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Application of the ground theory approach for investigating of knowledge requirement of global IS project manager

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Abstract

Using the constant comparative method of the grounded theory, the objective of this research is to identify the critical knowledge required of a global IS project manager. Although the objective of the study is to identify the knowledge required of a global IS project manager, this study focused to identify distinctive challenges of global IS projects and to derive the knowledge requirements of project managers to cope with the challenges. The identified knowledge requirements include system knowledge, business domain knowledge, technical project management knowledge, cultural knowledge, and interpersonal knowledge. This study also found that "information search", "adaptability", "responsiveness", and "flexibility" of global IS project managers are important to a global IS project's success. The results have important practical implications as to what areas of knowledge organizations should focus on to train their global IS project managers for the project's success.

Keywords: ground theory building, constant comparative method, project manager, agility, knowledge requirements, global IS project

1. Introduction

With the rapid decrease of communication and coordination, firms can now source IT services around the globe wherever the service can be performed most efficiently and effectively. The phenomenal growth of global IT service sourcing also means the growth of global IS projects, which involve interaction among individuals, organizations, and agencies from diverse national backgrounds and cultural contexts. Global IS projects not only include off-shoring projects to save costs but also include global projects to introduce advanced technologies or to learn best practices.

Undoubtedly, the goal(s) of a company doing a global IS project is saving costs, freeing internal staff to concentrate on their own specialties, or (and) the acquisition of advanced technologies and applications. However, global IS projects often encounter challenges caused by the characteristics of being "global", and end up without attaining the goals. The characteristics of a global project include geographical distance, different time zones, cultural gaps, language barriers, organizational differences, political differences, and geo-economic differences (Espinosa et al., 2006; Harzing and Feely, 2008; Kappos et al., 2008). Managing the challenges in a global IS project is eventually associated with project success, since there are additional project issues

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including communication problems (Jain et al., 2011; Keil et al., 2007; Levina and Vaast, 2008) and administrative issues such as contracts, time, and cost. It is not surprising to find that projects done in a project managers' home culture are more successful (Müllera and Turnerb, 2007).

Among many issues regarding global IS projects, this research focuses on project managers who can alleviate or aggravate project problems. Previous research consistently indicated that the project manager is the most important factor in determining a project's success (Zimmerer and Yasin, 1998). Numerous studies have attempted to identify the knowledge requirements of project managers, and assert the necessity to demonstrate proficiency of the knowledge (Daniels, 2011; Project Management Institute, 2011; Project Management Institute, 2013; Ravinder and Kollikkathara, 2017). However, most of the studies fail to cover comprehensive knowledge requirements for global IS project managers to lead to a global IS project's success. The objectives of this research are (i) to identify the comprehensive knowledge requirements for global IS project managers; thus, (ii) to help organizations and educators with insights into the specific areas of knowledge to focus on to train global IS project managers.

Using the constant comparative method of the grounded theory, we identified the challenges of global IS projects and the knowledge requirements of project managers to be able to cope with the challenges. First, past research regarding the knowledge requirements of project managers is reviewed. Then, research methodology and data analysis are presented. Finally, the study findings and conclusions are presented.

2. Knowledge requirements and project success

2.1 Knowledge and skills requirements

While knowledge is the information a person has in specific content areas, skill is the ability to perform a certain physical or mental task (Spencer and Spencer, 1993). Both of them are surface competencies and readily developed and assessed through training, education, and experience. A survey study on critical skills and knowledge requirements of IS professionals (Lee at al., 1995) reports that IS professionals should have knowledge and skills in technology, business operations, and interpersonal/management to effectively lead integration and BPR (business process reengineering) activities. As IS projects become more complex involving multiple functions and organizations, knowledge and skills of IS professionals in business operations and interpersonal/management become increasingly important. Cheney et al. (1990) and Fink and Neumann (2007) consider management/interpersonal skills to be critical because the importance of the boundary spanning role (i.e. scanning the environment, collaborating with others outside of the team, negotiating resources for the team) of IS professionals increases.

Particularly for project managers, IPMA (International Project Management Association) Competence Baseline version 3.0 suggests project managers should not only have technical competencies but also have non-technical competencies (IPMA, 2009). For global project managers, non-technical competencies are particularly emphasized due to the nature of projects in an international setting. This includes the development of a common understanding about the project, motivating team members to reach common goals, and rewarding team members from diverse backgrounds (Kerzner, 1995; Yasin, 2000).

For example, GIS (global information systems) implementation to support multinational company networks, managers might run into a situation where conflicts in data standards, national infrastructure, central/local requirements, and cultural differences need to be resolved (Biehl, 2007; O'Brien, 2011). Managers should have not only proper technical competencies but also contextual and behavioral competencies to resolve disagreements and respond to unexpected situations. The contextual and behavioral competencies include (i)

the ability to be sensitive to organizational culture/politics; (ii) the ability to deal with ambiguity; (iii) the ability to engage in cross-functional communication and cooperation; (iv) the ability to be self-directed and proactive; and (v) the ability to manage affected employees (IPMA, 2009; Biehl, 2007). Compared to domestic IS projects, global IS projects are much more complex and resource intensive. Global IS projects involve more people, functional units, and organizations than domestic IS projects. Detailed planning, flexibility during implementation, and interpersonal/management skills are critical to complete a project successfully (Biehl, 2007).

Partly adapted from Lee et al. (1995) and Fink and Neumann's (2007) work on the critical skills and knowledge requirements of IS professionals, this study categorizes skills and knowledge requirements of global project managers into the following dimensions: system knowledge, business domain knowledge, project management knowledge, cultural knowledge, and interpersonal knowledge.

System Knowledge is IT knowledge and skills needed by IT people such as programmers, analysts, and managers to successfully perform their jobs (Lee at al., 2006). System knowledge includes knowledge of system analysis and design, IT architecture and IT standards, database design and management, programming, applications/software, networks, security, system testing, and technological trends. A solid base of technical understanding is critical for IT professionals to maintain their credibility within an IS community (Benamati et al., 2010).

Business Domain Knowledge covers knowledge of business functions, company specifics, and business environments. As the nature of work for IT professionals changes, broad business and real world perspectives are crucial for IT professionals (Vitharana et al., 2012). Business domain knowledge helps IT professionals work effectively with other departments, internal users, external customers, and suppliers (Gallagher et al., 2010). In fact, knowledge gaps among vendor's IT teams and clients are associated with poor outsourcing outcomes (Ghosh and Scott, 2009).

Project Management Knowledge. Project managers (PM) must play a managerial role comprised of planning, organizing, and controlling. The project manager develops the project plan, organizes the project resources, and monitors the execution of the plan. Project management knowledge is concerned with setting clear goals and objectives, defining activities to be performed for each phase of the project, defining deliverables to be produced for each phase, allocating resources and time requirements for each phase, and assigning responsibilities of project members (Beise, 2004; Dvir et al., 2003; Valacich and DeLuca, 2006). During the project period, the PM also needs to perform administrative tasks such as performance reviews, project tracking, reporting, and other daily responsibilities.

Cultural Knowledge. Project managers working in another culture tend to be less successful than those working in their own culture (Müllera and Turnerb, 2007; Tractinskyand Jarvenpaa, 1995). Thus, global project managers are required to have the ability to work harmoniously with project members of different cultural backgrounds and the ability to resolve conflicts resulting from cultural differences to lead the project successfully (Jain et al., 2011). Failure to have those abilities can result in a less satisfied, less committed, less motivated team (Kim, 2010). Cultural knowledge includes dictionary, axiomatic, directory, and recipe knowledge (Sackmann, 1992). Dictionary knowledge refers to the "what" of problems, axiomatic knowledge refers to "why the problems happen", directory knowledge refers to "how it happened", and recipe knowledge refers to "what has to be done" to solve the problem.

Interpersonal Knowledge. According to Geiwits (1993), executives and commanders need social skills, which relate to establishing a social environment in which the group can function effectively by allocating human resources wisely and being sensitive to other's goals and perspectives. Social skills--often called interpersonal skills--are defined as "the abilities (a) to accurately select relevant and useful information from an interpersonal context, (b) to use that information to determine appropriate goal-directed behavior and (c) to

execute verbal and nonverbal behaviors that maximize the likelihood of goal attainment and the maintenance of good relations with others (Bedell and Lennox, 1997: p. 9)." In general, interpersonal skills refer to the abilities required for appropriate social behavior and positive interpersonal interactions. Interpersonal skills are necessary to create and sustain satisfying social relations to resolve conflicts, which will lead to a project's success.

In most cases, a project is performed by a project team made up of various stakeholders with different goals and interests, such as the IT team, business users, and other internal and external organizational groups. Developing relationships among members and various stakeholders is important to resolve conflicts and disagreements (Barki and Hartwick, 2001). Thus, interpersonal knowledge is regarded to be important for a project manager to lead a successful project.

2.2 Project success

IS project performance consists of two different dimensions: process performance and product performance. Process performance refers to how well the IS project process has been undertaken and is measured by on-time/on-budget completion of the project and team member satisfaction (Deephouse et al. 1996). Product performance refers to the performance of the information system, including system quality and user satisfaction about the system (DeLone and McLean, 2003). In DeLone and McLean's model, IS success is considered to be multidimensional and investigated at multi-levels: (i) technical level success in relation to the accuracy and efficiency of the system, and (ii) the effectiveness level success in relation to the effect of IS on the user. Separate measures have been used to assess each dimension of success: (i) system quality for the technical level, and (ii) user satisfaction for the effectiveness level.

3. Research methodology

After reviewing the literature on knowledge required of a global project manager, it was determined that no current theory is directly applicable to fulfill the objective. Therefore, "ground theory building" methodology that builds theory grounded in the data inductively is used for this study (Glaser and Strauss, 1999; Yin, 1994; Eisenhardt, 1989). This methodology is different from traditional theory building methodology where an existing theoretical framework is selected, then data is collected to show how the theory can be applied to the phenomenon under study. The traditional structuralists' methodology is criticized for being deductive and speculative.

"Ground theory building" methodology starts with the collection of qualitative data followed by data analysis. Data analysis starts by reading the collected data, discovering repeated ideas and concepts emerging from the data, and tagging the ideas and concepts with codes. Using the constant comparative method, the codes can be reorganized and the names of codes can be modified to better represent conceptual ideas. The coding categories can be integrated to generate concepts (Glaser and Strauss, 1999; Holliday, 2007; Pettigrew, 1990). These categories may become the basis for new theory.

After developing an initial set of knowledge required of global project managers through literature review, we arranged interviews with people in Korea and France who had intensive experience of global IS projects. As non-English speaking countries, both countries are considered to have similar difficulties in managing English-speaking global teams.

Before conducting the interviews, a semi-structured interview protocol was prepared to guide the interviews. Initially, a mini focus group interview with four to six people was planned because focus group discussion gives more specific and differentiated views by listening to real life situations. However, it was not easy to gather

people with intensive experiences in global IS projects at the same time and in the same place both in Korea and France. Thus, we conducted face-to-face interviews with one to four participants in five groups. However, we followed the guidelines of a focus group interview (Greenbaum, 1993).

In this study, a global IS project is defined as a project that involves individuals, organizations, and agencies from diverse national backgrounds and cultural contexts. Since we focus on the knowledge requirements of global IS project managers with no specific industry, we categorized knowledge into system knowledge, business domain knowledge, technical project management knowledge, cultural knowledge, and interpersonal knowledge. Industry specific knowledge such as finance, retailing, and manufacturing knowledge is broadly termed as business domain knowledge. Based on this definition and focus, we limited interviewees to people who have experience in global IS projects, but not industry specific.

Participants included all stakeholders including business managers, IS managers, IS consultants, business consultants, and top management. However, in order to prepare for the situation that each of the stakeholders had different points of views, a facilitator identified them before the discussion started. Researchers involved in this research took the role of facilitator and moderated discussions based on the questions prepared.

We conducted two interviews in France and three in Korea (Table 1). Interviews in Korea and France were conducted separately at different locations based on the interview protocol. The location of the interviews was selected by the participants. Usually the interview was performed in a meeting room at the company of the participants. With some participants, follow-up was conducted through e-mail to request clarifications and to offer participants the opportunity to provide feedback. The interviews were held in Korean, French, or English with facilitators who speak the same language. Interviews were transcribed in each language and translated into English.

Table 1. Overview of interviewees[1)]

Location	Group	Name	Position	Areas of expertise
France	Group A	Mr. ET	Project Manager	Outsourcing : IT Infrastructure
		Mr. JH	Director	Development of Intranet
		Mr. BB	Consultant	Compliance Systems
		Mr. MO	Director	ERP System
	Group B	Ms. NB	Consultant	Data Management
		Mr. AM	IT Manager	Web and Portal Management
		Mr. EB	Senior Manager	SAP Consulting
		Ms. CL	IT Manager	System Development
Korea	Group C	Mr. TK	Project Manager	System and Solution Implementations
		Ms. SK	Consultant	Business Solution Implementations
	Group D	Mr. HC	Project Manager	System and Solution Implementations
	Group E	Mr. ML	IT Manager	Banking Systems
		Ms. MY	Manager	Business Expert

Interviews were guided by a facilitator with open-ended questions for approximately one hour each.

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According to the interview protocol, the interviews were processed from explaining the research objectives and interview objectives to the interviewees. Even though the objective of the interview was to identify the knowledge required of global IS project managers, we guided the discussion to talk about the distinctive activities and issues of a global IS project compared with a domestic IS project for structuring the discussion. Then, we tried to investigate the knowledge of a global IS project manager needed to manage those specific problems of a global IS project. In order to focus on global IS projects, we tried to exclude common challenges and issues occurring in both domestic and global IS projects from the main discussion. Therefore, the main topics discussed during the interview were as follows:

- Distinctive activities and issues raised at each phase of the project life cycle in a global IS project
- Reasons for the distinctions
- Knowledge required of global IS project managers to manage the distinctions

Data analysis was performed using the constant comparative method of grounded theory (Glaser and Strauss, 1999). To enhance the validity of the interview data, we reviewed job descriptions of project managers in global IT service firms such as SAP AP, Accenture, Deloitte, IBM, EY, PwC, Citi, Flowserver, and Baxter. Furthermore, research findings were reviewed by several interviewees to confirm. Data analysis is presented in the following section.

4. Data analysis

Based on the constant comparative method, data analysis proceeded through several overlapping phases of reading and coding the interview transcripts, reorganizing the codes, changing the names of the codes to better represent conceptual ideas, and integrating the coding categories to generate concepts (Glaser and Strauss, 1999; Holliday, 2007; Pettigrew, 1990).

First, we transcribed the interviews and read them several times, extracted basic units of text (words, phrases or sentences) from the transcripts, and categorized them into three groups coded as “challenges and problems”, “actions required” and "knowledge/skills (i.e. system, business domain, technical project management, cultural and interpersonal knowledge)” required of a global IS project manager (Table 2). The initial codes for "knowledge/skills” were derived from a review of the literature. The process for reaching inter-coder reliability of a desirable level included individual coding followed by a check of agreement among codes and a discussion of differences of opinions about the use of the coding scheme. We resolved the differences through discussion and clarified them through the development of a revised coding scheme that included the addition of new coding categories. The new coding categories that emerged from the data are as follows: “information search”, “adaptability”, “flexibility”, and “responsiveness”. We each then used the revised coding scheme to re-code the interview transcripts. A comparison of the recoded interviews showed an overall agreement rate of 92%. Table 2 shows coding categories used in the analysis.

The argument for the concepts that emerged through data analysis is presented in the subsequent section.

Table 2. Coding categories

Group1	Group2	Group3	
Challenges	Action	Knowledge/Skills	
High complexity of the project	To have a global view, not focused on operations only	Knowledge of external business environment, company, and team	Business domain
	To take into account various parameters (time lag, holidays, local projects with different priorities, organizations involved and travels)	Having adaptability to consider new parameters without assumptions	AGILITY (Adaptability)
	To capture information from the relevant sources	Being adaptive to other's opinions when building or changing a project plan	AGILITY (Adaptability)
	To be able to anticipate changes in the project plan	Being adaptive to the teams' learning and changes during the project	AGILITY (Adaptability)
Inefficient meetings caused by language translation	To share the definition of important terminologies in English.	Knowledge of language	Cultural
	To assign right interpreters to the team.		
Misunderstanding caused by different levels of English	To prepare documents before meetings.	Knowledge of documentation for meeting agenda, templates, and deliverables	Project MGMT
More frequent changes to anticipate	To clarify needs/requirements	Knowledge of project-related business functions	Business domain
		Knowledge of systems and technology	System
	To identify risks and results of the changes, especially financial impacts	Knowledge of change management	Project MGMT
	To set-up an effective approval process	Knowledge of conflict management	Interpersonal
	To analyze and control change requirements in accordance with project objectives and contracts	Knowledge of project scope management	Project MGMT
	Not to delay a decision in accordance with the objectives of the project	Making fast decisions to deal with change management	AGILITY (Fast decision making)
	To monitor the progress of the project continuously	To review the plan and the project frequently	AGILITY (Adaptability)
Different expectations on final deliverables.	Not to assume based on personal experience or common sense	Skills to deal with different expectations on deliverables depending on project sites	Cultural

Group1	Group2	Group3	
Challenges	Action	Knowledge/Skills	
Different expectations on final deliverables.	To specify and get agreement of deliverables in details (format, report periods, etc.)	Knowledge of project scope management	Project MGMT
	To deliver standard product/service of contract, respecting local constraints	Knowledge of document management	Project MGMT
Different business process	To learn local business process To show best practice To identify and propose the processes best adapted to the business	Knowledge of business functions	Business Domain
		Capability to learn new business functions	Business Domain
		To interpret business problems and develop appropriate technical solutions	Business Domain
		Being open-minded and apply creative knowledge	AGILITY (Adaptability)
Different system environment and approaches	To clarify local system environment To guide advanced system architecture To lead to find the best solution to fit the local environment	Knowledge of system analysis and design, IT architecture, DB, Application, Network, Security/Testing	System
		Having flexibility to changing project methodologies to fit to current environment and changes	AGILITY (Flexibility)
Different working procedures	Be open to others, listen to them, and collect new ideas from everyone	Knowledge of understanding there would be different expectations	Cultural
Different understandings of how to achieve objectives	To ensure all team members have the same understanding based on written documents	Knowledge of understanding that people from different countries have different interpretations on the same thing	Cultural
	To be open to others and to understand the global environment	Having adaptability to assess continuously how the team operated and whether the project meets objectives	AGILITY (Adaptability)
	To manage contracts payments and different methodologies used along the project	Having adaptability to revise project plans to reflect current project environment	AGILITY (Adaptability)
		Having flexibility to change project methodologies to fit to current environment and changes	AGILITY (Flexibility)
Difficult to set up the team with right people (local /foreign people)	To know where to find experts to match the needs of the project	Knowledge of HR management	Project MGMT
	To utilize local partner	Knowledge of partner management	Project MGMT

Group1	Group2	Group3	
Challenges	Action	Knowledge/Skills	
Difficult to build teamwork	To listen, create a coaching environment, balance the team by mixing competencies	Communion knowledge with different levels of the project team	Interpersonal
	Find a way to keep the team motivated	Knowledge of team motivation	Interpersonal
Different ways to address an issue or a problem	To find out the best way to address problems	Knowledge of cultural differences in addressing issues and solving problems	Cultural
	To get advice from local members		
Difficult to manage time and budget due to different assumptions and more travel of foreign teams	To plan time and budget by considering various parameters To guide and get agreement on project management methodology	Knowledge of time control Knowledge of cost control	Project MGMT
Resolving problems with outside project teams Building relationships	To utilize local people	Knowledge of HR management Knowledge of partner management	Project MGMT
	To meet the people you work with and get to know them	Knowledge of Conflict management	Interpersonal
		Knowledge of relationships with project shareholders	Interpersonal
Different legal environment	To identify and plan about local constraints/specificities	Knowledge of environmental constraints within which the organization operates	Cultural
	To understand industry, politics, and regulations	Knowledge of external business environment	Business domain
Complexity of contracts with client, suppliers	To need to know the complexity and to be reactive and assess impacts quickly	Planning accurately by integrating whole project process without assumption	AGILITY (Adaptability)
	To define clearly who is responsible for what and ensure everyone gets the same understanding of responsibilities	Knowledge of HR management	Project MGMT

5. Findings

In the first column of Table 2, the identified challenges of a global IS project are presented. This study found that project managers overcome those challenges based on system knowledge, business domain knowledge, technical project management knowledge, cultural knowledge, and interpersonal knowledge (shown in the last column of Table 2). This study also found that the agility of the project manager is important to deal with the challenges in a timely manner.

The interview results were validated using the job descriptions of the project managers in global IT service firms such as SAP AP, Accenture, Deloitte, IBM, EY, PwC, Citi, Flowserver, and Baxter. These companies often perform global IS projects and specify detailed job descriptions and qualifications for the project manager. These practical sources of data are used to validate the theoretically developed coding scheme and coded data (Potter and Levine-Donnerstein, 1999). System knowledge corresponds to particular system knowledge such as CRM (customer relationship management) system knowledge in the job description. While business domain knowledge corresponds to deep domain knowledge and business experience in the job description, project management knowledge corresponds to PM certificate and PM methodology knowledge in the job description. Cultural knowledge, interpersonal knowledge, and agility correspond to understanding the environment, being open-minded, having strong communication skills, and being agile in delivery team management in the job description.

5.1 Knowledge requirements

5.1.1 System knowledge

Most participants noted that system knowledge including IT knowledge and skills needed by IT people is required by a global IS project manager. There are various areas of information technology such as system analysis and design, IT architecture and IT standards, database design and management, programming, applications/software, networks, security, system testing, and technological trends. Under the circumstances, it would not be necessary to be an expert in every area, but would be necessary to be ready to understand and manage them.

There was a project that had high complexity in terms of project structure, business problems, and IT architecture. The project manager was not very flexible to manage the project issues that might bring conflicts among project members. However, he had and showed extensive IT knowledge and experience in teams, whenever issues came out..... Most cases when the problem occurred, he suggested the right solution with assertiveness, and naturally team members started to trust him. Once he got the leadership based on trust, team members accepted his opinion or leadership. I believe this contributed to minimizing even other conflicts and risks. I think that IT knowledge is a fundamental skill for a global IS project manager. (Interview with Group C, Korea)

A project manager should be a bridge between the business users and the technical teams by interpreting and explaining complex and technical information in a simple way. Knowledge about systems and technology help the PM play a role of the bridge effectively. (Interview with Group B, France)

5.1.2 Business domain knowledge

As most IT projects are fundamentally related to business specifications and some include the defining phase of business requirements, it is hard for a project manager to make the right decision without business domain knowledge, such as business functions, company specifics, and business environment knowledge. A lack of business domain knowledge could cause severe problems when conducting a global project, since it may hinder the progress of IT tasks. Without a full understanding of the business requirements or the intention or rationale behind it, it also brings additional change management issues.

After the IMF crisis, I was involved in the project of a risk management system, which was led by a foreign

consulting firm. Under the circumstances, the clients had strong needs to learn best practices and to step forward to implement them as soon as possible. However, the project manager spent more than one month for project planning and more than three months for as-is analysis. He seemed to live in his own world and asked for the client to explain their situation over and over again without guidance. The foreign consulting team had no knowledge of the country, the client, or their business at all. …….After all, the project was delayed more than six months, exceeded the budget, and wasn't satisfied. (Interviewed with MK, Korea)

The person on local site is better qualified to solve a specific problem. A project manager should be open to situations and cultures, be able to understand situations from different points of view, and accept that in such situations. By doing this, he can really understand the client's needs. (Interview with Group B, France)

It would not be impossible for a project manager from the IT world to have specific business domain knowledge, but having only the ability to understand overall and to be familiar with terminologies can help a project manager interpret and manage the whole project.

In a global project, it would be perfect if a project manager knows about local constraints or business requirements. It would not be possible for an IT project manager to know all business requirements, but the project manager should, at least, be ready to learn and understand the business requirements. It's not necessary for him/her to know every detail. If he/she has the ability and insight to see the flow of business requirements, it could be OK. (Interview with Group B, France)

A project manager should be a bridge between the business users and the technical teams by interpreting and explaining complex and technical information in a simple way. (Interview with Group B, France)

5.1.3 Project management knowledge

Knowledge to manage the scope and to control cost and time is regarded as an essential part for a project manager. In some cases, team members from different cultural backgrounds maintain incorrect assumptions in certain aspects, which is regarded as common sense, causing problems in project management. For example, Koreans are more familiar with man/month based fixed term contracts, which is different from man/hour based contracts of Western people.

I think there is always a big difference in the way that each local and foreign team perceives the issues around the project scope and time. In the Korean working environment, working overtime is generally accepted even without overtime pay. Koreans, therefore, expect the whole project team to do the same thing. It often occurs that both local and foreign consultants find a big gap on how to spend their time, at the very first time to calculate and to report their "time report", . . . In the worst case, foreign project teams left the country when they thought the project was over and spent the entire budget and time allotted, and local partners filled additional work after the foreign members left the country who thought the project was over. (Interview with Group C, Korea)

The problem could be more serious in a system development project than in a packaged software implementation project. In a packaged software implementation project, the PM could make more accurate plans since most tasks and requirements would be limited by the software. Even though there were other issues around customization and deliverables, the project scope is more stable. A system development project, however, requires that the PM pay more attention to scope management. Overtime and being out of scope have

a more serious impact on the project's success.

In a global setting, a project manager needs to have more sophisticated knowledge of project management methodology regarding cost and time control, since frequent travel of foreign team members and project manager can cause discontinuity of projects. Even though travel was scheduled in the planning stage, it usually generates several problems with time management.

When foreign team members should travel, they left issues unresolved. Even though they were supposed to work and have meetings remotely, feedback could be delayed. Moreover, when they started to discuss again face-to-face, in many instances they should have tacked things from the beginning. It is also inconvenient to check progress. (Interview with Group C, Korea)

In most cases, a project manager of a global IS project runs several project at the same time. Even if that's not the case, it is hard to see a project manager stay all the time during the project. By nature, he often comes and goes for business trips. It causes discontinuity of running the project by himself. . (Interview with Group E, Korea)

The PM's knowledge of project management methodology includes not only technical skills to manage the scope, cost, time and deliverables, but also the abilities to assign and manage human resources.

Sometimes I can be assigned as a project manager after all contract processes have been finished. In that case, I do not have the power or time to build my own team and have to start the project right away. Even though I go through difficulties to manage the project with inappropriate people, it is not easy to change human resources during the project. Especially in a global project, once the team members are assigned and started the project overseas, it is almost impossible to change the team members later . . There was a case to replace a consultant in the middle of the project, but we paid for it in both money and time. . . . It is very important for a project manager to be involved in the preparation phase of the project, so that he/she can find experts to match the needs of the project and appropriately delegate sub-tasks (Interview with Group D, Korea)

In a global setting, it was also suggested that the PM should be more careful when preparing documents for meeting agendas, agreed templates and deliverables, and other logistics including the translation process.

It cannot be overemphasized the value of "documentation". From the kick-off day, we need to communicate what is expected from a delivery point of view but also from a report and tolerance point of view. (Interview with Group B, France)

5.1.4 Cultural knowledge

Language barrier was importantly commented on from every interviewee. Language barrier was one of the most important drivers in wrong communication and unnecessarily long meetings. In many cases, the language problem was mixed with cultural gaps, generating other issues.

Different types and levels of English make problems to deliver their own opinions. Even with a common working language, accents are different which creates some understanding problems. (Interview with Group B, France)

Most meetings were unnecessarily and inefficiently long. We had a professional translator, but it was not easy to deliver the exact meaning of technical terms. It made each other misunderstood and generated other

problems. (Interview with Group E, Korea)

In addition to language barriers, cultural differences generate communication problems and dissatisfaction. In global IS projects, people spend more time to get agreement among various stakeholders in project planning, legal contracts, scope of work, management reports, and project deliverables.

I often observed a project manager of a consulting firm insisted "Best Practice", even though the customer explained the difficulties to follow it because of different legal issues, customs, and business processes. . . . Whatever the solution he has, a project manager has to have the ability to understand the global environment in a global project. If he understands a different environment, he could guide and negotiate to the right way. (Interview with Group E, Korea)

A project manager needs to be able to adapt to the leadership style of the country or culture. For example, if an organization has very dynamic and time-critical culture or very conservative culture to protect their own intellectual property, a project manager needs to find a way to act for cultural fit. (Interview with Group A, France)

Cultural gaps with language barriers contributed to frequent changes of business specifications. Changes in business specifications are easily observed in most of the projects. However, this happens more frequently and more seriously in global IS projects, which results in the situation of the problems not being solved.

I started working with business specification documents given by the business user group. When I presented with my progress during a weekly meeting, I faced unexpected things. . . In many cases, I found even signed, written specifications were not enough to understand completely. What I understand was one thing, what they mean were more. When the translation process is involved, the situation could be much worse. (Interview with Group C, Korea)

When there are additional time and cost required because of requirement changes, Korean teams and vendors normally provided additional services free of charge: it would be considered oriental culture. However, foreign teams normally request additional payment. Skilled project managers could control it amicably, but it was sometimes observed that there were big arguments and left the project behind schedule, and local parties took all the responsibilities in the end. (Interview with Group E, Korea)

Due to cultural differences, decision making could not be done in a timely manner, especially on delicate issues. When political issues arose among stakeholders, such as the business team versus the IT team, the PM should have arbitrated and guided to make the best decision. Not only the formal approach but also the informal approach would be the solution. The informal approach, which communicates individually using a personal network with someone who has decision power, becomes effective in certain cases. However, it was generally hard for a foreign PM to identify the fact to solve the problem and to address the issue properly. In most cases, the local partner or co-PM from the local team took care of it.

5.1.5 Interpersonal knowledge

In a global IS project, there are many stakeholders involved. Business users vs. the IT team, internal vs. external personnel, native vs. non-native speakers, foreign vs. local teams, full time vs. part time, people who travel frequently vs. those who do not, and so on. Most participants pointed out that the PM should have skills to relate to others, which include communicating, negotiating, influencing, and motivating others.

A project manager should be able to create an environment where people can communicate and escalate problems easily without being afraid, which is more difficult when one cannot meet the people of the team. (Interview with Group A, France)

Sometimes people expect different information or deliverables for the same issues. When I worked for the project of implementing a new airline, I noticed there were big gaps or differences between airline desk employees and directors. When they met a problem, they approached to solve the problem differently and required different information, even though I suggested the right solution for it. (Interview with Group B, France)

As indicated below, skill training for the PM in a global IS project would be strengthened with more tactics utilizing both formal and informal methods.

Change management can make a big impact on the project's success. When clients insist on additional requirements without additional payment, it would be ideal to say "No" in principle. However, it doesn't always work in real life. If a project manager sticks to the principles and makes emotional conflict with project owners, it can make additional bigger problems. Therefore, a project manager needs to consider various ways to negotiate with informal approaches as well as formal approaches. (Interview with Group C, Korea)

As communication is more complex on a global project, the reactivity is different. Thus the project manager needs to have extended communication skills. It is more necessary to be able to formalize and capture information, and also to compensate for the non-existing informal exchanges. (Interview with Group A, France)

A project manager also needs to ensure that the team members won't be demotivated.

It will be achieved when a project manager listens, creates a coaching environment, and balances the team by mixing competencies. (Interview with Group B, France)

A project manager should be able to recognize the work of each and every one, provide acknowledgement and thanks, and give value to the work accomplished by the team. When engagement and motivation is promoted, the teamwork will contribute to the project success. (Interview with Group A, France)

5.2 Information search, adaptability, responsiveness, and flexibility

The study results show that the global IS project manager should actively search for and use information, and be responsive, flexible, and adaptive for managing the project.

5.2.1 Information search

This study found that the global IS project manager should search for, structure, and use information in a proper way in problem solving, managing personnel resources, and managing material resources.

I understand a project manager needs to make a decision based on his/her judgment, but he/she should search for information and listen and reflect on others' opinions as well. Especially when the project plan is needed to be changed, the whole process of the project should be considered. Involving team members for important decision making, such as a change of project plans, would make easier to do it. (Interview

with B, Korea)
In order to build a project plan, there are lots of new parameters to take into account, such as time lag, bank holidays, and local projects with different priorities. Therefore, a project manager should be able to capture information from the relevant sources with a global view rather than to make assumptions on his/her own. Too many assumptions eventually cause too many changes later. (Interview with Group A, France)

5.2.2 Adaptability

This study found that the global IS project manager adapts his/her behavior to the expectations and values of the culture of team members who have a different background.

Working with people who have different backgrounds could be very hard without being open-minded. If a project manager is open to others, listens to them, and collects new ideas from everyone, he/she can manage the project more smoothly and improve with creative knowledge. As a fundamental skill, creativity is being able to adapt to situations. Moreover, he/she also can benefit from it. (Interview with Group A, France)

5.2.3 Responsiveness

This study found that the global IS project manager be responsive to ensure that all functions critical to task and team maintenance are completed (Fleishman et al., 1991).

There are many hidden factors that delay global IS projects, and project team members expect a project manager to take a leadership role and judge the delicate situation with insight in a timely manner. If a project manager is so wishy-washy about the certain subject and holds off the decision, the project loses the way to go. (Interview with Group B, Korea)

5.2.4 Flexibility

In a global context, project managers should be careful and flexible to apply project management methodology in order for a project manager to control the overall project.

In terms of risk management, a project manager should have flexibility to use different project management methodologies depending on the project. It would be great if a project manager has deep knowledge of project management methodologies, but it is also important to know that there is no panacea for all problems. (Interview with Group C, Korea)

6. Discussion, limitation and future research

Although global IS projects have been studied during the past two decades, most studies tend to focus on issues and problems. There has not been much research in knowledge requirements of global IS project managers. This study has attempted to find the knowledge requirements of global IS project managers. We found that system knowledge, business domain knowledge, project management knowledge, interpersonal knowledge, and cultural knowledge are important for global IS project success.

"Information search", "adaptability", "responsiveness", and "flexibility" emerged to be important for global

IS project success. Information search and environmental scanning to know what is happening in the environment, and the ability to reconfigure resources to address a dynamically changing environment are described as dynamic capability or agility (Breu et al., 2001; Joiner and Josephs, 2006; Zaccaro et al., 1991). Agility is characterized as being highly responsive, flexible, and adaptive in current times of rapid change (Zaccaro et al., 1991; Joiner and Josephs, 2006).

Future study is suggested to find the structural relationship between the "agility" and the four concepts of "information search", "adaptability", "responsiveness", and "flexibility". Future study is also needed to investigate if the agility of the global project manager to recognize dynamically changing project environments and respond to them in a timely manner is related to project success.

The previous literature indicates that agility is based on knowledge gained from formal training and past experience. The development of an individual's agility through education and learning is focused on a broad range of knowledge to increase one's capacity to collect, consider, and react to information from the environment (Mohrman and Worley, 2009). Boldgett et al. (2008) argue that multi-faceted personnel with broader knowledge are more agile and higher-performing. Focusing on experience, Huang and Hu (2007) and Zollo and Winter (2002) argue that experiential knowledge generated through the accumulation of experience also becomes the basis of agility. Future research is suggested to investigate if the agility of a project manager is formed by bundling various skills and knowledge of the project manager gained from experience, education, and training (Zollo and Winter, 2002).

The results of this study have some implications for practice. Globalization of the information system service industry seemed to be a phenomenon of the 21st century. However, dissatisfaction with the performance of global IS projects is growing at the same time. The challenges of global IS projects are due to the characteristics of global IS projects. Although global IS projects have their own purpose to reduce time and cost or to introduce best technology and best practices with the right resources, it always has been a challenge for the project manager to understand the differences and to deal with the dynamic situation:

- differences in system environments (e.g. data standards, national network infrastructure, and central/ local requirements)
- differences in culture, languages, expectations, assumptions, business processes, working procedures, legal environment, and ways to address an issue
- unexpected problems, and frequent changes
- difficulties in building teamwork, and managing time and budget

Sometimes, project managers are assigned to certain projects right before the project starts and face many different challenges. Even though a project manager is highly experienced, it is not possible to know everything before the project starts. As an effort to make a global IS project successful, this study suggests a set of knowledge and agile behavior required for the project manager. An increase in a project manager's capacity to consider and react to the differences, problems, and difficulties will help him or her reposition as the environment changes unexpectedly.

We suggest that education and training could improve and develop the knowledge of a global IS project manager and his or her capacity to deal with a dynamic situation. This study aims at improving such education by providing project managers with insights into the specific areas of knowledge to focus on. Identifying a set of knowledge will also provide guidance to organizations, especially to IT service-oriented organizations, regarding the kind of training to be provided for their project managers. This study also helps educators develop an academic program to address effectiveness in global project management.

We need to be cautious when generalizing the results of this study for several reasons. First, our data

collection was limited to two countries, Korea and France. Our findings might not be representative, and major differences might exist, in other countries. Second, our primary data consists of interviews. Even though qualitative research is used in a wide range of academic and professional areas, inconsistent results between qualitative and quantitative data are often observed because researchers can make analytical errors and omissions with different data from different sources (Kaplan Duchon, 1988). Third, this study focused on only knowledge of project manager and agility for project success. There are other factors that make a global IS project successful, such as organizational, political, and technological factors, human intervention, characteristics of the project, and so on. These factors have not been considered here. These limitations need to be further studied in the future.

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