrastructures

This risk category defines the risks about the insufficient and unstable technological infrastructures, e.g. data and network infrastructures and electric supply in developing economies. Though technological infrastructures are important economic infrastructures for the success of IT projects, developing economies have relatively low investment in such infrastructures (Hoque & Boateng, 2017; Prasad et al., 2013). Due to the limited resources, the extant technical infrastructures are usually outdated with low quality, which leads to unreliable services and performance. Such immature technical infrastructures not only hinder the capability of IT projects to deliver high quality final products, but also obstruct adoption and diffusion of new systems among users (Kshetri, 2010). As a result, it can negatively affect the development of IT projects as well as discourage end users from utilizing the IT product.

Risk Category 12. Unexpected Local Technology Preferences

This category defines the risk factors associated with unexpected technology preferences and requirements from local stakeholders and communities. Local cultural values and economic development have profound influence on end users and their preferences (Abbasi & Al-Mharmah, 2000; Prasad et al., 2013). It is potentially disastrous if one assumes that standard and/or up-to-date features in developed economies have the same market demand in developing economies. Unexpected technology preferences of local users are common. Inadequate investigation of the market and insufficient attention to the influence of local culture and its impact on users' behaviors can all lead to failure of IT projects (Heeks, 2002; Prasad et al., 2013).

Risk Category 13. Heterogeneous External Environments

This risk category is associated with the diverse and complex industrial, political, and legal requirements imposed by heterogeneous environments that complex stakeholder groups must cope with. Many IT projects in developing economies involve stakeholders who come from different international communities, each of which may have their own various social and legal requirements (Heeks, 2002). Thus, such IT projects are expected to comply with these international standards and constraints in addition to local standards. Such diversity in stakeholder groups increases the complexity of development and deployment environments, which can impose challenges on projects (Muriithi & Crawford, 2003).

Risk Category 14. Lack of External Commitment on Project

This risk category is associated with the limited and unstable external resources and commitment, such as budget and procedural supports by government, to ensure the success of an IT project. Many IT projects in developing economies attempt to adopt current technologies and new design concepts in the hope of catching up with the global advancements (Kshetri, 2010). The unprecedented nature of these projects usually requires strong commitment and support from external environments like government or other international aid organizations. However, IT projects in developing economies may not obtain the support they need from their external environment (Kshetri, 2010; Muriithi & Crawford, 2003).

Risk Category 15. Lack of Educational Infrastructure

This risk category is about the insufficient and underdeveloped educational infrastructures in the external environment to support IT education. Education infrastructure is an important part of social infrastructures that can directly affect the quality of life (Fourie, 2006). The poor educational infrastructure for general education on technologies in developing economies can cause a society-wide lower level of understanding of up-to-date technologies, which can restrict the adoption and diffusion of the technologies among public users (Prasad et al., 2013). In addition, developing economies also typically lack adequate educational infrastructures for IT professional training, which can cause the shortage of IT expertise.

Risk Category 16. Misuse of Sensitive Cultural Elements

This risk category is associated with misinterpreting or misusing sensitive cultural elements in IT products. For example, although the unique cultural components such as historical symbols are not directly related to the specific goal, process, and technology of a project, using such sensitive symbols in inappropriate ways in products can raise questions, thus hindering the adoption of the project outcomes. Hence, the values embedded in IT products and services need to be consistent with what society cherish (Ndou, 2004; Yanwan, 2012).

Validation of the Conceptual Framework

The conceptual framework proposed through this study was validated using the IT project cases of two specific developing economies, i.e. Cambodia and Uganda. According to the World Bank (2014), the characteristics of these economies match those of developing economies described (also see IMF, 2019). While Cambodia and Uganda belong to distinctive cultural groups of South East Asia and East Africa respectively, they share certain common characteristics, such as post-conflict, yet fast growing economies (Leliverld, 2008). Hence, validating the conceptual framework using the two economies is considered well fitting and useful to the purpose of this study.

Data Gathering and Risk Identification Procedures

For our data gathering, we conducted semi-structured face-to-face interviews with industry experts who have experience in various IT-related projects in the two developing economies (Flick, 2009). During the interviews, the industry experts were asked to elaborate on their experience of a key IT project that they were involved in and the risks that they faced during the project, particularly related to the key elements of the projects, i.e. people, process, technology, and external environment. The duration of each interview was approximately 1 to 2 hours.

A total of 17 experts were interviewed, 9 experts from Cambodia and 8 experts from Uganda – each expert represented one IT project case. Our interviewees consisted of project managers, project sponsors, and senior project members who have worked on IT projects in the target regions. We selected these groups of individuals because we believed that in their capacity, they oversaw the projects and thus were able to provide details with respect to the risk factors emerged during their projects. The project domains include health, finance, manufacturing, telecommunications, software development, and education. These projects are also categorized under their sectors, such as private (commercial), government, and public (NGO). The interviewees are also categorized based on their role in the projects, such as vendor, client, subsidiary and sponsor, and their origins, such as local and foreign. The demographics of the expert interviewees and their projects are summarized in Table 4.

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Table 4 - Demographics of the Investigated Projects and Expert Interviewees			
Demographics	**Categories**	**N**	**%**
Experts by Region	Cambodia	9	53%
	Uganda	8	47%
Types of Project	Private Project (Commercial)	7	41%
	Government Project	6	35%
	Public Project (NGO)	4	24%
Main Project Organizations	Third Party Vendor	7	41%
	Internal IT Department	5	29%
	NGO	5	29%
Origin of Leading Project Organization	Local	6	35%
	Local and Foreign	6	35%
	Foreign	5	29%
Positions of Expert Interviewee	Project Manager	10	59%
	Senior Project Member	6	35%
	Project Sponsor	1	6%
Origins of Expert Interviewee	Local	14	82%
	Foreign	3	18%
Role of Expert Interviewee	Vendor	9	53%
	Client	6	35%
	Subsidiary (Internal IT)	1	6%
	Sponsor (Financial)	1	6%

All interviews were recorded and transcribed later. Most of the interviews were conducted in English, but for the cases of using local language, the scripts were translated to English before data analysis. Using the interview scripts, specific risk incidents that each project had faced were coded. Following the suggestions in literature (Miles & Huberman, 1994; Strauss, 1987), we transcribed the interview data, reviewed the data line by line, and labeled each of the risk incidents by referring a preliminary-defined list of codes. Finally, we coded a total of 257 risk incidents (Cambodia=138, Uganda=119) from the 17 project cases. The coded risk incidents were then matched with the proposed framework through a total of four rounds of independent matching by two researchers. In each round, the results from each of the coders were compared. Through the iterations, the list of risk codes was enhanced, and matching results were improved. The consistency between the two researchers, i.e., their inter-rater reliability, was validated using Cohen's Kappa (McHugh, 2012). Through a total of four rounds of matching, the scores of Kappa was improved from 0.42 to 0.98 for the Cambodia cases and from 0.47 to 0.97 for the Uganda cases respectively.[1] Based on the matched results, we then identified and conceptualized the country-specific risk factors of IT projects in each of the two developing economies.

Identification of IT Project Risk Factors in Cambodia

Through our matching process, we successfully identified 16 unique risk factors matched with all the 16 risk categories (RCs) in our conceptual framework respectively.

- Confusion due to Unclear and Inconsistent Project Goals among Stakeholders

  A total of 19 risk incidents (13.8%) were matched with RC1. The risk incidents mainly involved unclear and inconsistent project goals and project priorities among various stakeholders and thus their complex relationships in terms of their interests and

[1] According to McHugh (2012), our first Kappa score falls into the range of "weak" agreement (i.e., 0.4-0.59), while the final score is considered as "almost perfect" agreement (i.e., above 0.9). When considering the qualitative and unstructured nature of the initial round of matching, the weak agreement result between the two coders is understandable.

requirements. Due to this risk, a project had multiple and heterogeneous goals that frequently caused serious confusion among the various stakeholders in the IT projects in Cambodia. For example,

> *"The foreign headquarters did not set clear project goals in the beginning of a project to build an operations management system since they viewed this project as an experiment for a new market. Thus, my team and I did not have clear direction about the project schedules and expected outcomes. We had significant pressure to make something within a short time for our daily operations."*

- Miscommunication due to the Lack of Technical Knowledge among Local Stakeholders

A total of 19 risk incidents (13.8%) were matched with RC2. The risk incidents mainly involved the lack of knowledge and experience about the target technologies and projects especially by the local stakeholders, i.e. government, local vendors or NGOs, local clients, and local users, which frequently resulted in miscommunication among stakeholders, unrealistic project goals, and unexpected surprises in the middle or end of projects. The incidents also included difficulty in finding skillful local project managers and developers who were the key project stakeholders. For example,

> *"Our company was requested to develop an e-government system. Due to the lack of understanding and experience in IT projects by both the government and our internal members, however, there was no sufficient preparation for operation and maintenance of the system, which resulted in the project being placed on hold for a significant amount of time after system implementation."*

- Local Users' Disagreement with the Value of Software-Based Services

A total of 2 risk incidents (1.4%) were matched with RC3. The risk incidents involved local users' resistance to pay for online or virtual services. Their disagreement with the concept of service or software charges is largely related with the overall low level of the social value of services in Cambodia. For example,

> *"Our service was to provide an online platform for local bus ticket reservations. During the system and service implementation, we confronted serious hardship to make both the bus companies and users understand the charges on the online service due to the overall low perception on services, especially online and software-based services, in Cambodia."*

- Strong Family-Oriented Behavior Patterns within and across Local Stakeholder Groups

A total of 17 risk incidents (12.3%) were matched with RC4. The risk incidents mainly involved the unique cultural patterns of strong family-orientation in the people's relationship. This cultural characteristic applied not only within a project group or company but also across different project stakeholder groups, e.g. between government and local vendors and between foreign manager and local project members. These cultural patterns frequently caused inefficient decision-making processes and behavioral conflicts especially when involving foreign stakeholders. Language barriers among globalized stakeholders added more difficulties to understand different behavioral patterns and expectations within a project group. For example,

> *"I (as a foreign project manager) could not understand why Cambodian employees call others using family structures, like calling a manager "uncle". I felt isolated within the project team for a while, which resulted in significant difficulties in managing and communicating with local project members."*

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- Heterogeneous PM Processes and Organizational Structures among Stakeholders

A total of 4 risk incidents (2.9%) were matched with RC5. The risk incidents involved different approaches and practices in project management by different stakeholders, e.g. between foreign vendors and local clients, and functional deviances even among departments and divisions within an organization. Such heterogeneous processes frequently generated high complexity in communication channels and reporting lines among various project stakeholders. For example,

> *"Communicating the project progress was very difficult due to the highly complex communication channels and procedures involving multiple hierarchical positions in other stakeholder organizations, especially in government projects."*

- Lack of Feasibility Study and Vendor Selection Process

A total of 29 risk incidents (21.0%) were matched with RC6. The most frequent risk incidents were about the lack of feasibility studies for technology and project requirements, leading to unrealistic or unclear project plans in the beginning and thus causing serious scope creep in the later stages. The next frequent risk incidents involved the absence of formal vendor selection and contract development processes, and unclear project responsibilities and control procedures. For example,

> *"There was no formal vendor selection process in our project team. The project manager did not know how to initiate vendor selection. As a result, a vendor was selected just based on a relationship in upper positions, and the contract documentation was not officially completed at all."*

- Disorganized and Complex Operational Processes with Absence of Key Operational Functions

A total of 3 risk incidents (2.2%) were matched with RC7. The risk incidents involved inefficient operational processes in local stakeholders (as their operational infrastructure), e.g., manual and complex approval processes, that caused unexpected delays during the project. In line with this operational inefficiency and uncertainty, a high turnover rate of project members with the absence of HR management was also reported. For example,

> *"Highly uncertain project environments caused very frequent changes in project requirements and plans. Such frequent changes continued to generate stress onto the project staff and members. Unfortunately, my organization did not have professional HR management support to retain valuable members. So, there was frequent loss of project staff."*

- Hierarchical Work Practices and Organizational Processes: No Problem Solving and Documenting

A total of 13 risk incidents (9.4%) were matched with RC8. The risk incidents mainly involved strong cultural factors embedded in the organizational processes, such as family-oriented and hierarchical work practices, which frequently resulted in escalating conflicts to the upper position without proper problem-solving effort and procedure. Many times, this cultural factor applied to a foreign project manager or top management who did not have sufficient understanding of the local contexts, which generated inappropriate decisions on a project. Another cultural factor was a tendency to avert documenting. For example,

"When the project had any conflict among project members or groups, the Cambodian culture and work procedures tend to forbid team members or even local project managers to solve the problem by themselves. Frequently, the project manager had to escalate the problems or conflicts to upper managers… resolving conflicts always required extra time."

- Different Technology Standards and Availabilities between Local and Foreign Stakeholders

A total of 2 risk incidents (1.4%) were matched with RC9. The risk incidents involved different technology standards and availabilities among stakeholders like local vendors, foreign headquarters (HQ), and government. For example,

"When a local vendor proposed a new software for a government project, this highlighted a serious gap between the foreign HQ and the client (government). While the foreign HQ required the utilization of new hardware to optimize the performance of the proposed software, the client insisted to install the new software in their existing hardware."

- Difficulties to Find High-Quality Local IT Assets

A total of 3 risk incidents (2.2%) were matched with RC10. The risk incidents in this category involved limited technology assets, such as specific software and hardware that either were required to directly or indirectly support the project progress and management. Especially, finding high-quality local vendors within Cambodia was reported as a significant challenge during the projects. For example,

"Our project involved an implementation of a large-sized database regarding the history of Cambodia. We tried to find locally available IT equipment for the project, including scanners and large-scale storages. However, local vendors' equipment did not meet the quality standards while foreign equipment were too expensive. This generated technical problems with the locally-available resources and budget problems with the foreign resources."

- Lack of Accessibility to Stable, Secure, and Localized Network Services

A total of 9 risk incidents (6.5%) were matched with RC11. The risk incidents mainly involved the lack of accessibility to stable and secure technology infrastructures, such as poor and unstable Internet speed and unsecure network/mobile transactions, causing inefficiency in project progress. These issues were also related with users' low trust on network-based services in Cambodia like online payment, which resulted in project failure. In addition to the poor technology infrastructure, no localized service platforms (using Khmer) were also reported as a hindrance of user adoption of project outcomes. For example,

"The project was to build a transportation service network with a centralized online ticket purchase. However, people (local users) hesitated to use this service since they felt that electronic payment for online purchasing was not secure yet."

- Misunderstanding of Local Technology Maturity Levels and Unique Requirements by Foreign Project Manager and Team Members

A total of 5 risk incidents (3.6%) were matched with RC12. The risk incidents involved the lack of understanding of local technology maturity levels and unique requirements especially by foreign project managers and team members, which required critical

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changes in the middle or even end of projects. Such significant gaps between local user expectations and global project groups were frequently found in IT projects in Cambodia. For example,

> *"Our project was to educate and support women with special needs especially in rural areas using a mobile app. The project team had to alter the system design to meet the unexpected requirements of this user group because the women in rural areas preferred voice interaction over text interaction in using the mobile app due to their high illiteracy rate."*

- Project's Heterogeneous Sociopolitical Environments among Stakeholders

Only 1 risk incident (0.7%) was matched with RC13, which was about project's heterogeneous sociopolitical environments especially between local and foreign stakeholders. Specifically,

> *"The project was to form and support social groups for women's rights to use social media and other relevant technologies. However, government was conservative about sharing public opinions through social media. But, our foreign project sponsors could not understand it."*

- Lack of Project Continuity due to Unstable External (Foreign) Financial Sources

A total of 4 risk incidents (2.9%) were matched with RC14. The risk incidents in this category involved the limited and unstable financial sources for new project initiatives causing the lack of project stability and continuity in projects. Such instability of project budgets frequently led to strong dependency on external budget availability for project planning, not on the project goals. For example,

> *"Our project needed to use foreign vendors' services due to the low-quality services by local vendors. However, the limited project budget did not allow it. We had to wait one more year to get a new budget."*

- No Local Education Programs for Technology and PM Trainings

A total of 7 risk incidents (5.1%) were matched with RC15. The risk incidents in this category mainly involved the lack or absence of educational programs (a social infrastructure) for technology and professional PM trainings, e.g. for app development and for human resource management skills. This risk became more serious when the projects needed to use only local team members. For example,

> *"During the project, several problems in communication and team management among local project members occurred. In order to address these problems, our top management attempted to identify local professional training programs, especially for project soft-skills, such as project communication and motivation skills, but we could not find the right one."*

- Restriction on IT Use Behaviors due to Strong Value Recognition on Cultural Heritage

Only 1 risk incident (0.7%) was matched with RC16, which was about a cultural restriction on project outcomes. Specifically,

> *"We used images of Angkor Wat as the background in our game app, which resulted in users' resistance. We found that this cultural heritage is a central symbol of*

Cambodian culture and thus people were too respectful to use its images in a mobile game."

Identification of IT Project Risk Factors in Uganda

From the Uganda cases, we identified 14 unique risk factors matched with the proposed risk categories (RCs), except for RC15 and RC16.

- Conflicts due to Divergent Project Interests and Priorities among Stakeholders

  A total of 9 risk incidents (7.6%) were matched with RC1. The risk incidents mainly involved heterogeneous project goals, objectives, and priorities among the divergent stakeholders. Often, this resulted into conflicts among the diverse groups within an IT project in Uganda. For example,

  "The foreign funding organization set strict timelines to support an underlying program. Because of this, our team had to rush the project from development to deployment without testing. This resulted into a lot of change requests during the deployment phase, whereby users did not get a chance to test the system and thus were unaware of some of its functionalities."

- Poor Decision-Making due to the Lack of Proper Technology and Project Experience and Workforce Capacity

  A total of 24 risk incidents (20.2%) were matched with RC2. These risk incidents mainly described insufficient knowledge and experience in new technologies and IT projects, which culminated into overall poor project decision-making. For example,

  "During the roll-out of the system, remote users of the system were unable to provide accurate information of the system's output to our offsite project technical team. As a result, the technical team had to recall all remotely used system devices in order to directly evaluate and address the problem which resulted in unnecessary project costs."

- Lack of Awareness of the Value of Technologies

  Only 1 risk incident (0.8%) was matched with RC3. The risk incident was about insufficient understanding of technologies and their value in the workplace due to the conservative mindset of local people in Uganda. Specifically,

  "*There was a serious challenge to change individuals' mindsets about a new system within the organization. Particularly, senior employees were highly resistant to the idea of being taught new things along with the new technology initiative. Our project team received backlash in regards to the initiative proposed by the top management because employees believed that the new technology was not useful but harmful to their jobs."*

- Difficulties in Communication due to Linguistic Differences

  Only 1 risk incident (0.8%) was matched with RC4. The risk incident reflected the cultural conflicts between foreign and local project stakeholders, such as unique customs and language usages. Specifically,

  "Our local project team had difficulty in communicating with the foreign vendor due to language barrier. This inherently slowed down the project during the later stages, especially during the testing phase given that the foreign team was mostly offsite and

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communications had to be done electronically, which generated more difficulties in understanding each other."

- Non-Inclusive Collaboration Process due to Conflicting Organizational Processes among Stakeholders

A total of 11 risk incidents (9.2%) were matched with RC5. The risk incidents mainly described inconsistent work processes among diverse stakeholder groups due to the poor communications among project teams and key interest groups. As a result, some stakeholders, especially local, were not properly involved in the project process. For example

"Our local IT team and foreign vendor lacked a common understanding of project requirements. This was due to the lack of involvement of our local team in the requirements definition phase by our local top management… resulting in continuous confusion during the project."

- Lack of Structured (Formal) PM Procedures, Guidelines, and Policies

A total of 37 risk incidents (31.1%) were matched with RC6. The risk incidents centered on the inept PM practices in place. There was lack of formal PM procedures, including structured planning, testing, and controlling mechanisms in place to serve as a project standard for project managers and key decision-makers. For example,

"Our project contract was signed prior to gathering of any project requirements… the project scope was defined at a higher level. As a result, our project team had to conduct detailed requirements gathering during the project, which led to additional challenges regarding decisions on what should be within or outside the project scope."

- Overall Operational Incompetence due to Unstandardized Business Processes and Policies

A total of 5 risk incidents (4.2%) were matched with RC7. The risk incidents highlighted overall operational incompetence in Uganda, such as unstandardized operational policies and business processes in both private and public sectors. Some of the risk incidents were also related to the corruption within the local organizations overseen by the local stakeholders. For example,

"Individuals across the organization had different perspectives of the business processes. Views varied from a legal understanding, practice, experience, supervisory perspective among others. As a result, such diverse perspectives created confusion for our project team in determining the accurate workflow of a given business process."

- High Bureaucratic Decision-Making Processes: Neglecting Local Needs

A total of 5 risk incidents (4.2%) were matched with RC8. The risk incidents described constricted governance procedures that restricted decision-making to top-level management, such as local government or foreign HQ and thus affected timeliness of project approvals. With such red tape, the inclusion of the operational workforce from both the technical and business spectrums from the local team was sidelined. For example,

"The top-level management at HQ always made negotiations for procurement on behalf of the local sites in partner countries like Uganda. If HQ decided on the project, local sites were obligated to fulfil expectations, thus limiting their role to implementers and overseers of the selected vendors. However, this decision-making process often

ignored the specific needs of local sites in Uganda, such as unique technological requirements, customized services for the local customer base and customized local internal business processes."

- Mismatch in Technology Resources among Stakeholders

A total of 3 risk incidents (2.5%) were matched with RC9. The risk incidents were about discrepancy in technology resources and standards possessed by various stakeholder groups particularly from the perspective of the foreign and local sides. This affected the proper integration of systems, and in extreme cases, this resulted in complete abortion of the project implementation. For example,

"During the planning phase, the foreign stakeholder insisted to use open source software despite efforts from our local project team in trying to propose a customized solution. This technical discrepancy resulted in incompatibility between the foreign and our local systems and therefore leading to inefficient data management."

- Lack of Essential and Appropriate IT Assets

A total of 5 risk incidents (4.2%) were matched with RC10. The risk incidents described the inappropriate IT assets, mostly hardware, directly required to complete the project. For example,

"During the deployment of an application, there were technical failures, where hardware was being disintegrated during the implementation phase. With no clarity for the underlying cause and the lack of alternative hardware, our project team had to abandon the application altogether."

- Inadequate Network, Energy, and Geographic Data Infrastructures

A total of 6 risk incidents (5.0%) were matched with RC11. The risk incidents were mainly about insufficient and unstable technological and physical infrastructure required for project support, such as Internet connection, electric power supply, and geographic data services. Such constraints on infrastructure negatively affect the timely deployment of the project outcomes. For example,

"During the deployment stage, there were significant power outages that often lasted for long hours, thus creating delays in the system availability."

- Unfit and Conflicting Technology Choices due to Limited Understanding of Unique Technology Requirements

A total of 4 risk incidents (3.4%) were matched with RC12. The risk incidents described the unique technology requirements on the local side and the failure of foreign stakeholders to understand the unique local project contexts that would allow for customizable solutions and thus avoid unnecessary project failures. For example,

"During the project, our local technical team was overseen by a foreign vendor who did not fully understand our business context. This resulted in unnecessary functionalities being implemented, thus significantly derailing the project."

- Strict Regulatory and Compliance Requirements on Technology Use and Adoption

A total of 5 risk incidents (4.2%) were matched with RC13. The risk incidents in this category are associated with government pressures, legalities, and restrictions

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surrounding the use and adoption of technology requirements, such as restrictions on external cloud-based technologies. For example,

> *"Our local government pushed to avail certain system resources before the project was ready. As a result, the project team felt pressured, in part to maintain the running of the organization's operations."*

- Lack of Project Continuity due to Insufficient External (Government) Financial Support

  A total of 3 risk incidents (2.5%) were matched with RC14. The risk incidents were mainly associated with the limited and unstable financial support threatening project continuity. This was especially due to the lack of proper knowledge and awareness within government stakeholders about significance of the projects and their optimal funding requirement to sustain the projects. For example,

  > *"After the limited contract period between the foreign sponsor and our local government agencies, the project required continuous support from the government side. But, there was a problem to get continuous financial support to maintain the system following its deployment."*

From the Uganda cases, we could not identify any risk factors intersecting external environment risk with infrastructure immaturity and cultural uniqueness respectively.

Discussion

By applying the proposed risk identification framework to IT project cases in two developing economies, this study identified their unique risk factors. Table 5 summarizes the identified risk factors from Cambodia and Uganda respectively and Figure 1 shows their relative granularities between the two economies.

Table 5 - Identified Risk Factors for Cambodia and Uganda IT Project Cases

Risk Category	Cambodia Risk Factors (n=138, %)	Uganda Risk Factors (n=119, %)
RC1	Confusion due to unclear and inconsistent project goals among stakeholders (n=19, 13.8%)	Conflicts due to divergent project interests and priorities among stakeholders (n=9, 7.6%)
RC2	Miscommunication due to the lack of technical knowledge among local stakeholders (n=19, 13.8%)	Poor decision-making due to the lack of proper technology and project experience and workforce capacity (n=24, 20.2%)
RC3	Local users' disagreement with the value of software-based services (n=2, 1.4%)	Lack of awareness of the value of technologies (n=1, 0.8%)
RC4	Strong family-oriented behavior patterns within and across local project stakeholder groups (n=17, 12.3%)	Difficulties in communication due to linguistic differences (n=1, 0.8%)
RC5	Heterogeneous PM processes and organizational structures among stakeholders (n=4, 2.9%)	Non-inclusive collaboration process due to conflicting organizational processes among stakeholders (n=11, 9.2%)
RC6	Lack of feasibility study and vendor selection process (n=29, 21.0%)	Lack of structured (formal) PM procedures, guidelines, and policies (n=37, 31.1%)
RC7	Disorganized and complex operational processes with absence of key operational functions (n=3, 2.2%)	Overall operational incompetence due to unstandardized business processes and policies (n=5, 4.2%)

RC8	Hierarchical work practices and organizational processes: no problem solving and documenting (n=13, 9.4%)	High bureaucratic decision-making processes: neglecting local needs (n=5, 4.2%)
RC9	Different technology standards and availabilities between local and foreign stakeholders 2 (1.4%)	Mismatch in technology resources among stakeholders (n=3, 2.5%)
RC10	Difficulties to find high-quality local IT assets (n=3, 2.2%)	Lack of essential and appropriate IT assets resources (n=5, 4.2%)
RC11	Lack of accessibility to stable, secure, and localized network services (n=9, 6.5%)	Inadequate network, energy, and geographic data infrastructures (n=6, 5.0%)
RC12	Misunderstanding of local technology maturity levels and unique requirements by foreign project manager and team members (n=5, 3.6%)	Unfit and conflicting technology choices due to limited understanding of unique technology requirements (n=4, 3.4%)
RC13	Project's heterogeneous sociopolitical environments among stakeholders (n=1, 0.7%)	Strict regulatory and compliance requirements on technology use and adoption (n=5, 4.2%)
RC14	Lack of project continuity due to unstable external (foreign) financial sources (n=4, 2.9%)	Lack of project continuity due to insufficient external (government) financial support (n=3, 2.5%)
RC15	No local education programs for technology and PM trainings (n=7, 5.1%)	N/A
RC16	Restriction on IT use behaviors due to strong value recognition on cultural heritage (n=1, 0.7%)	N/A

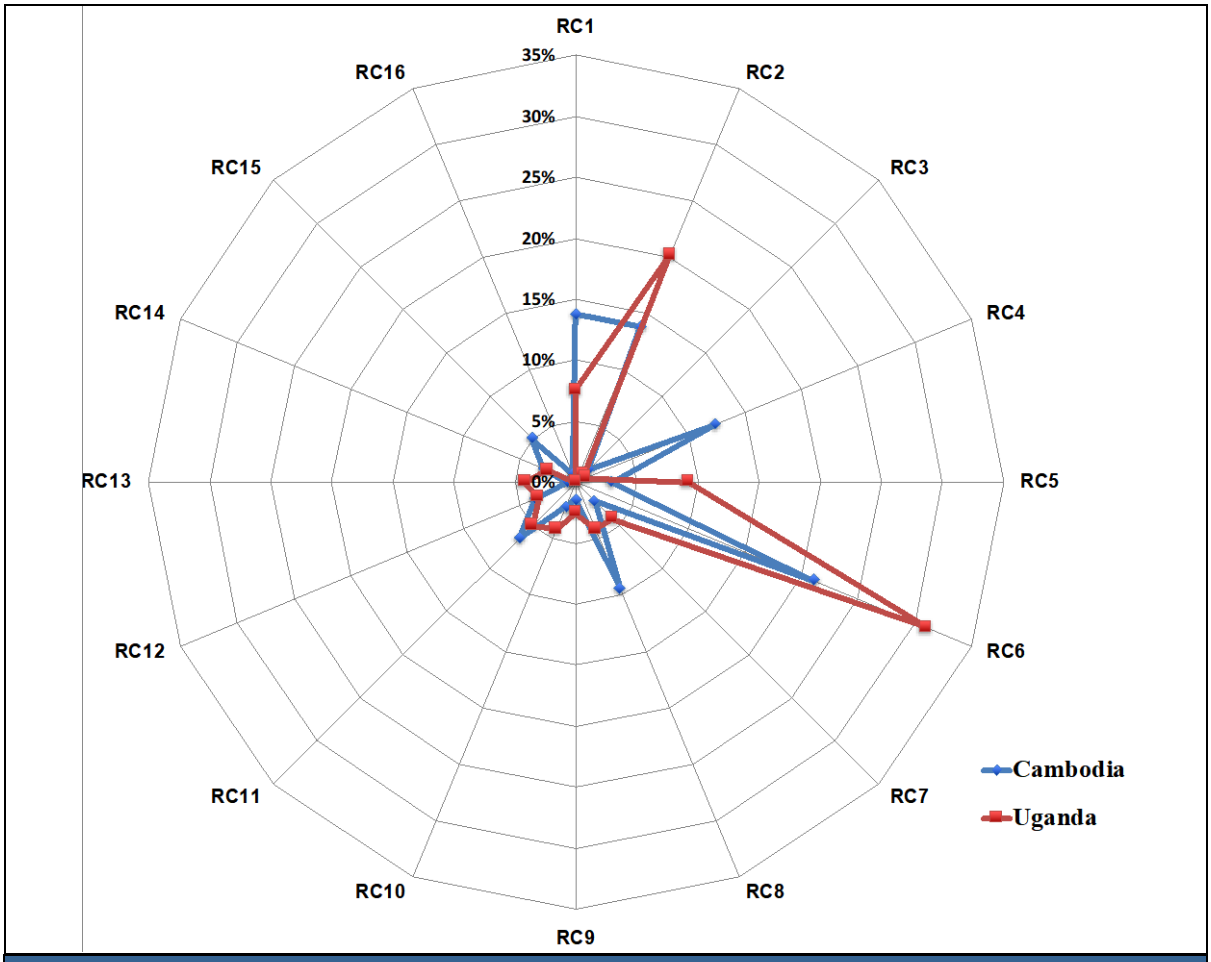

Figure 1 – Unique Risk Granularities of Cambodia and Uganda

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According to Table 5 and Figure 1, the top two risk categories showing the highest frequencies in both economies were RC6 (21% in Cambodia and 31.1% in Uganda) and RC2 (13.8% in Cambodia and 20.2% in Uganda). Both risk categories are under the developing economy characteristics dimension of unprecedented technology and project. In addition to these common high-risk factors, our results also reveal the unique risk granularity of each country. RC1 (13.8%), RC4 (12.3%), and RC8 (9.4%) are the next three highest risk categories in Cambodia, while RC5 (9.2%), RC1 (7.6%), and RC11 (5.0%) are the next three highest risk categories in Uganda. These unique risk granularities of IT projects may be attributed to the unique social, technological, and cultural conditions in each country (e.g. Bostrom & Heinen, 1977; Lee et al., 2009; Prasad et al., 2013).

First, the results indicate that the risk categories under the unprecedented technology and project characteristic are highly ranked in both countries. Particularly, lack of appropriate project processes (RC6) is the most critical risk that leads to frequent IT project failures in the two developing economies. The specific risk factor identified from IT project cases in Cambodia was the lack of feasibility study and vendor selection process. On the other hand, that of Uganda was the lack of structured PM procedures, guidelines, and policies. These findings reveal that the management processes for planning, monitoring, and controlling IT projects in the two developing economies are usually not formalized. In other words, their IT processes are unstandardized and immature, mainly due to the newness of IT projects in these economies. In the PM field, the standardization and maturity of PM processes have been considered as outcomes of adoption and education of industry best practices, such as the project management professional (PMP) and the capability maturity model integration (CMMI). These industry best practices involve the governance structure and frameworks, professional knowledge and practices, and their continuous educational programs for project managers and members (Kakar, 2017). Therefore, our risk results suggest government, NGO, and other organizations who aim to initiate new IT projects in developing economies should invest in training for standard PM processes at an early stage. The second highest risk category is insufficient IT knowledge and skills (RC2). These risk factors involve the miscommunication due to the lack of technical knowledge in local stakeholders (Cambodia), and the poor decision-making due to the lack of proper technology and project experience and workforce capacity (Uganda). The newness of advanced technologies to developing economies sounds somewhat obvious. However, the identified risk factors in the two economies highlight project leadership's lack of recognition of the relevant risks, including misunderstanding of local stakeholders and the lack of skills and insufficient IT knowledge especially among local stakeholders, such as government, local vendors, and public users. These risks frequently result in poor decision-making in various stages of a project. To address such risks, a project can be introduced progressively through multiple stages with sufficient training being provided especially to local project stakeholders, instead of a full-scale implementation of a new technology or system. Overall, our findings indicate that among the four project characteristics in developing economies, the unprecedented technology and project is the most critical characteristic that causes IT project risks in the two developing economies.

Second, the project risks under complex stakeholder groups and cultural uniqueness are highly ranked in Cambodia. Particularly, confusion due to unclear and inconsistent project goals among stakeholders (RC1), e.g. simply acquiring budgets from foreign sponsors instead of producing working systems for the public, generate serious conflicts among the project stakeholders in the middle of project. In line with this risk factor, the short-term orientation or the lack of long-term commitment of local NGOs and government was frequently mentioned during our interviews in Cambodia. Other two highly ranked risk factors are the strong family-oriented behavior patterns within and across local project stakeholder groups (RC4) and the hierarchical work practices and organizational processes which frequently results in no problem-solving effort and a tendency to avoiding documentation (RC8). Both risk factors are related to the cultural uniqueness of Cambodia, which affects most of the local stakeholders,

including local users or clients, local vendors, local project members, and government, and the organizational structure and work procedures of specific cultural groups (Hofstede & Bond, 1988). In the context of Cambodia, we found that a strong collectivism and family-oriented culture affects not only personal relationships, but also official ones, e.g. referring to top management or project manager as "uncle" and giving complete authority to them during a project. When foreign stakeholders like a foreign project manager and developers were involved, such cultural uniqueness was hard to understand and generated personal and procedural conflicts between the local and foreign project groups. Another interesting cultural uniqueness that affects the project process was a strong tendency to avoid problem solving and clear documentation. This cultural factor can be related to the strong hierarchical culture in Cambodia. According to Hofstede (1980, 1983), a high power distance society tends to have a strong hierarchical organizational structure and more complex authorization procedures. Moreover, Cambodia is known to have unique historical backgrounds, such as a long history of Khmer Empire, French colonization, and Khmer Rouge regime (Wikipedia, 2019). These backgrounds might generate many unique social and behavioral patterns. For example, some interviewees pointed out the Khmer Rouge regime as a historical background of the avoidance tendency for documenting behavior since the entire society has long suffered from a high level of illiteracy and fear to be educated after this historical tragedy. In addition, the geographical characteristics of Cambodia should also be considered. For example, while IT projects in Uganda tend to frequently involve neighboring countries; this is not a common practice in Cambodia. Such difference may generate culturally distinct contexts for IT projects in Cambodia. These findings indicate that Cambodia is highly influenced by their regional and cultural uniqueness. Therefore, understanding such unique behavioral contexts will be critical for project success in Cambodia especially when involving foreign-based project participants.

Lastly, the project risks under complex stakeholder groups and infrastructural immaturity are highly ranked in Uganda. Particularly, non-inclusive collaboration process due to conflicting organizational processes among stakeholders (RC5) was identified as the process risk by the complex stakeholder groups characteristic. Similarly, conflicts due to divergent project interests and priorities among stakeholders (RC1) was identified as the people risk under the same project characteristic. Like Cambodia, heterogeneous and inconsistent project processes and goals generate serious conflicts among the project stakeholders. However, the complexity of divergent stakeholder groups may provide more unique contexts of IT projects in Uganda. According to our interview results, IT projects in Uganda tend to frequently involve neighboring countries in addition to other foreign vendors and sponsors, which creates more complex dynamics among project stakeholders. Hence, their differences in work processes and organizational structures may cause inefficient project progress and lead to counterproductive behaviors such as intentional or unintentional exclusion of specific stakeholder groups' requirements. To avoid these risks, project managers (or management groups) should implement effective and broader communication channels, such as having regular meetings with various stakeholders to update project progress and issues. Another high-ranked risk factor was inadequate network, energy and geographic data infrastructures (RC11) as a technology risk by the infrastructure immaturity project characteristic. Recently, the number of IT projects in Uganda has dramatically increased due to new policies that articulate the government's commitment to foster research and development to transform Uganda into a knowledge-based economy. The new policies focus on strategic sectors such as information and communication technology (ICT) (Brar et al., 2010). According to our findings, however, IT projects in Uganda frequently face problems due to the low level of technology infrastructure, such as insufficient data networks, unstable electricity services, and inaccurate geographic data services. Contrasting to these findings, interestingly, we could not discover any risk factor regarding the external environment under the same project characteristic (RC15). Absence of this specific risk category might be related to government's growing commitment to technology-based education, resulting in a recent increase in social services and educational facilities in higher education. On the other hand, the cultural uniqueness-related risk factors in Uganda were also relatively ranked low. Relating to this

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finding, it should be noted that Uganda has higher accessibility to Western cultures and practices due to its geographical and historical contexts. Furthermore, less cultural conflicts could be expected in the Uganda context especially from working with neighboring countries that share a certain level of cultural and social similarity characterized by trans-regional ethnic groups, such as the Bantu in the South, West, and East, and the Nilotics in the North, East, and Northwestern (Kajumbula et al., 2006). This minimalist cultural impact may also explain the absence of risk factor in Uganda cases specifically in the category of misuse of sensitive cultural elements (RC16).

The findings of this study also support the extant literature on IT project risks in other contexts such as IT projects in developed economies and outsourcing projects (e.g., Keil et al., 2002; Nakatusu & Iacovou, 2009; Philp et al., 2010; Schmidt et al., 2001). Furthermore, our findings extend the general risk factors by contextualizing them with the unique environments of specific developing economy. For example, the risks associated with top management such as lack of top management support has been recognized as one of the most critical risks for IT project failure (e.g., Kappleman et al., 2006; Keil et al., 2002; Nakatusu & Iacovou, 2009; Schmidt et al., 2001). Our findings extend this general risk by highlighting the complex dynamics and conflicts between foreign and local management. Such conflicts are related to the unique project environments in developing economies, i.e., the lack of understanding of local requirements by foreign top management or headquarters. Many of our risks are shaped by cultural factors. For example, the hierarchical organization structure and culture in local sites frequently require decision-makings by foreign managers who do not have sufficient knowledge on local sites. These dynamics have seldom been discussed in extant studies. The lack of user involvement has also been well recognized as a key risk factor of IT project failure (e.g., Keil et al., 2002; Nakatusu & Iacovou, 2009; Schmidt et al., 2001). The extant findings in general contexts have focused on the lack of project team' or manager's intention or ability to involve users. However, our findings highlight social and infrastructural difficulties to involve local users in IT projects, such as the high literacy rate especially in rural areas and no internet service platform with local languages. These findings enrich our understanding about why certain risks more matter in specific developing economies.

Overall, understanding these variations in social, technical, and cultural contexts will be instrumental to project managers and sponsors who are initiating IT projects in these economies. In addition, these findings help us to further understand the risk factors in IT projects in developing economies and their underlying causes, which will be useful for developing appropriate risk mitigation strategies.

Conclusion

With rapid advancement in technologies and large opportunities of development in developing economies, more and more IT projects are initiated in this context. Global aid agencies, such as United States Agency for International Development (USAID), World Bank, United Nations Development Programme (UNDP), and United Nations Children's Fund (UNICEF), have already paid attention to information and communication technologies for development (ICT4D) projects to address developing countries' economic and social problems. Through these IT projects, many new technologies have been introduced to benefit their economy and public welfare. Many project organizations, however, are not adequately prepared to face unique challenges and project risks in those complex and unique environments. Regardless of its significance and urgency, IT project risk management in developing economies has largely been ignored in the literature. Thus, our understanding of the risk factors in IT projects in developing economies and their sources is very limited and largely untapped.

Through this study, we aim to propose a framework for identifying unique risk factors in IT projects in developing economies. For this, we conceptualized four characteristics of projects

in developing economies through a literature review in the relevant areas. The characteristics include complex stakeholder groups, unprecedented technology and project, infrastructural immaturity, and cultural uniqueness. We applied these characteristics to the four elements of IT projects, i.e. people, process, technology, and external environment, to form our framework. The framework was then applied to interview data for IT projects in two developing economies, Cambodia and Uganda, and then specific risk factors from each economy were identified.

Implications for Research and Practice

The proposed framework and the identified risk factors through this study will be useful for both academics and project practitioners who are or will be involved in IT projects in developing economies. First, the conceptual framework proposed in this study is an early attempt to provide a theoretical perspective in identifying and understanding potential IT project risks in developing economies by considering their unique characteristics. Furthermore, this study successfully identified context-specific risk factors for two specific economies. When considering the inability to generalize risk factors to all developing economies due to the unique social, technical, political, and cultural backgrounds of each developing economy, we believe our context-specific findings provide extra benefits to the literature. By applying the proposed framework and the same procedure for identifying project risks in other developing economies, the body of knowledge in IT project risks in developing economies will grow in literature. In line with this, the importance of deeper understanding of the history, cultures, customs, and economics through cross-disciplinary studies needs to be highlighted.

Second, the outcomes of this study, i.e. the identified risk factors based on the proposed framework, provide practical insight to better understand the IT projects and their challenges in the two developing economies. According to our findings, the biggest common project risks in the two economies fall into the category of lack of appropriate project processes. This category involves the lack of standardized PM procedures based on industry best practices, such as project requirement gathering, feasibility study, resource assessments, and vendor selection. Many projects in developing economies are mainly dependent on the availability of project budgets, without a proper process of project feasibility studies. Our findings clearly point out the significance of setting up formal PM processes in early stages of project initiation in developing economy contexts. Our findings also indicate the category of insufficient IT knowledge and skills (RC2) is another biggest source of project risks, which involve miscommunication and poor decision-making by local project stakeholders due to their lack of knowledge and experience in new technologies and IT projects. In addition to these common risk factors, our findings further reveal the unique risk granularities of each country, i.e., more cultural uniqueness-related project risks in Cambodia and more complex dynamics among stakeholders and infrastructural issues in Uganda. These differences are socially, historically, and geographically bound in each of the economies. Ignoring or misunderstanding these unique contexts of IT projects in each developing economy is likely to lead to project failures. Therefore, to achieve better outcomes, project managers or management groups should understand these unique aspects of their projects that can be achieved by an improved understanding of the cultural and social backgrounds of a specific economy.

Limitations and Future Research

This study examined IT project risks in developing economies using projects cases from two specific developing economies and thus has limitations in its findings. In the future, we aim to extend this study to other developing economies in order to gain sufficient insight that can be potentially applicable to more generalizable contexts of developing economies. In addition, this study adopted a qualitative approach in coding and understanding IT project risks from the interview results. This approach can generate rather subjective evaluation outcomes, although a rigorous process suggested by the relevant literature was applied. To augment our current findings and gain more objective insight, the study plans to adopt alternative

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approaches, such as text mining and specifically topic modelling, which involve methods in statistical modelling to identify abstract topics in project risks through text classification (Nikolenko et al., 2017).

This study can be extended into various directions. First, we found that different projects risks could be interdependent or have potential causal relationships. According to Lee and Baby (2013), project risks are characterized by "continuous changes involved in coordinating diversified internal elements (e.g., people, processes, and technology) and also dealing with ever-changing external environments" (p. 1122). Due to these dynamics, one risk can cause another risk. Hence, further investigation into their interdependent or causal relationships would be interesting and useful to both academics and practitioners. Moreover, in order to understand their deeper relationships, longitudinal research approaches will be required. Second, the current framework can be extended by modelling the different levels of significance or impact of each of the risk factors on project success or failure. A risk itself is an uncertainty, which can lead to either negative or positive outcomes (Hillson, 2004). Expanding the perspective of project risks into both negative and positive will provide a more holistic understanding of their roles in IT projects in developing economies. Furthermore, the framework will be extended by defining mitigation strategies along the dimensions of project elements and project characteristics. In this paper, we slightly discussed some recommended practices to reduce the risks or their impacts. However, a systematic approach or perspective will be further required to manage the dynamics of project risks (e.g. Lee & Baby, 2013; Liu, 2016).

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