ADAPTATION AND INTEGRATION FOR MULTINATIONAL PROJECT BASED ORGANIZATIONS

By

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ABSTRACT

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Adaptation and Integration for Multinational Project-Based Organizations

Thesis directed by Assistant Professor Amy N. Javernick-Will

With increasing globalization, multinational organizations in the Architectural Engineering and Construction (AEC) industry need to (1) adapt to local environments to reduce risks associated with working internationally and (2) integrate knowledge and strategy with the rest of the organization to remain competitive at the global scale. Being able to simultaneously respond to these potentially conflicting pressures of local adaptation and organizational integration is a challenge and research is needed at the project level in a project-based industry such as the AEC industry. As a result, we identified adaptation and integration criteria through an in-depth literature review and developed a questionnaire and associated qualitative scale to assess projects' levels of adaptation and integration based on the responses to these pressures. 31 project managers from ten organizations responded to the questionnaire for a recently completed international project. The results identified a significant relationship between the amount of relevant US knowledge brought to the local country (technical knowledge, procedures, processes and standards) and project performance. No other significant relationships between adaptation/ integration and project performance were found. We believe that this is due to the questionnaire's focus on responses to adaptation and integration while not capturing environmental pressures such as project type, scope, location, organization type and strategy that impact projects levels of adaptation and integration. When we performed a cross-case comparison between projects that rated high versus low for adaptation and projects that rated high versus low for integration, we found that processes and strategies varied. Higher adaptation projects were more involved in the local community and higher integration projects used richer knowledge exchange methods such as in person discussion. Finally, qualitative analysis of nine interviews with project managers allowed us to better understand the relationship

between local adaptation and organizational integration at the project level and showed that a balance between the two was needed and that achieving this balance is a challenge for multinational project based organizations.

Keywords: Local Adaptation, Global Integration, Project Level

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EXECUTIVE SUMMARY

Introduction

While the growing trend of globalization offers new opportunities for diversification and expansion, it also introduces new risks from working in unfamiliar environments and from increased competition at the global scale. It is therefore important for multinational project-based organizations in the Architectural, Engineering, and Construction (AEC) industry to (1) *adapt* to local environments to better respond to the differences between the home and the host countries and to (2) *integrate* knowledge and strategy within their organizations to remain competitive internationally.

Point of Departure

Adapting to project environments is necessary for global project success as it reduces misunderstandings, delays, cost overruns and/or damaged reputations (Orr and Scott 2008). Local adaptation can be achieved by acquiring local knowledge (Eriksson et al. 1997; Javernick-Will and Levitt 2010; Javernick-Will 2009) and adjusting work practices to the host country market and culture to create a locally accepted and sustainable project.

In addition, organizations need to integrate knowledge and strategy to avoid wasting time, resources and money repeating past mistakes or "reinventing the wheel" (Javernick-Will and Hartmann 2011). Organizational integration can be achieved by ensuring organization-wide strategies and process implementation in addition to integrating organizational knowledge through knowledge management and transfer methods (Javernick-Will and Hartmann 2011; Javernick-Will and Levitt 2010; Carrillo and Chinowsky 2006).

Despite the need for both local adaptation and organizational integration for multinational firms, previous research has pointed to the competing nature of these pressures (Prahalad and Doz 1987; Johnson 1995; Roth and Morrison 1990) and have studied strategies responding to these pressures

(Bartlett and Ghoshal 1989; Harzing 2000; Taggart 1997). However, there is a dearth of research regarding these concepts at the project level in a project-based industry.

Research Questions

This research addresses the needs and gaps identified by studying the concepts of local adaptation and organizational integration at the project level in the AEC industry. We define:

- *Local adaptation* as the methods implemented by the project team to acquire local knowledge and to adjust organizational processes and procedures to the local environment in order to reduce the risks associated with working internationally, specifically the risks that are due to the differences between the home and the host country. *and*
- *Organizational integration* as the extent to which project teams use the same processes/ procedures and exchange knowledge across the global organization (for instance, with other project teams, other divisions, and the headquarters).

Specifically, this research aims to address:

1. How can we rate the level of local adaptation and global integration of a project?
2. How are project team's levels of local adaptation and organizational integration related to project performance? *and*
3. How can project teams adapt to new local environments *and* integrate knowledge and strategy within the rest of the organization simultaneously?

Research Method

To answer these questions, we employed a multi-method research design including four phases:

Phase 1: Creating an exploratory questionnaire to assess the levels of adaptation and integration in projects. This phase included a literature review and data collection and analysis of questionnaire and interview responses from 10 and 9 project managers, respectively.

Phase 2: Updating the questionnaire, administering it to 31 project managers, and assessing the project's levels of adaptation and integration.

Phase 3: Analyzing the responses to the updated questionnaire quantitatively to better understand the relationship between adaptation, integration, and performance.

Phase 4: Analyzing (1) the interviews of the project managers from phase 1 and (2) the response from the updated questionnaire in phase 2 to better understand the relationship between these concepts and how project teams can both adapt to new local environments *and* integrate knowledge and strategy within the organization.

Main Findings and Contributions

Project manager's perceive local adaptation as more important than organizational integration and, as a result, focus more on adaptation. Adapting to the local environment is associated with project performance, while knowledge integration may not be perceived as contributing directly to the current project's performance. Instead, integration is a long-term organizational objective. Thus, project managers tend to focus more on the short-term performance of the project, where they are accountable for performance and evaluated.

A balance between local adaptation and organizational strategy integration is needed for succeeding at the global scale; however, this is a challenge at the project level in project-based organizations. Project managers discussed how too much organizational integration could lead to a lack of flexibility and focus on the client's needs and expectations, triggering a loss of competitive advantage. In contrast, too much focus on local adaptation can lead the organization to depend on a local market and lead to lost organizational expertise.

Different processes are used for high versus low levels of adaption and integration.

Projects that had high adaptation employed more aggressive methods to integrate within the local environment, including reducing the number of expatriates and increasing the number of locals through training. In contrast, projects with low adaptation continued to rely on expatriates in the local environment and sent them to study the local environment prior to the project.

High integration projects used richer knowledge exchange methods (such as meetings and face-to-face discussions), in comparison to low integrated projects, that used more emails and phone. In addition, these projects were differentiated through their global exchange of knowledge, versus within a certain region.

No significant relationship between projects levels of adaptation/ integration and project performance was found. The questionnaire focused on the project teams' responses to adaptation and integration pressures and neglected the environmental pressures these project teams face (project scope, perceived differences between project host country and home country (Petersen et. al 2008), organization type (Javernick-Will 2013), organization's strategy when working internationally, and organization's past experience in local environment). These pressures can impact the amount of local adaptation and integration required at the project level, which would impact the level of adaptation.

Conclusion

Studying local adaptation and organizational integration at the project level in a project-based organization is complex, but needed as organizations continue to expand globally. Future research should focus on creating a framework that includes analyzing the environmental pressures impacting projects' responses and assessing the project team's responses to these pressures.

INTRODUCTION

The growing trend of globalization has led to the development of large multi-national project-based organizations and numerous global projects. Data from the top 500 design firms show an increase in the percentage of "mega" companies, defined as the top ten engineering firms in terms of income based on the ENR top 500 design firms, from 49% in 1981 to 71% in 2012, as well as an increase in international revenue (from 16% of the total revenue in 1981 to 31% in 2012) (Chinowsky 2013, American Council of Engineering Company Report on Midsize Engineering Firm Competitiveness). As a result, international projects have become key to the economy, especially in the Architectural-Engineering and Construction (AEC) industry as they offer new opportunities for expansion outside of the company's home country market. For instance infrastructure projects are of key importance to improve aging infrastructure in developed countries and to help the economic growth in developing countries especially in Asia, Africa and Latin America.

While international work brings many opportunities for diversification and expansion, it also introduces new challenges from an increasingly competitive environment at the international scale to differences in culture, regulations, and the economy between the home and the host country. Those differences introduce new risks for international construction projects (Han and Diekmann 2001; Han et al. 2007). Because of the growing importance of globalization, organizations need to learn how to reduce the risks associated with working internationally to better succeed at the global scale. Indeed, differences exist between the home and the host country and can be the origin of misunderstandings, delays, cost overruns and/or damaged reputations (Orr and Scott 2008), especially in the AEC industry where projects are deeply embedded in the local area. As a result, adapting to project environments by understanding these differences, gathering local knowledge, and adjusting work practices to the host country market and culture has become key to reducing the impact of these differences and global project success.

In addition, as organizations become increasingly international with their expansion, integrating knowledge and strategy across projects and markets within the organization is necessary to continuously

improve and remain competitive. Knowledge sharing is key to avoid wasting time, resources and money repeating past mistakes or "reinventing the wheel" (Javernick-Will and Hartmann 2011). To increase project and organizational performance, knowledge should be transferred, shared and made easily available to the members of the organization (Carrillo and Chinowsky 2006; Javernick-Will 2012; Javernick-Will and Hartmann 2011). As a result, the knowledge-based view of the firm asserts that knowledge is an important organizational resource for success (Grant 1996). Thus, organizational knowledge integration (including knowledge management and transfer) can help improve the performance of projects and the organization.

Previous research has pointed to the necessity of local adaptation and organizational integration for multinational firms and have developed frameworks to study the various strategies used by organizations when entering new markets (Prahalad and Doz 1987). The majority of these studies have focused at the organizational level and very little research has studied local adaptation and organizational knowledge integration at the project level or for project-based organizations. However, because of the project-based nature of the AEC industry and the increase of international projects, it is crucial that these concepts are studied at the project level. Indeed, projects teams need to acquire local knowledge, adjust working methods to local environments, and manage and share knowledge within the organization to be successful, which requires being profitable as an organization as well as locally sustainable and accepted in the project's host country.

To address this limitation and calls for research in this area (Levitt 2007), this research (1) designs a questionnaire and scale to assess the level of adaptation and integration of projects in multinational project based organizations; (2) analyzes projects' levels of local adaptation and organizational knowledge integration with project performance; (3) studies the relationship between adaptation and integration at the project level in project-based organizations; and (4) analyzes how project teams can *both* adapt to new environments and integrate knowledge within the organization. As a result, this research contributes to the body of knowledge by studying the concepts of local adaptation and

organizational integration at the project level in project-based organizations, which is particularly relevant in the AEC industry.

POINT OF DEPARTURE

This research departs from literature related to adaptation and integration to (1) determine criteria that can be used to assess the level of adaptation and integration of projects and (2) better understand the relationship between these concepts in the project-based construction and engineering industry; and uses performance literature to (3) identify project performance criteria in the AEC industry to analyze the relationship between the level of adaptation and integration of a project and performance.

Adaptation

Working internationally presents risks associated with the differences between the entrant's home country and the project host country. The level of risk when entering new foreign markets is closely related to the level of cultural, administrative and economic differences between the home and the host countries (Ghemawat 2007). Understanding these differences by acquiring and maintaining local knowledge of the new project area should help to reduce these risks (Lord and Ranft 2000a) and the 'liability of foreignness' (Zaheer 1995). As a result, the acquisition, assimilation, transformation and exploitation of local country knowledge and the adaptation to the local environment are necessary to reduce the impact of those differences (Petersen and Pedersen 2002; Petersen et al. 2008). Adaptation also helps to avoid misunderstandings, delays, cost overruns, and/or damaged reputations (Orr and Scott 2008) that can negatively impact project performance. In fact, Orr and Levitt (2011) highlight the importance of adaptability in international projects and rank it higher than the ability to predict risks. Adaptation to local environments varies depending on the organization, and is dependent on its ability to learn, its international working experience, its willingness to adapt strategies to the local environment, its perceived unfamiliarity of the foreign market and the elapsed time spent in the host country (Petersen and Pedersen 2002). Ultimately, adaptation is dependent on acquiring knowledge about the local environment, differences with the organization's home market, and the degree of embeddedness of the organization in the project environment.

Acquisition of Local Knowledge

To adapt to a new environment, project teams need to acquire local knowledge from that environment. Various types of local knowledge exist and it is important to understand the nuanced differences between these knowledge types. Eriksson et al. (1997) distinguish between two types of foreign market knowledge needed: business knowledge and institutional knowledge. Business knowledge represents the knowledge of the local business culture and of the local industry actors: suppliers, sub contractors, clients, and competitors…). Institutional knowledge is used to categorize the local knowledge that needs to be obtained within a project's host country in the AEC industry (Javernick-Will 2009; Javernick-Will and Scott 2010). This classification includes three main categories (Javernick-Will and Scott 2010):

- ***Regulative knowledge*** includes laws, regulations, country's stability and government policies, approval and permitting processes. This knowledge is often easier to acquire than other institutional knowledge types, as it is more formal and explicit.
- ***Normative knowledge*** involves values and norms, industry and market knowledge, work practices and relationship types. This knowledge is less explicit than regulative knowledge as it is morally governed and often requires observation of behaviors.
- ***Cultural cognitive knowledge*** consists of local cultural beliefs and language. This knowledge is deeply shared across the local community and the most difficult to acquire.

Studies have shown that the importance given to these three pillars of institutional knowledge varied depending on the industry as well as on the type of firm (Javernick-Will and Scott 2010). For instance, based upon over 100 interviews in the AEC industry, the most frequently mentioned types of important institutional knowledge were normative (50%) followed by regulative (38%) and cultural cognitive (12%) (Javernick-Will and Scott 2010). Due to the variety of interests and activity types, within the AEC industry, differences were observed based upon firm type, with development firms focusing more frequently on social norms and local expectations while contractors focused more on laws and logistics

and engineers on work practices and design construction standards (Javernick-Will and Scott 2010). Organizations and project teams should therefore identify the most important institutional knowledge type for the nature of their activities and focus on acquiring these specific types of institutional knowledge.

Acquiring this knowledge should help to increase the level of adaptation of a firm as they understand the differences they will encounter. Depending on the entry mode selected: permanent or mobile, the adaptation process will vary (Chen and Messner 2010). Javernick-Will (2009) describes different ways of acquiring local knowledge, which can include contractual relationships, non-contractual relationships, acquiring a firm or hiring locals, strategically obtaining knowledge through pioneering or trial projects, relying upon past experience, or through public sources.

It is theorized that the more methods used and the more effort put forth to acquire local knowledge, the more adapted the project team will be. Conversely, a lack of adaptation increases the impact of institutional differences and can be at the origin of institutional exceptions, or deviant acts committed in a new location due to a lack of institutional knowledge (Orr and Scott 2008). These often lead to misunderstandings, delays, cost overruns, and/or damaged reputations (Orr and Scott 2008).

This past work has indicated that firms working on international projects need to acquire local knowledge. The amount of local knowledge needed and the means to acquire this knowledge are dependent on the level of embeddedness of the firm's activities in the local country. The concept of embeddedness refers to the number and the nature of the relationships between the entrant firm and the local community in the host country and is very closely related to adaptation (Orr and Levitt 2011).

Degree of Embeddedness

This level of embeddedness varies according to the firm's type, role in the project and the management decisions regarding its involvement in the work that has to be done locally (doing the work internally or outsourcing to local contractors) (Orr and Levitt 2011). Heavily embedded firms are more exposed and vulnerable to institutional differences and exceptions. As a result, the level of embeddedness

influences the strategies used to enter a market and the amount of organizational learning needed. In turn, this reflects the level of adaptation needed on a particular project. Several strategies can be employed to reduce the impact of local embeddedness: (1) increasing the supply of local knowledge before the start of the project (feasibility studies, trial projects); (2) decreasing the need for local knowledge (hire local consultants, outsourcing to local contractors); and (3) reducing the consequences of local knowledge deficit (making contingency plans, cultivating adaptability) (Orr and Levitt 2011). Implementing these strategies is necessary to reduce the risks associated with institutional exceptions (Orr and Scott 2008).

These previous studies have shown that local adaptation is important for projects. Specifically, studies have pointed to the need for organizations to acquire local knowledge and adapt their organizational knowledge to create a locally accepted and sustainable project when entering new markets. In addition to adapting to new local environments, multinational project-based companies need to integrate and manage knowledge within their organization to achieve higher performance (O'Dell et al. 2000, Mertins et al. 2001).

Integration

Sharing and integrating knowledge across the organization are important to improve performance and create competitive advantages. Knowledge transfer helps to avoid wasting time, resources and money spent repeating past mistakes or "reinventing the wheel" (Javernick-Will and Hartmann 2011). In addition, it can improve access to diverse sets of expertise, which increases learning and innovation and helps the organization remain competitive. To highlight the importance of this knowledge exchange, Grant (1996) introduced the concept of the knowledge-based view of the firm, whereby knowledge is a resource that is as valuable as capital to an organization. In this view, the knowledge and capabilities that reside within a firm help sustain an organization's competitive advantage and performance.

Due to the importance of knowledge, many firms are particularly concerned with the effective capture and transfer of knowledge across the organization. Robinson et al (2001) found that construction organizations were motivated to create knowledge management strategies due to the desire for continuous

improvement, dissemination of best practices, quick customer response, reduction of rework and the development of new products and services. As a result, they need to be able to identify organizational expertise, determine the best strategy to manage and share knowledge, and measure the impact on the organization's performance of knowledge management and sharing (Carrillo and Chinowsky 2006).

Multinational organizations are no different and, due to the geographical dispersion of offices across the globe, they must focus on strategically transferring knowledge across projects and offices in the organization. Considering the unique knowledge bases that employees gain from each market the organization operates in, a focus on knowledge integration can improve performance and create strategic advantages for the organization. For instance, Cross and Cummings (2004) showed that connections crossing organizational, physical and hierarchical boundaries help improve individual performance because these knowledge exchanges offer a diversity of information with various insight to a question or problem. This knowledge exchange is more strongly associated with performance when group members come from different locations, are more structurally diverse (different organization affiliations, roles or positions), occupy different functions within the organization, and report to different managers (Cummings 2004a).

Due to the benefits of global knowledge exchange within an organization, the organizations must focus on creating knowledge sharing networks (KSN) that transcend traditional geographic and project boundaries. Creating these connections and networks must overcome institutional differences, organizational constraints and personal limitations (Javernick-Will 2011). This adds to the traditional challenges associated with knowledge transfer in project-based organizations such as in the AEC industry where knowledge transfer between projects can be associated with an increase in capabilities and project performance if done efficiently, but can also hinder project performance (e.g. cost and schedule) if the knowledge needed is not well identified, transmitted and applied (Landaeta, 2008). As a result, project teams often focus on short-term objectives for project success over longer-term objectives for organizational success. Previous work in the industry found that the lack of time, lack of standard work

processes, organizational culture and insufficient funding are challenges for knowledge management in the AEC industry (Carillo et al. 2004).

Given these challenges, it is important to enable employees to locate knowledge sources (Javernick-Will 2011) and motivate employees to exchange knowledge (Javernick-Will 2012). For instance, identifying the capabilities within divisions may lead to increased knowledge exchange as divisions that are acknowledged for their abilities increase knowledge flows between the division and others in the organization (Monteiro et al. 2008). However, when divisions are not located on the knowledge path, they exchange knowledge less, become isolated and underperform. This is referred to as the "liability of internal isolation" (Monteiro et al. 2008). As a result, understanding "who knows what" and where capabilities reside is important for organizations (Javernick-Will and Hartmann 2011).

In addition to recognizing capabilities to increase knowledge flow, the organization must implement the right knowledge sharing methods and strategy for the organization, which will depend on the type of knowledge exchanged (Monteiro et al. 2008). Nonaka and Takeuchi (1995) differentiate explicit knowledge (which can be easily exchanged and documented) from tacit knowledge (which is acquired through experience and more difficult to share). As a result, formal methods are useful to combine and exchange explicit knowledge through project databases (statistics of past projects), reports (lessons learnt and projects "close out"), procedures and processes (checklists) and general intranet systems, while socialization methods are often still required to exchange tacit knowledge (Javernick-Will and Levitt 2010). This can include meetings, teleconferences, reviews, transfer of people to different offices, personal discussions, mentoring, and training. However socialization can be limited due to geographic or hierarchical boundaries. In these cases, interactive online platforms may enable the combination of formal and socialization methods by offering information and capability location through searches, access to written information, and peer-to-peer interaction through forums (Javernick-Will and Levitt 2010). When transferring local institutional knowledge that is gained through projects, socialization methods are used most frequently; however, the frequency of their use decreases for knowledge that has

been codified and made explicit, such as regulative knowledge of laws and policies (Javernick-Will and Levitt 2010).

In addition to identifying and locating knowledge capabilities, creating the proper methods to exchange knowledge, organizations must also focus on motivating knowledge exchange. Javernick-Will (2012) identified four main criteria to motivate intra-organizational knowledge exchange: (1) providing resources, (2) relying on intrinsic motivations (enjoying sharing knowledge), (3) creating extrinsic global incentives (incentives/ awards linked to organizational or long-term performance) and (4) increasing social motivations, which relies on reciprocity, conformity, peer recognition, mimicking the behavior of leaders, knowledge sharing commitments, and perceived importance of knowledge exchange. Social motivations were the most frequently indicated motivation to exchange knowledge. Furthermore, organizational structure matters, where the integration of knowledge is increased when divisions report to a corporate level country office, when a centralized structure is used, and when managerial rewards and incentives are linked to overall performance (Lord and Ranft 2000a).

Due to the increased importance of organizational knowledge integration, several of the most recent studies include related criteria in performance frameworks for global construction organizations (for example the learning and innovation dimension of the balance scorecard (Jin and Deng 2012; Yu et al. 2007). In addition, some research has focused on subjective project success indicators, highlighting the importance of relationships, communication, knowledge and information exchange on project performance (Chinowsky et al. 2010; Molenaar et al. 2012; Sanvido et al. 1992). Chinowsky et al. (2010) showed the impact of the alignment between knowledge exchange and knowledge requirements at the organization level on project's effectiveness and Molenaar et al. (2012) studied the use of peer reviews to assess and predict project performance. The relational aspect of project success is also referred to in Sanvido et al. (1992)'s four critical project success factors: a well organized and cohesive team, contracts encouraging team work between the different actors, experience on similar projects and timely and valuable optimization of the information between the different actors. This shows the importance and

growing focus on knowledge integration to improve efficiency even in the construction industry where it is a challenge due to the project-based and unique nature of the industry.

Adaptation and Integration

As a result, organizations evolving in this new global market need to better understand global strategy, including pressures to adapt to new markets and integrate knowledge across markets. Prahalad (1975) first described these pressures through the Integration Responsiveness (IR) framework, where *local responsiveness* is defined by the extent to which divisions respond to the local market's needs and *global integration* refers to the extent to which activities are coordinated and global strategy is integrated across the different divisions. The IR framework has been further developed by Prahalad and Doz (1987) and Bartlett and Ghoshal (1989) and widely used to study global pressures (Johnson 1995; Roth and Morrison 1990) and strategies to respond to these pressures (Harzing 2000; Taggart 1997).

Some of these studies differ on the categorization of firms according to the global integration and local responsiveness dimensions, with some studies classifying organizations in three clusters (Prahalad and Doz 1987, Roth and Morrison 1990, Johnson 1995) and others in four clusters (Bartlett and Ghoshal 1989, Leong and Tan 1993, Taggart 1997). The three-cluster classification relies on the vision of local responsiveness and global integration as competing challenges that cannot be achieved simultaneously. The three types of organizations identified are locally responsive (facing high pressures for adaptation to local market's needs), globally integrated (facing high pressures for global strategy and coordination within the organization) and multifocal (facing moderate pressures from both local responsiveness and global integration) (see figure 1). The four-cluster classification differs from the three-cluster classification in that global integration and local responsiveness can be achieved simultaneously. This four-cluster classification, as illustrated in figure 2, replaces the multifocal cluster with two new clusters: a low responsiveness/ low integration cluster and a high responsiveness/ high integration cluster. The four-cluster typology introduced by Bartlett and Ghoshal (1989) includes the following organization types: multinational (high local responsiveness, low global integration), global (low local responsiveness,

high global integration), international (low local responsiveness, low global integration) and transnational (high local responsiveness and high global integration).

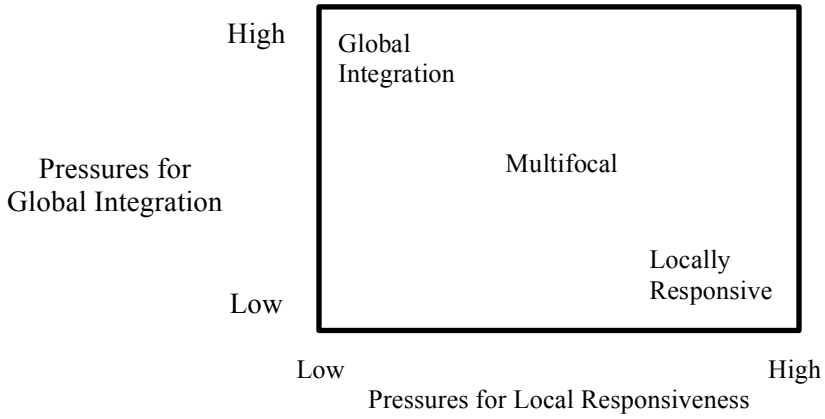

Fig. 1: Three cluster classification
Integration – Responsiveness Grid adapted from Roth and Morrison (1990)

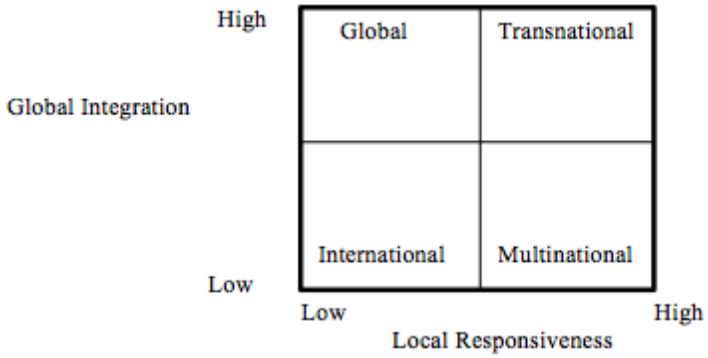

Fig. 2: Four-cluster classification

To classify organizations into the three clusters described previously, Roth and Morrison (1990) employed cluster analysis on fourteen industry variables. Then, they used Miller (1986)'s competitive attributes (complex innovation, marketing differentiation, breadth and conservative cost control) and performance indicators to try to define and differentiate the global strategies and performance of the three clusters identified. The results for the performance indicators varied amongst the three clusters, but no significant differences were observed. Johnson (1995) extended Roth and Morrison (1990)'s work and confirmed the three-cluster classification for the US construction equipment industry. Similar to Roth and

Morrison (1990), the study did not find performance differences across the clusters of organizations; however, it did find that locally responsive groups focused less on conservative cost control, and that the globally integrated and multifocal groups focused more on breadth, complex innovation, quality reputation and premium positioning than the local responsive groups.

In contrast, Leong and Tan (1993) based their study on Bartlett and Ghoshal's (1989) four-cluster typology. Using a survey methodology, they investigated which characteristics defined by Bartlett and Ghoshal were assigned to the different organizational types. The characteristic choices were developed along four themes: (1) the configuration of assets and capabilities, (2) the role of overseas operations, (3) the development and diffusion of knowledge and (4) how competitiveness is achieved in the global market.

Within the AEC industry, Comu et al. (2012) proposed a framework to assess performance of construction and engineering organizations that are internationalizing according two dimensions. Those are (1) *global integration* defined as the extent to which the organization uses integrated systems and processes and (2) *global reach*, which measures the amount and size of the organization's international operations. This model also provides recommendations on how to improve performance and respond to the competing pressures of global reach and global integration. They introduced four stages representing different levels of internationalization for globalizing construction organizations: at first *globalizing entry mode* that could evolve in *globalizing expansion mode* if focusing on global reach or in *globalizing optimization mode* if focusing on global integration and that could ultimately reach the *globalizing mature mode* if focusing on both. Depending on the measured values of global integration and global reach, organization will fall in one of those four quadrants. In this research, we will use a four-quadrant representation, similar to this one to classify projects based on their levels of adaptation and integration. While the global reach dimension differs from our local adaptation, as it considers the organization's international operations as a whole, the global integration relates to our definition of global integration.

Multinational project-based organizations in the AEC industry need to adapt to the local environment (local responsiveness dimension) and to integrate knowledge, strategies and processes across the organization (global integration dimension) to be successful on international projects. If an organization focuses on only one aspect, neglecting the other, either project or organizational performance may suffer, or both. As a result, many organizations aspire to be a transnational organization that simultaneously adapts to the foreign market while integrating knowledge across the organization. This is thought to be the best structure to ensure optimal performance in the global context.

For the purpose of this research, we adapt the concepts developed in literature of local responsiveness/ global integration and global reach/ global integration and define:

- *Local adaptation* as the methods implemented by the project team to acquire local knowledge and to adjust organizational processes and procedures to the local environment in order to reduce the risks associated with working internationally, specifically the risks that are due to the differences between the home and the host country. *and*
- *Organizational integration* as the extent to which project teams use the same processes/ procedures and exchange knowledge across the global organization (for instance, with other project teams, other divisions, and the headquarters).

Linking the levels of adaptation and integration to performance will help to determine the importance of these concepts at the project level. To highlight this relationship, we identified the common indicators and methods used to measure project performance from the construction literature. Rather than creating a framework to comprehensively measure performance, we base the evaluation of project performance on the most common criteria identified from past work.

Project Performance

Project performance measurements depend on how a successful project is defined and on the perceptions and expectations of the different actors (owners, designers or contractor) (Sanvido et al. 1992). As a result, measuring the performance of construction projects is complex.

Shenhar et al (1997) include four dimensions—project efficiency, impact on customer, business success and preparing for the future—in their performance criteria, which measure the project's success at its completion and beyond. Similarly, Atkinson (1999) analyzes success criteria at the delivery stage ("the process of doing it right": cost, time, quality and efficiency) and at the post delivery stage ("the system": criteria from project managers and "the benefits": business success). Molenaar and Songer (1998) focus primarily on the conformance to or variance from the plan and identified five success criteria for design-build projects in the public sector: budget variance, schedule variance, conformance to expectations, administrative burden, and overall user satisfaction. Chan (2001) distinguishes objective measures (time, cost, value and profit, safety, environment performance) and subjective measures (quality, functionality, end user's satisfaction, client's satisfaction, design team satisfaction, construction team's satisfaction).

Despite the different approaches used and the various success criteria identified, three common criteria—time, quality and cost—are the most frequently used at the project level (Atkinson 1999; Lim and Mohamed 1999; Songer and Molenaar 1998; Shenhar et al. 1997). For the purpose of this research, we based our project performance measurements on these most common success criteria by adapting questions used by Molenaar and Songer (1998).

In this research, we study the pressures of local adaptation and organizational integration at *the project level* in a project-based industry. While previous work studied the optimal internationalization strategies at the organization level (Prahalad and Doz 1987, Barlett and Ghoshal 1989, Roth & Morrison 1990, Johnson 1995) or at the subsidiary level (Taggart 1997) there is a dearth of studies at the project level. In addition, while past research has applied the IR framework to manufacturing industries (Roth and Morrison 1990), the US construction equipment industry (Johnson 1995) and Taiwan's technology

industry (Johnson et al. 2008), there has not been studies on this framework in a project-based industry such as the AEC industry. As a result, our main contributions consist in adapting and applying the IR framework concepts to the AEC industry at the project level.

In a nutshell, our study uses the literature on local adaptation, organizational integration and some of the characteristics of the four-cluster IR framework developed by Bartlett and Ghoshal (1989) and studied by Leong and Tan (1993), to build a questionnaire to assess the level of local adaptation and global integration of projects and interview project managers on the processes, benefits, difficulties and tradeoffs of both. We then linked project's identified levels of adaptation and integration to project performance.

RESEARCH QUESTIONS

This research studies the relationship between local adaptation (similar to responsiveness) and organizational knowledge and strategy integration at the project level in the AEC industry (a project-based industry). Achieving successful local adaptation and global integration simultaneously is theoretically difficult given the limited bandwidth and focus of project teams. Studying if and how project teams can do both successfully is important as it could help improve the performance of projects and organizations.

This study is organized around three main questions:

1. How can we rate the level of local adaptation and global integration of a project?
2. How are project team's levels of local adaptation and organizational integration related to project performance? *And*
3. How can project teams adapt to new local environments *and* integrate knowledge and strategy within the rest of the organization simultaneously?

RESEARCH METHOD AND RESULTS

In order to answer these questions, we employed a multi-method research design. Figure 3 illustrates the four main phases of this research. Phase 1 included a literature review to identify criteria of adaptation and integration and created a questionnaire to assess projects' levels of adaptation and integration. In phase 1, this exploratory questionnaire was tested on 10 project managers and validated by follow up interviews with those project managers. This enabled us to update the questionnaire and to distribute it to a larger number of project managers in phase 2. A rating scale associated with the updated questionnaire was also developed in phase 2 to assign an adaptation and an integration score to each project. As a result, phase 2 responded to the first research question: how can we rate the level of local adaptation and global integration of a project? Phase 3 quantitatively analyzed the data collected from the updated questionnaire created in phase 2 to better understand the relationship between the variables and to answer the second research question: how are project team's levels of local adaptation and organizational integration related to project performance? Phase 4 combined the qualitative analysis (1) of the interviews of the project managers in phase 1 and of (2) the data collected with the updated questionnaire in phase 2 to answer the third research question: how can project teams adapt to new local environments *and* integrate knowledge and strategy within the rest of the organization simultaneously?

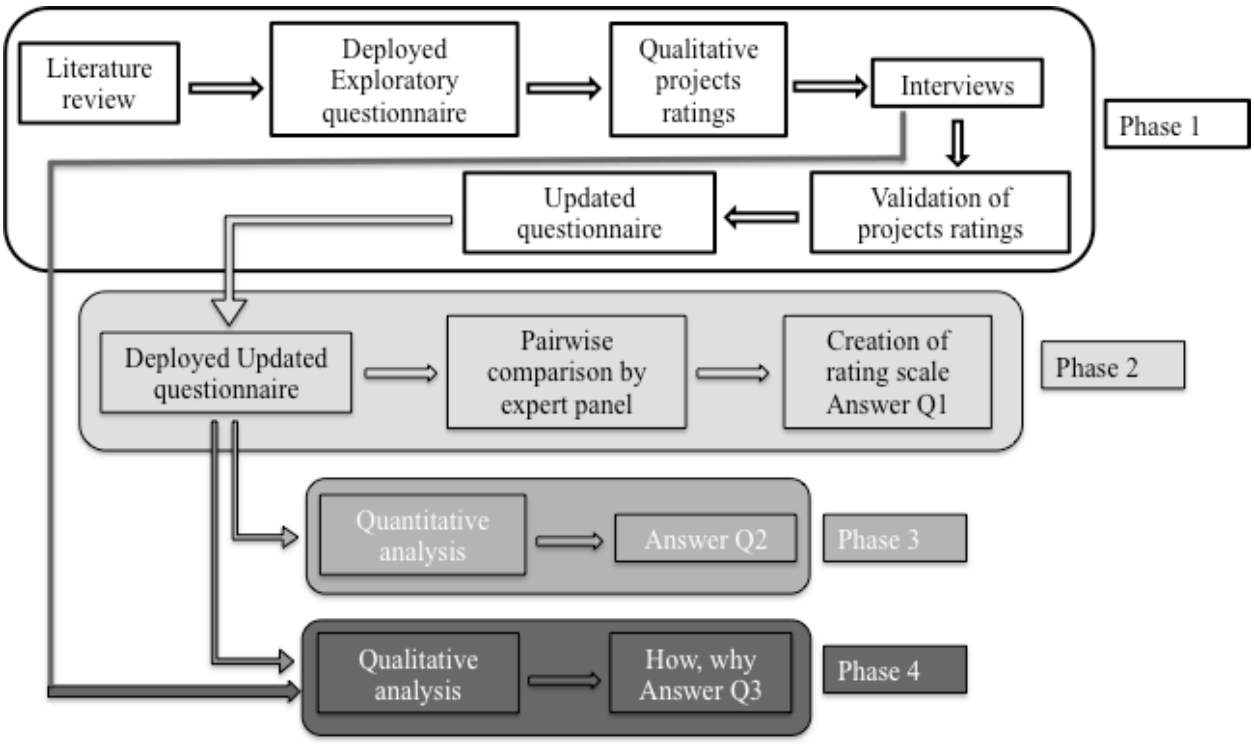

Fig. 3: Research Method Phases

In the next sections, we describe each phase of the research in further detail and present the associated results.

Phase 1: Exploratory Questionnaire and Follow-up Interviews

Method

We first reviewed literature on adaptation, integration and project performance to identify adaptation and integration characteristics that have been used in previous studies. These characteristics were used to build an exploratory questionnaire to assess project levels of adaptation and integration. This computer-based questionnaire was administered to 10 project managers from 5 different organizations using Survey Gizmo. The project managers were asked to identify an international project they worked on and to answer the questionnaire for this particular project. This questionnaire contained questions on adaptation, integration and performance. For instance, adaptation questions asked about the percentage of

expatriates working on the project and the percentage of relationships with the host country; integration questions aimed to gather information on the amount of relevant knowledge shared within the organization, the frequency, direction of knowledge exchanges and on the organizational strategy in the global market. Based on the project managers' answers to the questionnaire, we assigned qualitative ratings for adaptation and integration (high, moderate high, moderate, moderate low and low) for each project. For more information on the exploratory questionnaire and the qualitative rating of the projects, please refer to Appendices 1 and 2.

We then conducted follow-up interviews with 9 of the 10 project managers surveyed to validate the ratings obtained from the questionnaire analysis and to analyze the relationship between adaptation and integration. The interviews lasted approximately 1 hour and were recorded and transcribed. We followed the ethnographic interviewing method developed by Spradley (1979) and asked semi-structured but open-ended questions to give freedom for the project managers to respond and to capture new ideas that were not included in the questionnaire. More precisely, descriptive questions were asked to gather information on the project manager's role and the project scope; and structural and contrast questions were used to better understand the adaptation and integration processes, difficulties encountered, and the relationship between the two concepts. We then asked the project managers to assess their levels of adaptation, integration and project performance to compare the interview analysis with the questionnaire analysis. Examples of semi-structured interview questions are included in Appendix 3.

The interviews were transcribed and imported in QSR NVivo for analysis. NVivo is a software providing tools to facilitate the management and analysis of qualitative data such as running queries, coding to nodes or writing memos (Bazeley 2007). We coded the interview transcriptions to thematic nodes to validate the survey responses and analyzed the relationship between adaptation and integration, the processes used, difficulties encountered, and recommendations for both at different levels in the organization. The qualitative ratings presented in table 1 are derived from combining the two researcher's independent ratings.

Results: Analysis of the Exploratory Questionnaire and Follow-up Interviews

The comparison between the ratings obtained from the qualitative analysis of the exploratory questionnaire and from the analysis of the follow-up interviews presented slight differences for four of the 18 ratings (two for adaptation and two for integration) as shown in table 1.

Table 1: Ratings for adaptation and integration for each project

Organization Type	Project Number	ADAPTATION Rating based on		INTEGRATION Rating based on	
		Questionnaire Analysis	Interview Analysis	Questionnaire Analysis	Interview Analysis
Owner (Embassies)	1	Moderate High	Moderate	Moderate Low	Moderate Low
	2	Moderate	Moderate	Moderate High	Moderate High
Owner (Manufacturing facilities and reserach laboratory)	3	Moderate High	Moderate High	Moderate	Moderate
	4	Moderate Low	Moderate Low	Moderate	Moderate Low
Owner (Oil and Gas facilities)	5	Moderate High	Moderate High	Moderate High	Moderate High
General Contractor (Nuclear power plants)	6	Moderate		High	
	7	Moderate	Moderate	Moderate	Moderate
	8	Moderate Low	Moderate Low	Moderate	Moderate
Design Engineering (Flood recovery)	9	Moderate High	High	Moderate High	Moderate
	10	High	High	Moderate Low	Moderate

The differences in adaptation levels for projects 1 and 9 were based on the comparison of the projects' processes used to adapt and focus on adaptation. The interview analysis showed that project 1 was less adapted than project 9 and had a similar level of adaptation to project 2. Indeed, project manager 1 considered local adaptation to be less important than knowledge integration and mentioned few adaptation processes used. In contrast, project manager 9 showed that local adaptation and understanding the local clients requirements were the main focus of the project and that project 9 had a high level of adaptation, comparable to project 10's level of adaptation.

The differences in integration levels for project 4 relied on the fact that there was a lack of resources and formal methods used to integrate knowledge and strategy in the organization. The analysis of integration levels for projects 9 and 10 showed that integration varied depending on the organizational level (whether at the regional or global level). Indeed, projects 9 and 10 belonged to the same

organization and respectively scored moderate high and moderate low integration from the qualitative analysis of the exploratory questionnaire. However the interviews showed that the level of integration of those two projects was high at the local level, but low at the global level. The organization had very little knowledge and global strategy transfer between different locations in the world, as the primary organizational strategy was to allow local offices to focus on local needs and requirements. The existence of different levels of organizational integration, depending on the unit of analysis within the organization, is important for our study and was not considered in the exploratory questionnaire. In order to capture this nuance, the updated questionnaire differentiates organizational integration at three levels: the headquarters, the local offices and the rest of the organization.

Analyzing the differences between the qualitative analysis of the exploratory questionnaire and the follow up interviews helped us to identify information that was not captured in the exploratory questionnaire and questions that should be modified to better address nuances that were developed in the interviews. It also enabled us to shorten the length of the questionnaire by focusing on the most important adaptation and integration questions. As a result, some of the changes between the exploratory and updated questionnaire encompassed:

- ✓ Considering projects recently completed or near completion
- ✓ Simplifying the questionnaire by:
    - o Rewording some questions that were not well understood by the project managers in the exploratory questionnaire,
    - o Differentiating three organizational levels for knowledge exchange: the local offices in the host country, the headquarters, and the rest of the organization (project teams in other parts of the world),
    - o Considering the exchange of knowledge without differentiating local and technical knowledge *and*

- Differentiating local adaptation and organizational integration based on whether knowledge was gathered from/ or relationships were with the host country, the local offices in the host country, or the rest of the organization or the headquarters.

✓ Including a project performance section to analyze the relationship between the projects' levels of adaptation/ integration and performance.

✓ Adding a section that

- Assessed the difference between the levels of focus and achievement of local adaptation/ integration
- Obtained the project managers' perceived importance of adaptation and integration on project and organizational performance,
- Asked if the project managers considered adaptation and integration at the project level to be positively correlated (the two concepts are related and the project team needs to work on both simultaneously), negatively correlated (the two concepts are conflicting and the project team must focus on one to be successful) or not correlated (the project team needs to work on both independently), *and*
- Analyzed the organizational strategic approach concerning adaptation and integration in comparison to the projects' levels of adaptation and integration:
  - For instance, for adapting to the local environment, the question asked, "how did the organization operate in the global market?" with responses of: by building a strong local presence through sensitivity and responsiveness to national differences in the local country, by adapting some of the organizational methods to the local country and culture, or by implementing the organization's global standards.
  - And for integration, the question asked, "how did your organization work and share knowledge?" with responses of: by developing globally scaled operations using the knowledge acquired through various projects and shared worldwide within the organization, by using the knowledge developed in their local division combined with the

headquarters' knowledge or by focusing on the on-going project operations and the knowledge available within the project team.

This process enabled us to improve and update the exploratory questionnaire.

Phase 2: Updated Questionnaire and Creation of the Associated Rating Scale

Methods

In the second phase of the research, we administered the updated questionnaire via Survey Monkey to a larger number of project managers and created a rating scale to qualitatively assess the projects' levels of adaptation and integration. Gathering a large number of responses was difficult, primarily because the questionnaire focused at the project level. Therefore, project managers had to not only obtain their organization's approval for participation, but also the clients' approval to participate. As a result, we were only able to obtain responses from 31 project managers from ten different organizations.

The following section presents the method used to analyze the data collected from updated questionnaire and to create the associated rating scale. For more details on the updated questionnaire and its analysis please refer to Appendices 4 and 5. The analysis of the updated questionnaire and the creation of the rating scale used a five-step process:

Step 1: We distinguished *rating questions*, which were used directly to assess the project's level of adaptation/integration from *explanatory questions,* which were used to explain answers to rating questions or the processes employed. Six rating questions were identified for adaptation and seven for integration. Three explanatory questions were included for adaptation (time spent working in the host country, the existence or not of a local office in the host country, and the most used adaptation processes) and one explanatory question for integration asking about the most common knowledge integration methods used at the different organization levels).

Step 2: We then associated an adaptation/ integration *qualitative rating* (high, moderate high, moderate, moderate low, low) to each rating question answer choice. This qualitative rating was assigned based on reasoning inspired from set theory, which develops the concept of membership to a set. Set theory was first introduced by Cantor (1873) and became a key concept of mathematics. Since the development of fuzzy sets (Zadeh, 1965), set theory has been used in social research to assign values to conditions based upon the degree of membership in a set or out of a set. As a result, the attribution of the adaptation/integration ratings rely on the presence/ absence/ or observed quantity of local adaptation/ global integration indicators identified through an in depth literature review.

Step 3: Each adaptation/ integration qualitative rating was associated to an adaptation/ integration numerical score (high → 5, moderate high → 4, moderate → 3, moderate low → 2, low → 1) to compute overall adaptation and integration scores for each project (in step 5).

Step 4: We simultaneously used pairwise comparison via an expert panel to assign weights to each adaptation/integration rating question. The pairwise comparison matrix helped us to assess weights for different questions by asking a panel of experts to compare the level of importance of two items at a time. Pairwise comparison is part of the Analytical Hierarchical Process developed by Saaty (1980) and was chosen over other weighting methods for its precision and larger spread of weights (Eshlaghy and Radfar 2006; Pöyhönen and Hämäläinen 2001). As the number of questions for adaptation and integration was smaller than or equal to seven, pairwise comparison could be used (Eshlaghy and Radfar 2006). The calculation of the consistency index enabled us to check the consistency of the experts' pairwise comparison matrices (Guo-Jian et al. 2011).

Five experts were chosen based on their experience studying global projects, which was measured by the publication of at least 2 peer-reviewed manuscripts regarding global projects. They were asked to complete two pairwise comparison matrices: one for adaptation and one for integration. (Please refer to Appendix 4 to see the instructions sent to the expert panel to complete the pairwise comparison.)

The adaptation and integration pairwise comparison tables from the five experts were combined using aggregation of individual priorities (AIP). This method was chosen over the aggregation of individual judgments (AIJ), as the group is not assumed to act as a unit (Forman and Peniwati 1998). As a result, the weight for each question was obtained by computing the arithmetical mean of each experts weights for each question (and not of each pairwise comparison) (Forman and Peniwati 1998; Gass and Rapcsak 1998).

Tables 2 and 3 present the adaptation and integration rating questions and the associated weights calculated based on the expert panels' pairwise comparisons.

Table 2: Adaptation rating questions and associated weights (expert panel pairwise comparisons)

Adaptation Rating Questions	Qualitative Rating Explanations	Weights
A1 Rates the ***percentage of expatriates*** (project team members within your organization that are not from the host country) working on the project compared to the total staff (expatriates + locals).	A lower percentage of expatriates indicates a higher level of adaptation.	0,14
A2 Rates the ***amount of local knowledge gathered*** by the project team either from the local host country or from the local offices in the host country.	A higher level of local knowledge gathered indicates a higher level of adaptation.	0,18
A3 Rates the extent to which the project team ***focuses its attention on adapting*** to the local environment.	Higher focus on adaptation indicates a higher level of adaptation.	0,20
A4 Rates the extent to which the project manager ***believes its project team succeeds in adapting*** to the local environment.	Higher level of perception that project team has succeeded in adapting indicates a higher level of adaptation.	0,05
A5 Evaluates ***how the organization operates in the global market.***	If a respondent selected, "By building a strong local presence through sensitivity and responsiveness to national differences among countries", this indicates a higher level of adaptation.	0,17
A6 Rates the ***percentage of relationships the project team has within the host country*** (externally to the organization) in comparison to the percentage of relationship with the rest of the organization (in the host country and around the world).	A higher percentage of relationships in the host country indicates a higher level of adaptation.	0,26

Table 3: Integration rating questions and associated weights (expert panel pairwise comparisons)

Integration Rating Questions	Qualitative Rating Explanation	Weights
I1 Rates the amount of ***relevant knowledge exchanged between the project team and the rest of the organization*** (other local offices in the host country, other offices around the world, the headquarters).	Higher intraorganizational knowledge exchange indicates a higher level of integration.	0,21
I2 Indicates the ***frequency of the knowledge exchanges*** between the project team and the rest of the organization.	Higher frequency indicates a higher level of integration.	0,10
I3 Indicates the ***direction of the knowledge exchanges*** (bi-directional or unidirectional).	Bi-directional knowledge exchanges indicates a higher level of integration.	0,13
I4 Rates the extent to which the project team ***focuses its attention on sharing knowledge with the rest of the organization***.	Higher focus on sharing knowledge indicates a higher level of integration.	0,16
I5 Rates the extent to which the ***project manager believes that the project team succeeds in sharing knowledge with the rest of the organization***.	Higher levels of perception that the project team shares knowledge indicates a higher level of integration.	0,05
I6 Evaluates ***how the organization operates in a global environment***.	If a respondent selected "By developing globally-scaled operations using the knowledge acquired through various projects and shared worldwide within the organization", this indicates a higher level of integration.	0,14
I7 Rates the ***percentage of relationships the project team has with the rest of the organization*** (outside the host country) in comparison to the percentage of relationship in the host country (both internal and external to the organization).	A higher percentage of intraorganizational relationships external to the host country indicates a higher level of integration.	0,20

Step 5: Once the scoring was completed for each question in Step 3 and the weights were obtained from Step 4, we were able to compute overall adaptation and integration scores for each project, using the following formula: overall score = Sum of ((1 to 5 score for each rating question) X (question weight)).

Figure 4 summarizes the five-step process developed for the analysis of the projects' levels of adaptation and integration.

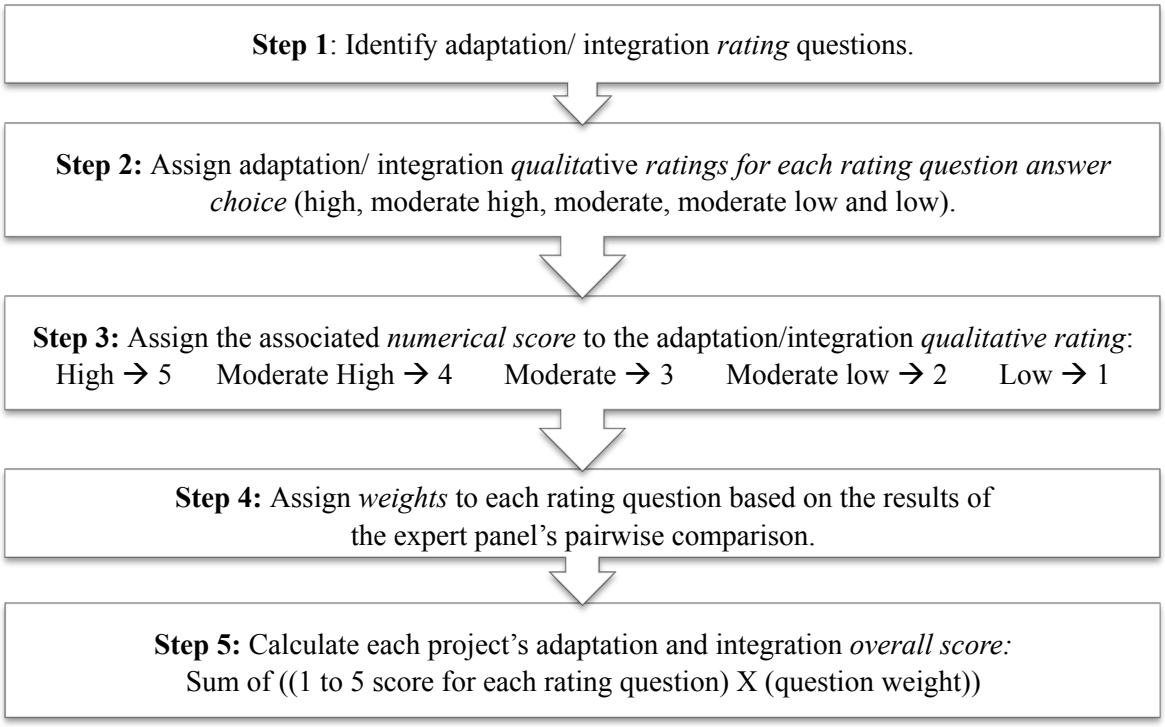

Fig. 4: Summary of the five-step rating scale process

Overall, each project was assigned an adaptation score and an integration score within a range from 100 to 500 based upon the project manager's responses to the updated questionnaire. A higher score indicates a higher level of adaptation or integration.

Results: Qualitative Analysis of the Updated Questionnaire

Table 4 presents the scores (where one is low adaptation or integration and five is high adaptation or integration) to each rating question for each project. In addition, it provides the overall adaptation and integration scores computed using our rating scale and weights obtained from the AHP process for each project. To identify contextual factors and trends, it also shows the organization and organization type for each project.

Table 4: Adaptation and integration individual scores and overall scores per project

Organization number	Organization Type	Project Number	A1	A2	A3	A4	A5	A6	I1	I2	I3	I4	I5	I6	I7	Overall Adaptation Score	Overall Integration Score
O1	Engineering and Construction (Energy and water infrastructure)	P1	5	3	3	5	3	2	4	5	5	3	4	3	3	312	369
		P2	5	5	5	5	1	3	4	3	5	3	4	1	3	380	321
		P3	2	4	4	5	5	4	4	3	5	4	3	5	1	394	348
		P4	5	2	3	5	1	3	2	3	1	5	5	5	3	286	320
		P5	3	5	5	5	5	4	4	5	5	5	5	5	1	446	394
		P6	2	5	5	5	5	3	4	3	4	5	4	3	1	406	328
		P7	5	5	5	5	3	3	3	5	4	4	4	3	1	414	311
		P8	1	2	2	5	3	3	2	1	4	3	4	3	5	244	314
		P9	1	2	5	5	5	4	3	3	5	4	3	1	2	364	291
O2	Engineering and Construction (Water and wastewater infrastructure)	P10	4	5	5	5	3	1	4	3	4	3	3	5	3	348	359
		P11	1	2	3	4	1	4	2	3	4	1	3	3	1	251	217
		P12	5	2	3	3	1	3	1	2	4	3	3	1	2	276	210
		P13	5	4	5	5	5	3	3	3	5	4	4	1	1	430	276
		P14	1	2	4	4	1	3	2	1	1	2	2	5	5	245	277
		P15	5	3	4	5	5	2	3	5	4	4	4	3	1	366	311
		P16	2	3	5	5	1	3	3	3	5	3	3	1	5	302	335
		P17	3	4	5	5	3	5	2	1	2	2	3	5	1	420	215
		P18	5	4	1	3	3	1	3	3	4	2	5	3	1	254	264
		P19	5	4	4	5	5	4	4	5	4	4	5	1	3	436	349
		P20	1	3	3	4	1	3	4	5	2	4	5	5	3	243	379
		P21	5	2	2	2	3	1	1	4	4	2	2	3	5	233	297
		P22	4	2	5	5	5	1	2	4	5	2	2	5	1	328	279
O3	Engineeering and Construction (Infrastructure, buildings and nuclear reactor development)	P23	1	3	3	2	1	2	2	2	4	3	3	1	1	207	211
		P24	3	4	4	3	3	4	2	5	1	3	2	1	1	364	197
O4	Engineering and Construction (Infrastructure)	P25	5	5	5	5	3	5	3	4	5	2	4	3	1	466	282
O5	Owner (Buildings)	P26	5	4	3	4	1	1	3	5	5	3	4	5	3	265	376
O6	Owner (Research laboratory)	P27	5	4	4	4	3	5	3	4	4	3	4	5	1	423	313
O7	Construction (Nuclear power plant)	P28	1	3	4	4	1	5	3	3	4	5	5	1	1	315	284
O8	Owner (Oil and Gas infrastructure)	P29	1	3	3	2	3	1	3	3	4	5	3	5	4	215	390
O9	Owner (Office buildings)	P30	5	4	5	5	1	5	3	5	5	5	4	3	1	414	340
O10	Engineering (Infrastructure)	P31	3	3	2	5	3	5	2	2	5	2	3	5	1	342	264

Table 5 represents the number of projects achieving high adaptation/high integration, high adaptation/low integration, low adaptation/ high integration and low adaptation/ low integration. Figure 5 represents each project's overall adaptation and integration scores on a four-quadrant graph adapted from the Integration Responsiveness framework.

Table 5: Frequencies of projects according to their adaptation and integration projects

		Adaptation		Total
		Low	High	
Integration	High	5	12	17
	Low	6	8	14
Total		11	20	31

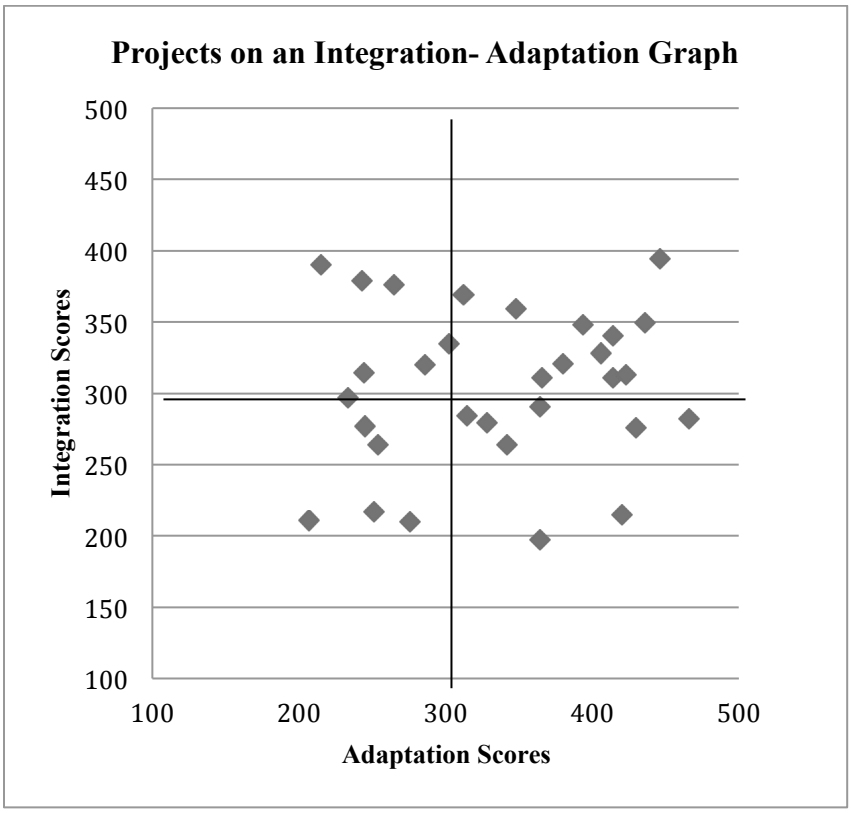

Fig 5: Representation of the projects on an integration-adaptation graph

For analysis, we divided projects at a score of 300, which is the mid-point of the potential range of overall adaptation and integration scores). For instance, projects with overall adaptation/integration

scores higher than 300 are considered highly adapted/ integrated, whereas projects that scored 300 and lower are considered to have low levels of adaptation/ integration. Based on table 5 and figure 5 we can see that 20/31 projects achieve a high adaptation level and 17/31 projects achieve a high level of integration. 12 projects simultaneously achieve high adaptation and high integration levels.

Table 6 illustrates the relative frequencies of projects per range of overall scores for adaptation and integration and figure 6 represents these on a histogram. This shows that the majority of the projects achieved moderate integration levels (with 83% of projects scoring between 250/500 and 400/500 for integration compared to 51% for adaptation). No projects achieved scores higher than 400/500 for integration, whereas 29% of projects scored higher than 400 for adaptation. In addition, teams had greater standard deviations in their level of adaptation (78 for adaptation compared to 55 for integration).

Table 6: Relative frequencies of projects per range of overall scores for adaptation and integration

Project Scores	**Relative Frequencies**	
	Adaptation	**Integration**
100-150	0%	0%
150-200	0%	3%
200-250	19%	13%
250-300	16%	29%
300-350	19%	35%
350-400	16%	19%
400-450	26%	0%
450-500	3%	0%

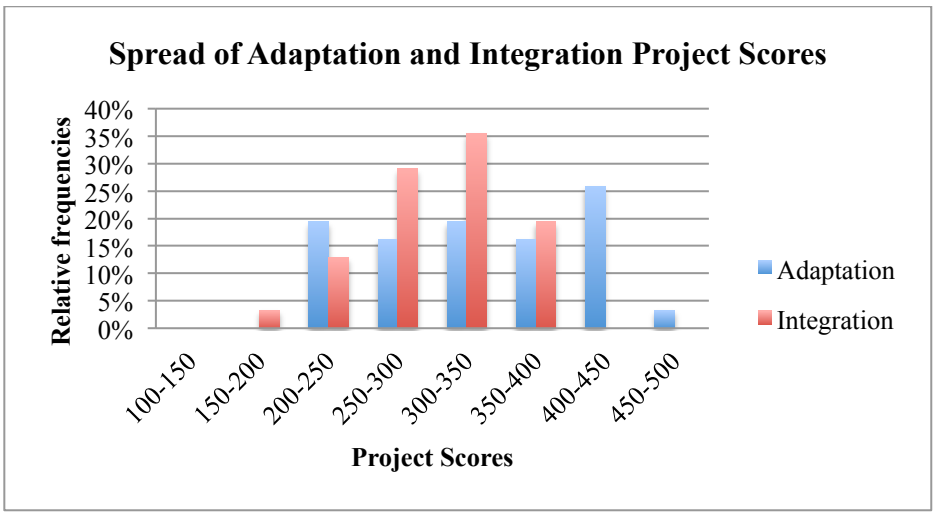

Fig. 6: Frequency of projects per range of overall scores for adaptation and integration

Findings from the updated questionnaire analysis are coherent with the findings from the exploratory study (please refer to table 1 and figure 7). Indeed, no project achieved high levels of integration and only two out of nine achieved moderately high levels of integration. Five of the nine projects scored moderate integration ratings and two received moderate-low integration ratings. In contrast, four out of the nine projects scored at least moderate high for levels of adaptation (two high and two moderate high).

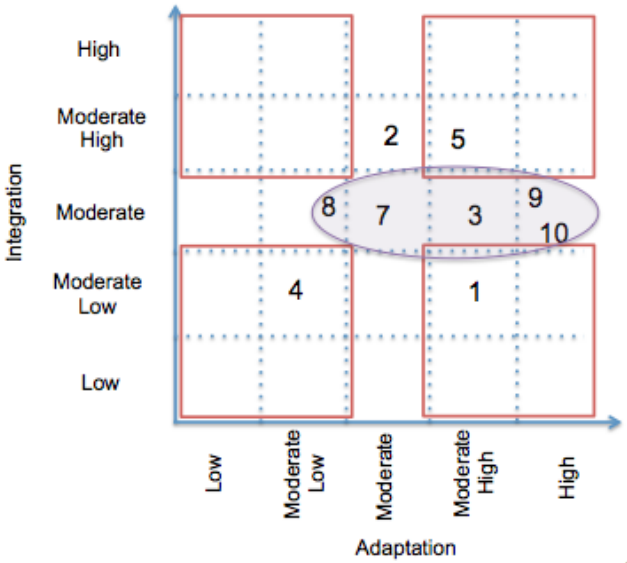

Fig. 7: Plot of the adaptation and integration project ratings from the exploratory study

As a result, it may be more difficult to achieve high levels of integration, or not as high of a priority at the project level, compared to achieving high adaptation in the local project area. This finding will be further analyzed in the discussion section.

The project managers were also asked to identify any other benefits they received other than the performance metrics listed, which included cost and schedule performance, satisfying the client's expectations and fulfilling the project teams expectations. This response was open-ended, meaning that we qualitatively analyzed the responses. The main benefits cited were:

- Increased market share and presence in the local market (13/31)
- Demonstrated performance leading to good reputation and future opportunities (10/31)
- Increased experience in working internationally at the organizational level (8) and at the individual level (6).

To summarize, phase 2 answers the first research question: how can we rate the level of local adaptation and global integration of a project? The analysis of the updated questionnaire provides insight on (1) the levels of adaptation and integration of the different projects and on (2) the project managers' perceived importance of adaptation/ integration for the project/ the organizational success.

Phase 3: Quantitative Analysis of the Updated Questionnaire

Phase 3 quantitatively analyzed the data collected from the 31 projects using SPSS. As the sample size is very small, this phase is very exploratory and the results are used to describe the data, rather than infer generalizable results. This phase consists in (1) analyzing, based on the project managers' answers, the relationship between the individual adaptation, integration variables, (2) studying if any statistical relationship exists between the individual questions of adaptation/ integration, the overall adaptation/integration scores and the individual and overall performance scores, and finally, (3)

identifying clusters of projects that emerge from the data based upon the questionnaire responses and see if they differ in performance. As a result, phase 3 includes three main parts:

Part 1: A *categorical principal component analysis CATPCA* to analyze the relationship between the adaptation/ integration/ performance questions based on the project managers' answers,

Part 2: *Cross tabulations* to identify the relationship between the levels of adaptation and integration at the project level and project performance (measured in terms of cost, schedule, client's expectations and team's expectations).

Part 3: A *two-step cluster analysis* to illustrate the existence of clusters of projects based on their levels of adaptation and integration, followed by a one-way ANOVA used to identify if significant differences in terms of project performance (cost, schedule, client's expectations and team's expectations), and project levels of adaptation and integration exist between the different clusters. Cluster analysis, when combined with ANOVA, offers a complementary approach to the analysis of the relationship between projects' levels of adaptation/integration and project performance that was completed using the cross tab method.

Part 1: Categorical Principal Component Analysis (CATPCA)

Method

Principal Component Analysis (PCA) is a method widely used for multivariate data analysis, which was first introduced by Pearson (1901) and then developed by Hotelling (1933). This method converts the variables into uncorrelated dimensions referred to as principal components, based on the data collected. The first principal components account for most of the variability of the data. Principal component analysis is often used as a data reduction technique, but can also be used as input to other analysis or to help interpret the data by providing information on the relationship between the variables based on the data collected, as in our case. *Categorical principal component analysis (CATPCA)* is a non-linear principal component analysis performed by SPSS that enables the analysis of ordinal and nominal multivariate data that are often encountered in social and behavioral science research. CATPCA uses non

linear optimal scaling transformation of the variables (Meulman et al. 2004; Linting and van der Kooij 2012).

CATPCA is the appropriate PCA method for categorical data such as ours, which includes adaptation, integration and performance scores measured for different variables (rating questions) on a 5-point scale for the 31 projects studied. CATPCA provides similar outputs as PCA with *component loadings* (reflecting the correlation between the variables and the principal components), *component scores* (coordinates on the principal components of each object/case of the data set), and *biplots* of the object points in the principal components dimension and of the vectors for the variables (component loadings of the adaptation/ integration/ performance questions). The biplot is obtained by superimposing the data from the component loadings and the object points.

In our analysis, we performed CATPCA on the data collected in the updated questionnaire for the adaptation questions and for the integration questions separately. The data used for each of the CATPCA were the 1 to 5 scores for the adaptation, integration and performance individual rating questions. This enabled us to better understand and analyze the relationship between these questions (variables).

We also performed additional CATPCA on the adaptation/integration variables but separated the data set into two, based upon whether the total adaptation or integration score was high (greater than 300 (mid point of the projects possible scores), meaning the data is more "in" the high adaptation or integration set) or low (less or equal than 300, meaning that the data is more "out" of the high adaptation or integration set).

Results of Categorical Principal Component Analysis (CATPCA) on adaptation and integration variables

The component loadings for the CATPCA for the adaptation variables and for the integration variables are shown in tables 7 and 8. We can see that the main component loadings for component 1 (or dimension 1) of the adaptation variables are A1 (percentage of expatriates working on the project compared to the total staff), A2 (amount of local knowledge gathered by the project team either from the

local host country or from the local offices in the host country), A3 (extent to which the project team focuses its attention on adapting to the local environment) and A4 (extent to which the project manager believes its project team succeeds in adapting to the local environment). Component 2 mainly consists of the opposite of A5 (how the organization operates in the global market) and of A6 (percentage of relationships the project team has within the host country (externally to the organization) in comparison to the percentage of relationships with the rest of the organization (in the host country and around the world)). The main component loadings of dimension 1 for integration are I1 (amount of relevant knowledge exchanged between the project team and the rest of the organization (other local offices in the host country, other offices around the world, the headquarters)), I2 (frequency of the knowledge exchanges between the project team and the rest of the organization), I4 (the extent to which the project team focuses its attention on sharing knowledge with the rest of the organization) and I5 (the extent to which the project manager believes that the project team succeeds in sharing knowledge with the rest of the organization). The second component for integration includes I3 (the direction of the knowledge exchanges (bi-directional or unidirectional)), the opposite of I6 (how the organization operates in a global environment) and I7 (percentage of relationships the project team has with the rest of the organization (outside the host country) in comparison to the percentage of relationship in the host country (both internal and external to the organization)).

Table 7: Component loadings for the adaptation variables

	Dimension 1	**Dimension 2**
A1	**0.695**	-0.396
A2	**0.789**	-0.161
A3	**0.804**	0.190
A4	**0.780**	0.308
A5	0.457	**-0.606**
A6	0.343	**0.837**

Table 8: Component loadings for the integration variables

	Dimension 1	**Dimension 2**
I1	**0.863**	-0.001
I2	**0.764**	-0.084
I3	0.475	**0.649**
I4	**0.723**	-0.252
I5	**0.758**	-0.01
I6	-0.248	**-0.795**
I7	-0.574	**0.449**

The CATPCA provided similar results for adaptation and integration by identifying two dimensions of for both concepts:

- A first component focused on the exchange of knowledge, either with the host country for adaptation or with the rest of the organization for integration.
- A second component evaluated the percentage of relationships outside the project team (either outside the organization in the host country for adaptation or within the organization, but outside the host country for integration) and the adaptation and the integration strategy at the organization level based on the study by Leon and Tran (1993). For both integration and adaptation, the question on strategy had a negative loading on component 2. This can be explained as A5 (how the organization operates in the global market) and I6 (how the organization operates in a global environment) focused on the strategy for responding to adaptation and integration pressures at the organizational level and not at the project level. In addition, this question didn't take into account the environmental pressures such as the project type, project scope and past organizational experience in the project location that also impact projects responses to adaptation and integration pressures. As a result, the strategy question, as formulated in our questionnaire, does not capture all aspects of responses to adaptation and integration pressures at the project level and needs to be updated to better reflect these in future research.

In conclusion, the results of the CATPCA are coherent between adaptation and integration, identifying two dimensions of a similar nature (knowledge exchange on the one hand and relationships and strategy on the other hand) for each concept. These findings help to validate some of the concepts developed when building the questionnaire and provide insight on the relationships between the variables based on the project managers' answers to the questionnaire and on how to improve the study by capturing the environmental pressures that impact project levels of adaptation and integration.

Part 2: Cross Tabulations

Method

Cross tabulations are a statistical method that summarizes categorical data in a contingency table. These are very useful to identify relationships between two variables. We dichotomized the responses from project manager's concerning each adaptation, integration and performance variable as 0 if the project was "out" of the set (defined as receiving a rating of 3 or less) or 1 if the project was "in" the set (defined as receiving a rating of more than 3). We then performed cross tabulations to identify relationships between the adaptation, integration, and performance variables. Cross tabs enabled us to identify relationships that didn't appear as significant using the Spearman's correlation coefficient test. This can be explained by the fact that the frequencies were increased as instead of considering the data in five categories per variable, we dichotomized it in two categories (high/low per variable).

As the tables were made of two rows and two columns, we used the Chi-square to calculate the Fisher's exact test. We chose Fisher's exact test because some of the cells had an expected frequency smaller than 5 (Fisher 1949). We used the two-sided exact significance because we were not testing particular hypotheses on relationships and instead were exploring whether relationships were significant between variables. We considered a relationship to be significant if the Fisher's exact test two-sided p-value was smaller than 0.05 and suggestive if it was between 0.05 and 0.1.

Results: Analysis of the relationships identified

The cross tabulations provided information on relationships between variables based on the project manager's answers. Six relevant relationships were identified, as shown in table 9. The relationship was considered significant when the Fisher's exact test's two-sided p value was smaller than 0.05 and suggestive when it was larger than 0.05 but smaller than 0.1.

Table 9: Significant or suggestive relationships identified with the cross tabulations method

	Significant or Suggestive Relationship	**Fisher's exact test two sided p-value**	**Standardized Statistics**
1	A higher percentage of expatriates in the project team is associated to a higher performance in terms of satisfying the clients' expectations.	0.029	-2.318
	A higher percentage of expatriates in the project team is associated to a higher performance in terms of satisfying the project team's expectations.	0.066	-1.978
2	A positive relationship between the amount of relevant knowledge gathered from the rest of the organization and performance to the expected project cost.	0.095	1.824
	A positive relationship between the amount of relevant knowledge gathered from the rest of the organization and performance in terms of satisfaction of the project team's expectations.	0.095	1.824
3	A positive relationship between the extent to which the project team manager believes the project team succeeds in adapting to the local environment and the performance in terms of satisfaction of the project team's expectations.	0.066	1.990
4	A higher performance in terms of clients' expectations is associated to a unidirectional knowledge exchange with the rest of the organization.	0.060	-2.036

1) A higher percentage of expatriates working on the project team compared to the total staff (expatriates + locals) is associated to a higher performance in terms of satisfying the clients' and project teams' expectations. A possible explanation for this finding is that host countries might hire US based contractors/ engineering firms rather than local ones in the goal of benefitting from the US knowledge/ methods/ processes that local firms do not possess. Conversely, if the owner is a multi-national organization, they may be better able to communicate their goals and desires to an expatriate, or someone having experience in different countries (Haas 2006). Expatriates often have experience on several international projects and are familiar with the organization's processes and

procedures. As a result, their presence on a project is important and can explain that the satisfaction of the host country clients' expectations in terms of knowledge and methods brought from the US will increase with the percentage of expatriates working on the project. In addition, project team members from multi-national organizations may be more comfortable working with fellow expatriates. Because the project managers that completed this questionnaire were mainly expatriates, their opinion of meeting the project team's expectations may be based on their own comfort level and expectations, which may be more frequently met when working with other expatriates who have similar experience and training. Indeed, similarities often increase feelings of comfort and satisfaction even though they reduce the benefits of working with diverse project teams such as offering a diversity of information with various insight to a question or problem and therefore improving performance (Cross and Cummings 2004).

2) A positive association between the amount of relevant knowledge gathered from the rest of the organization and the performance in terms of cost and satisfaction of project team's expectations. This can be explained similarly as the relationship between the percentage of expatriates and the clients' expectations and project team's expectations. As expatriates are often selected due to their experience, technical knowledge and organizational knowhow, they bring this knowledge to the host country and the local clients or the other team members can benefit from their expertise. This results in higher performance in terms of project budget and satisfaction of project team's expectations.

3) A positive relationship between the extent to which the project manager believes the project team succeeds in adapting to the local project environment and the performance in terms of satisfaction of project team's expectations. In other words, the project team's success in local adaptation is associated with a higher performance in terms of satisfaction of project team's expectations. As a result perceptions of adaptation are associated with perceptions of performance whereas perceptions of integration are not associated with perceptions of performance (two-sided p-value of the Fisher's exact test is of 0.477). A possible explanation is the project team's higher focus on the short-term

project performance versus the longer-term organizational performance. While local adaptation has a direct impact on project performance, the benefits of knowledge integration may appear only in the long term and at the organizational level. Therefore, it may be more difficult for project managers to perceive the benefits of knowledge integration at the project level.

4) A negative relationship between the direction of the knowledge exchange and performance in terms of satisfaction of clients' expectations. In other words, a unidirectional knowledge exchange is associated with performance in terms of client's expectations. This might be explained by the fact that a unidirectional exchange of knowledge can be useful for the project team as it brings knowledge from the rest of the organization that is needed for the project. However, a bidirectional knowledge exchange is better when considering a long-term performance for the organization that is beyond the short-term objective of good performance at the project scale.

In conclusion, the cross tabulations highlight (1) a relationship between the amount of technical knowledge, organizational knowhow, past experience on international projects, (2) a unidirectional knowledge exchange and performance in terms project team's expectations and (3) a relationship between the perception of succeeding in adapting to the local environment and satisfying the project team's expectations.

Part 3: Cluster Analysis

Method

Cluster analysis allowed us to study if groups emerged from the data based on their individual scores to the adaptation and integration rating questions. Cluster analysis is a method that consists of defining groups of homogeneous objects (with common characteristics), referred to as clusters, in order to classify data. Cormack (1971) and Gordon (1980) introduce the concepts of "internal cohesion" and "external isolation" of clusters. Clusters are formed based on the similarity of objects with respect to various criteria: in our study we are looking at the clusters formed for projects based on their scores for

adaptation and integration. In addition, the nature of the clusters formed is highly dependent on the variables selected by the researcher. For this research, we considered all of the adaptation and integration rating questions presented previously to create our clusters. In addition, cluster analysis helps to identify common characteristics within a cluster and/ or the differences between the clusters identified.

We used two-step clustering, which is an exploratory clustering method available on SPSS to study the clustering of categorical data. The output of the two-step analysis on SPSS includes:

- a model summary showing the significance of the results (poor, fair, good)
- a cluster predictor importance showing the relative importance of each variable used to create the clusters
- a cluster size viewer indicating the size of the smallest cluster, the size of the largest cluster and the ratio of size of the largest cluster to the smallest cluster
- a cluster comparison viewer indicating what score (from 1 to 5) the majority (*most frequent number*) of projects in one cluster achieves for each variable (in our study, each adaptation or integration question). This is particularly useful to identify the level of adaptation and integration of each cluster, the differences between the clusters, and to compare them.

After the cluster analysis, we ran a Kruskal-Wallis test to compare the different clusters identified in terms of overall adaptation/ integration scores and individual performance scores. If the test is significant, this means that at least one of the clusters differs from the others based on this criterion. We used the Kruskall-Wallis test, as it is the extension of the Mann-Whitney U test for nonparametric data, such as ours, in the one-way analysis of variance. In addition, it doesn't assume normality of the data used.

Results of the Cluster Analysis

Analysis of the Clusters Obtained

The two step cluster analysis did not identify any natural clusters (only one cluster emerged when not entering a specific number of clusters); however when forcing the number of clusters, five is the first

number of clusters providing significant results (fair), even though of weak evidence. The higher number of clusters increases the cluster analysis quality, however, this also decreases the explanation that can arise from the analysis. As a result, we performed our cluster analysis with five as the specified number of clusters. The results are presented figure 8.

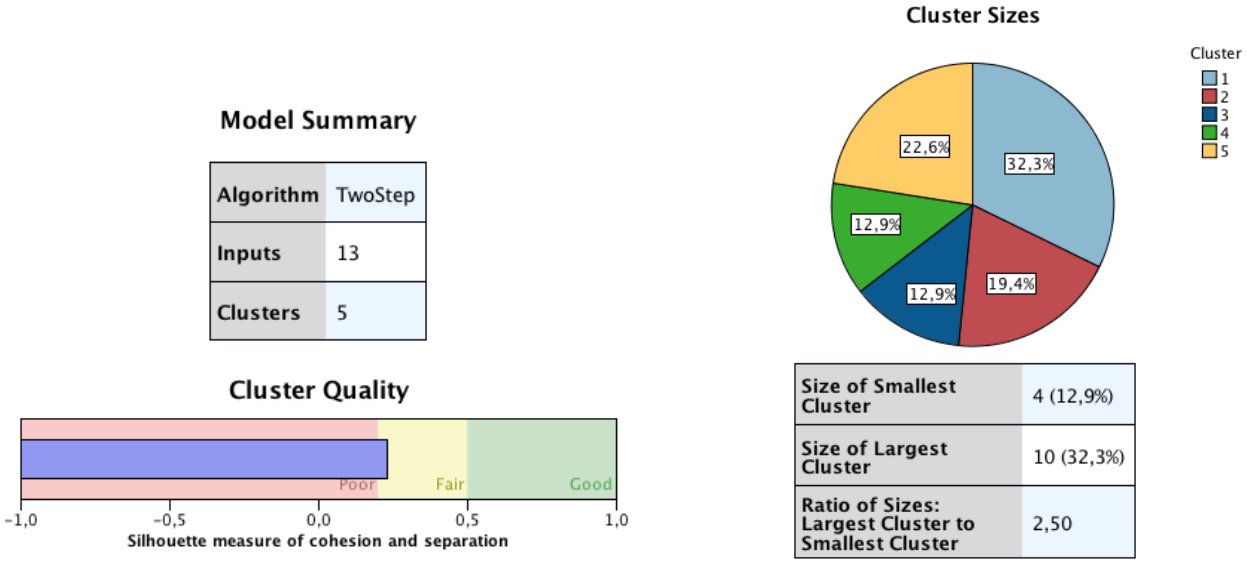

Fig. 8: Model summary of the cluster analysis and cluster size viewer

The predictor importance shows the key variables used to create the clusters (see figure 9). The predictor importance of the variables varies depending on the number of cluster specified and in the case of our five-cluster analysis, the most important adaptation and integration individual rating questions (variables) used to predict the clusters were:

- how the organization operates in the global market (adaptation) (A5)
- the extent to which the project team integrates knowledge with the rest of the organization (I4)
- the percentage of relationships the project team has with the rest of the organization (I7)
- the frequency of knowledge exchange the project has with the rest of the organization (I2)

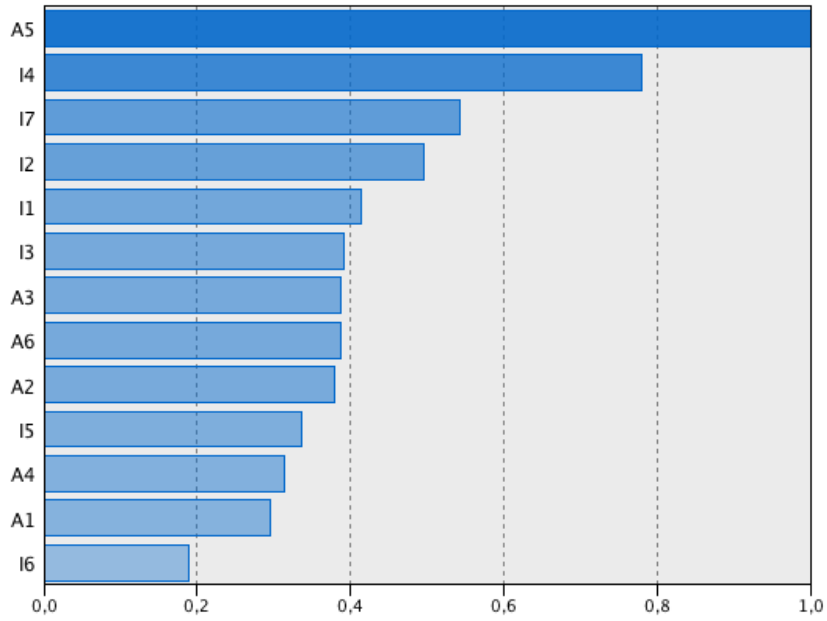

Fig. 9: Predictor importance of the adaptation and integration variables used to build the clusters

Based on the analysis of the comparison cluster viewer, we can infer levels of adaptation and integration associated to each cluster based on how the scores achieved by the majority of the projects within a cluster fall on the 1 to 5 range of answers for the adaptation and integration rating questions. Table 10 summarizes the results of the cluster comparison viewer and shows the levels of adaptation and integration inferred based on this method. Please refer to appendix 9 for the cluster comparison viewer.

Table 10: Table summarizing the cluster comparison viewer and deducted adaptation/integration cluster levels

Cluster number	**Scores achieved by the majority of the projects within a cluster on the 1 to 5 range of answers for the adaptation and integration rating questions**													**Based on the analysis of the cluster comparison viewer, inferred level of adaptation and integration of cluster**	
	A1	**A2**	**A3**	**A4**	**A5**	**A6**	**I1**	**I2**	**I3**	**I4**	**I5**	**I6**	**I7**	**Adaptation**	**Integration**
1	5	5	5	5	5	4	3	5	5	4	4	3	3	High	Moderate High
2	5	3	3	5	3	1	4	3	5	3	4	5	3	Moderate High	*Moderate High*
3	1	3	3	4	1	2	2	3	4	3	3	1	1	Low	Low
4	1	2	3	5	1	3	2	1	1	3	5	5	3	Low	*Moderate Low*
5	5	4	5	5	3	1	2	4	4	2	2	5	1	Moderate High	Low

In addition, levels of adaptation and integration for the clusters can also be inferred by comparing whether all the project overall adaptation/ integration scores within a cluster belong to the high set (above 300) or low set (300 and below) of adaptation/ integration scores. Table 11 illustrates the levels of adaptation and integration of clusters based on this method and compares them to the levels obtained using the first method described.

Table 11: Comparison between the levels of adaptation and integration of the clusters using the two different methods described previously

Cluster number	Based on the analysis of the cluster comparison viewer, inferred level of adaptation and integration of cluster		Total number of projects in cluster	Based on scores assessed using our qualitative rating scale, number of projects in cluster achieving				Based on the number of projects achieving high/ low adaptation/ integration of each cluster, inferred level of adaptation and integration of cluster	
	Adaptation	Integration		High Adaptation	Low Adaptation	High Integration	Low Integration	Adaptation	Integration
1	High	Moderate High	10	10	0	7	3	High	Moderate High
2	Moderate High	*Moderate High*	6	4	2	6	0	Moderate High	*High*
3	Low	Low	4	1	3	0	4	Low	Low
4	Low	*Moderate Low*	4	0	4	3	1	Low	*Moderate High*
5	Moderate High	Low	7	5	2	1	6	Moderate High	Low

Results of the Kruskal-Wallis Test

When performing the Kruskal-Wallis test, we find that the five clusters vary significantly in terms of adaptation and integration (significance of 0.001), which is logical since the clusters were built using the individual project scores to the adaptation and integration rating questions. However, they don't vary in terms of performance (see table 12). This is a similar result to Johnson (1995b) and Roth and Morrison (1990)'s studies which did not find any difference in terms of performance between the clusters of organization types in the construction equipment industry and in other global industries. This can be explained by the fact that our questionnaire focused on the project teams' responses to the pressures of adaptation and integration but omitted the environmental pressures that can affect the level of adaptation and integration of a project needed and the response of the firm. For instance, if the project team has past experience on a similar project in the same local environment, the levels of local adaptation and

knowledge integration needed will be lower and therefore the project's adaptation and integration scores will be lower, without being necessarily associated to a lower performance.

Table 12: Results of the Kruskal Wallis Test

Test Statistics[a,b]

	TotalAdaptationScorewithexpert5arithmeticmeanweights	TotalIntegrationScorewithexpert5arithmeticmeanweights	Perf1	Perf2	Perf3	Perf4
Chi-Square	18,358	17,994	2,547	4,976	3,927	6,088
df	4	4	4	4	4	4
Asymp. Sig.	,001	,001	,636	,290	,416	,193

a. Kruskal Wallis Test

b. Grouping Variable: TwoStep Cluster Number

In conclusion, phase 3 quantitatively analyzed the data collected from the updated questionnaire created in phase 2 and helped answer the second research question: how are project team's levels of local adaptation and organizational integration related to project performance? For instance, the CATPCA provides insight on the relationship between the adaptation variables and between the integration variables; the cross tabs highlight significant and suggestive relationships between the adaptation/integration and performance variables and the cluster analysis identifies groups of projects with similar characteristics and shows that those clusters differ in terms of adaptation and integration, but not in terms of performance.

Phase 4: Qualitative Analysis of the Updated Questionnaire and NVivo Interviews

Method

The fourth phase of the research consisted of performing cross-case comparisons to identify common processes, strategies for adaptation and integration that led to different project ratings of adaptation/ integration. Cross case comparison is a qualitative research method used for explaining and understanding differences between cases (Glaser and Strauss 1970). In our study, we use mixed approaches to cross case comparison combining *case-oriented* strategies (grouping the cases based on

common characteristics identified) and *variable oriented* strategies (based on the identification of themes that help differentiating between the cases) (Miles and Huberman 1994).

These cross-case comparisons were based on the qualitative analysis of (1) the project managers' interviews using NVivo and of (2) the updated questionnaire using Excel. The cross case comparison of the projects that achieved high levels of adaptation versus low levels of adaptation, and of the projects that achieved high levels of integration versus low levels of integration, enabled us to identify processes, strategies and recommendations to achieve high adaptation and high integration independently and simultaneously. This also permitted the analysis of the relationship, including any tradeoffs that existed, between adaptation and integration. We then focused our analysis on projects that simultaneously achieved high adaptation and integration levels to better understand how project teams could adapt to new local environments and integrate organizational knowledge and strategy simultaneously.

Results

Adaptation Findings

Cross case comparison of the most frequent adaptation processes used based on the analysis of the updated questionnaire.

Table 13 shows the relative frequencies of the processes that were most used to adapt to the local environment when considering all the 31 projects, the 20 projects that received high adaptation ratings, and the 11 projects that received low adaption ratings in order to identify processes that were associated with a higher level of adaptation.

The most common methods used for local adaption across all the projects were prior personal experience working on international projects (74%) and gathering information on the local country (61%). The fact that prior personal experience was the most commonly used adaptation process is related to the fact that all the organizations already had operations in the host country for at least 5 years. The two methods that were the least cited were trial projects (19%) and sending people before the start of the project to study the local environment (19%). No specific method was significantly favored by high

adaptation projects, while 55% and 45% of the low adaptation projects, respectively, used training of expatriates and sending people to study the local environment before the start of the project.

Table 13: Percentage of projects that indicated the frequent use of each adaptation method

	Relative Frequencies		
Adaptation Process	**All projects (31)**	**High Adaptation Projects (20)**	**Low Adaptation Projects (11)**
A. Training of expatriates to become familiar with the new local environment (language, culture, charm school...)	35%	25%	55%
B. Prior personal experience of a project team member(s)	74%	80%	64%
C. Trial project (smaller project carried out before the full-scale project to test the local environment)	19%	20%	18%
D. Sending people in advance to study the host country	19%	5%	45%
E. Gathering information (laws, regulations, permitting, risks) on the local country	61%	60%	64%
F. Outsourcing as many tasks as possible to local subcontractors	23%	30%	9%

Cross case comparison of the adaptation processes, strategies, difficulties and recommendations based on the 9 project managers' interviews.

In addition to the information on the processes used for local adaptation gathered from responses to the updated questionnaire, the project managers' interviews provided insight on the difficulties encountered, strategies used, and recommendations for adapting to new local environments based on the project's levels of adaptation. Table 14 shows a summary of the main points mentioned by the project managers during their interviews. The number of times the issue was mentioned is shown in parenthesis.

Table 14: Cross-case comparison of high versus low adaptation projects

LEVEL OF ANALYSIS	LEVEL IN THE ORGANIZATION	High and Moderate High Adaptation Projects (Projects 9, 10, 3, 5)	Moderate and Moderate Low Adaptation Projects (Projects 7, 2, 1, 8, 4)
DIFFICULTIES	PROJECT LEVEL	*nationalism of some countries (1/4) *lack of technical knowledge of local subcontractors (1/4) *obligation to hire local subcontractors (1/4) *remote locations of projects (1/4)	*lack of local knowledge: cultural cognitive knowledge (misunderstandings; normative knwoledge (4/5) *different mindset (don't think outside box, follow processes blindly) (2/5) *language barrier / issues with translators (technical terms); (4/5) *different work ethics (1/5) *outsourcing to local engineering firms (1/5) *work with local subcontractors/ different work techniques/ lack of technical knowledge of local subcontractors (3/5) *remote locations of projects (1/5)
	ORGANIZATION LEVEL		*inefficiency due to too frequent rotation (2/5) *organizational rules making adaptation difficult (1/5)
STRATEGIES/ PROCESSES	ORGANIZATION LEVEL	*adapt organizational general specifications to local environment (3/4) *strategic comm with local communtity (3/4) *giving for reciprocity: classes, building schools ((1/4) *reduce number of expatriates (1/4)	*adapt organizational general specifications to local environment (4/5) *strategic communication with local communtity (1/5) *support of embassies (1/5) *progessive transfer of technology to local people (2/5)
	REGIONAL LEVEL	*advisory role of local office (contractor selection, how to deal with local community) (3/4) *yearly improvements/ changes in regulations (1/4)	*yearly improvements/ changes in regulations (1/5)
	PROJECT LEVEL	*study local environment (market anlaysis/ startup periods to set up project) (2/4) *understand local environment (2/4) *communication with local community (workshops) (2/4) *hire local contractors (1/4) *language and culture training (1/4) *bilingual people on team (1/4) *use of local language (1/4) *outsource all enginnering to local company recommended by local office (1/4)	*study local environment (construction envrionment profile, local regulations…) (2/5) *adapt building features to locla environment (incorporating religious and cultural resuirements) (1/5) *hire local staff and train them (safety) *hire local consultants (2/5) *language and culture training (2/5) *bilingual people on team (1/5)/ *use of translators (1/5) *past international experience helps to adapt (1/5) *cooperative relationship with owner (1/5)
RECOMMENDATIONS	GENERAL		*evolve towards international building code (1/5) *Better prepare as an organization to the challenges (1/5)
	INDIVIDUAL LEVEL		*personal study /learning of culture (2/5) *more personal involvement earlier (1/5) *experience/preparation (1/5)
	PROJECT LEVEL	*have good coordination (1/4) *tayloring of expatriates programs to meet local people's needs (1/4)	*having translators more involved in project (1/5) *hire Westtern educated locals (1/5) *more efforts to explain technic to local contractors and make sure they understand (1/5)

Processes

Out of the 9 project managers interviewed, 4 projects achieved high adaptation and 5 projects achieved moderate or low levels of adaptation. The high adaptation projects focused on (1) understanding the host country expectations and requirements and (2) communicating with the local community to explain their project through workshops and project presentations followed with the local community. Project managers from high-adapted projects indicated that they relied heavily on the organization's local offices to provide an advising role for local market analysis, knowledge of the local regulations, and the

selection of the local contractor. These projects also transmitted knowledge and trained local staff to meet the goal of reducing the number of expatriates working in the local office and increasing the number of local staff for better adaptation and acceptance in the local country. In addition, projects achieving higher adaptation scores went beyond the common adaptation processes. For instance, one project manager decided to use the local language as the main language for the project in order to internalize the language difficulty within the project team and reduce the risks of misunderstandings with local contractors and the local community. Another project manager focused on helping the local community by developing schools and sending professors to educate local people. This strategy was beneficial both for the organization and for the local community as it helped to educate the local community, and, at the same time, trained the local staff for the organization's local office.

Difficulties

One of the project managers that achieved a low adaptation rating raised the issue of frequent rotation of people due to the remoteness of the area and the isolation of the expatriate villages from the local community, which reduced contact with locals. This was due to a corporate regulation whose objective was to protect the expatriates, but instead isolated them. The corporate office lacked flexibility in updating their regulations, which, in the project manager's experience, lowered the expatriates' level of adaptation in the host country and also made them want to leave the area.

Most of the projects hired local contractors and/or local engineering firms either by obligation, for instance, one project required that 40% of the work had to be performed by local contractors in Indonesia ("local content"), or by choice because local engineering/ design firms had a better knowledge of local laws and regulations. However, issues were often encountered when working with local contractors, due to differences in the work techniques used and/or the local contractor's lack of technical knowledge. As a result, this often led to decreased performance in the budget and schedule. For instance, one project manager mentioned that during meetings, when they asked the subcontractor if they understood, they

answered yes, but this meant they understood the words used, but did not understand the techniques or the drawings, which created problems with having the work designed and constructed appropriately.

Recommendations

The areas of improvement/ recommendations provided by the project managers also reflected the levels of adaptation of the projects. The lower adaptation projects focused their recommendations on more basic operations, while the projects that received higher adaptation ratings focused on more subtle recommendations. For instance, projects that received lower ratings of adaptation indicated that the project team should be involved for a longer period of time on the project, should employ staff that had acquired past international experience in other countries or in the particular host country, and recommended a detailed study of the local environment and culture to prepare for the project. In contrast, project managers whose projects received higher adaptation ratings mentioned more subtle recommendations that included better understanding the mindset of local contractors and finding ways to better communicate expectations and understanding of the technical concepts. Projects that scored higher for adaptation focused more on working in cooperation with the local client and host country.

Parameters influencing levels of adaptation for projects

For the majority of the cases (7/9), projects within an organization achieved similar levels of adaptation, which can show that the focus on adaptation also depends on the organization's strategy and policy when working internationally.

Differences in the level of adaptation also varied based on the organization type: owners of manufacturing facilities, and the design engineering/ contracting firm focused more on local adaptation and achieved higher levels of adaptation. A potential reason for this difference could be that the owners of manufacturing facilities have to ensure that the facilities they build are accepted in the local country, as they will later employ local staff. In addition, the engineering project teams that design infrastructure have to work in close cooperation with the local community to ensure appropriate infrastructure within the community. In contrast, the projects that received low levels of adaptation were the two projects from

the general contractor of nuclear technology, who was hired for their technical expertise, and the two projects from the owner of the US embassies that would house, primarily, citizens of the United States.

These preliminary findings reveal that adapting to a project location is not only dependent on the type of organization, which was studied previously (Javernick-Will 2013) but also project scope and environmental pressures. The level of adaptation needed also varied based on the host country: three very experienced project managers mentioned that China and India were countries that were the most difficult to work with in terms of difference in culture, work techniques and language barriers. This relates to Ghemawat (2004) showing that distance between the home and the host country in terms of culture, administrative and political, geographic and economic impacts the level of adaptation needed for projects. It also relates to Petersen et al. (2008)'s article that highlighted the importance of the perceived knowledge gap between the home country and the host country and its impact on projects' levels of adaptation and understanding of the need to adapt.

Conclusion on adaptation findings

To summarize, high adaptation projects consider adaptation as more important than integration for project success and focus on understanding the host country's expectations and communicating successfully with the local community. High adaptation projects use more developed adaptation processes and strategies. In addition, project levels of adaptation depend on a large number of parameters such as the organization type, strategy, the differences between the home country and the host country, the project scope and other environmental pressures. Capturing all these factors is important to assess the projects' levels of adaptation achieved in comparison to the levels needed. Future research should focus on further studying and identifying those complex environmental pressures.

Integration Findings

Cross case comparison of the most frequently used integration processes based on the analysis of the updated questionnaire.

Table 15 represent the percentage of projects that employed the various knowledge integration processes for each of the organizational levels studied (local offices, headquarters, rest of the organization) for all 31 projects and then contrasts the percentage of projects using these processes for projects that received a high integration rating and those that received a low integration rating. When considering the 31 projects, the most common knowledge transfer methods used at the different levels of the organization are emails (77% with the headquarters, 58% with the local offices and 81% with the rest of the organization). When focusing on the highly integrated projects, we notice that emails remain the most used method at the global level (headquarters 82% and the rest of the organization 82%). At the local level, meetings and face-to-face/personal discussion methods play an important role (respectively 53% and 41%). In contrast, low integration projects rely mainly on emails (71%) and phone conversations (36%), even at the local offices level. This difference is important because meetings and face to face/personal discussion are very useful for the transfer of tacit knowledge (Javernick-Will and Levitt 2010). They enable richer information exchanges, with a contextual dimension that is easily lost through email. The use of meetings and face-to-face processes for highly integrated projects highlights the benefits of those two processes for exchanging knowledge. In addition to these socialization methods, projects that received high integration ratings also used more intranet, share points and online forums, classified as online interactive methods by Javernick-Will and Levitt (2010). Those can be useful as they enable the transfer of tacit and explicit knowledge simultaneously.

Table 15: Percentage of projects that use various integration processes to exchange knowledge at different organizational levels.

Knowledge Exchange Process	High Integration Projects (total 17)			Knowledge Exchange Process	Low Integration Projects (total 14)			Knowledge Exchange Process	Total Projects (31)		
	Headquarters	Local offices	Rest of the organization		Headquarters	Local offices	Rest of the organization		Headquarters	Local offices	Rest of the organization
Email	82%	47%	82%	**Email**	71%	71%	79%	**Email**	77%	58%	81%
Face to face	6%	41%	6%	**Face to face**	0%	29%	7%	**Face to face**	3%	35%	6%
Intranet	53%	24%	47%	**Intranet**	29%	21%	29%	**Intranet**	42%	23%	39%
Meetings	18%	53%	12%	**Meetings**	0%	29%	0%	**Meetings**	10%	42%	6%
Reports	29%	24%	29%	**Reports**	29%	21%	21%	**Reports**	29%	23%	26%
Phone	35%	24%	12%	**Phone**	36%	36%	36%	**Phone**	35%	29%	23%
Workshops/ Seminars	0%	0%	6%	**Workshops/ Seminars**	0%	7%	0%	**Workshops/ Seminars**	0%	3%	3%

Cross case comparison of the integration processes, strategies, difficulties and recommendations based on the 9 project managers' interviews.

In addition to the information on the processes used for integration processes gathered from responses to the updated questionnaire, the project managers' interviews provided insight on the difficulties encountered, strategies used, recommendations for knowledge integration with the rest of the organization in comparison with their levels of integration. Table 16 shows a summary of the main points mentioned by the project managers during their interviews. The number of projects the issue was mentioned for is shown in parenthesis.

Tables 16: Cross-case comparison of moderate high versus moderate versus moderate low integration projects

LEVEL OF ANALYSIS	LEVEL IN THE ORGANIZATION	Moerate High Integration Projects (Projects 5, 2)	Moderate Integration Projects (Projects 8, 3, 7, 9, 10)	Moderate Low Integration Projects (Projects 4, 1)
DIFFICULTIES	GENERAL		*personality conflicts (1/5) *good relationships (1/5)	*some people are better than others at integrating knowledge (1/2) *email meaning (1/2) *communicationg well (1/2)
	ORGANIZATION LEVEL	*exploitation of knowledge gathered (1/2) *efficient reporting (1/2)	*acceptance of corporate polices, integrating local and global strategies (different goals and expectations); lack of understanding (1/5) *too frequent rotation, need to retrain (1/5) *exploitation of knowledge gathered (lot of knowledge captured, but need update and cultivate it) (2/5) *documentation issues encountered *accuracy of information (2/5) *knowledge transmitted locally but not globally 3 *timely information sharing (dessiminate information as soon as possible)2 *lack of resource globally/ lack of structure (2/5) *lack of time, not priority (keeping the team engage is more important) (2/5) *know who to go to (can be difficult to track somebody at the global level when looking at special expertise) (1/5)	*efficiently document and communicate (2/2) *lack of documentation (1/2) *lack of resources (2/2) *little return compared to investment (too many people working around the world) (1/2) *lack of time (1/2) *know who to go to (1/2)
STRATEGIES	ORGANIZATION LEVEL	*provide general specifications (2/2) *HQ supervision (1/2)	*provide general specifications (4/5) *HQ supervision (2/5) *multi-disciplinary teams, draw people from different locations (2/5) *use of resources from the entire organization (2/5) *organizational culture (1/5) *lot of opportunities to share knowledge and culture, need of knwoledge sharing (1/5)	*provide general specifications (2/2) *use of resources from the entire organization (2/2) *oganizational learning (2/2)
	PROJECT LEVEL	*have specific people dedicated to reporting (1/5)	*need of a good project leadership/project manager main contact point (4/5) *technical knowledge and organization's knowledge (1/5)	*project manager main contact point/ need of a good project leadership (2/2)
PROCESSES Javernick-Will and Hartlann (2010); Javernick-Will and Levitt (2010) classification	COMBINATION	*Intranet/ interpersonal system *project reports database (1/2) *final project report (2/2) *lessons learnt program *internal communication: montly letters (2/2) *reporting to HQ (weekly and monthly) (2/2)	*project reports database (1/5) *project review and close out (1/5) *lessons learnt program: technical and cultural (4/5) *reporting to HQ / local level reporting shared monthly with leadership team and quarterly with larger staff (2/5)	*project reports database (1/2) *past experience (2/2) *organization's knowledge (2/2) *lessons learnt (2/2) *monthly newsletters (interesting cultural data) (1/2) *weekly reports (1/2)
	SOCIALIZATION	*emails (1/2) *conferences (2/2) *personnel transfer (1/2) *training (1/2) *seminars (1/2) *word to mouth for modification of standard specifications: something being approved on a project will be likely to approved on another one (1/2)	*emails (2/5) *webconferences (1/5) *phone calls (2/5) *face to face/ ask questions (3/5) *seminar/ workshops (2/5) *corporate visits (2/5) *weekly meetings with project team (1/5) *monthly updates (1/5) *knowledge sharing between project managers working on similar projects (1/5)	*emails (1/2) *training/mentoring on how to do work overseas(1/2) *word to mouth for modification of standard specifications: something being approved on a project will be likely to approved on another one (1/2)
	INTERACTIVE ONLINE	*open forum for exchanging ideas (2/2)	*knowlegde network forum, ask questions (1/5)	*sharing points system(1/5)
RECOMMENDATIONS		*focus on young and new resources (1/2)	*build a more collaborative environment (2/5) *share strategies between Business Units (1/5) *be more open/ make it easier to communicate with no fear/ build trust (3/5) *flexibility (no one size fits all strategy) (1/5) *autonomy across regions to get new opportunities/ ability to provide capability and services on local issues (2/5) *have more structured processes to share knowledge gloablly, to make it easier for people to connect (1/5) * improve access to information (1/5)	*be flexible even though having high expectations (2/2) *avoid changes of scopes (1/2)

The qualitative ratings of the projects' levels of integration based on the project managers' follow-up interviews show that no project achieves high levels of integration and only two projects out of nine achieve moderately high levels of integration. Five of the nine projects score moderate integration ratings and two received moderate-low integration ratings. As a result, the cross-case comparison was more difficult to perform for the integration interviews as there was a smaller spread in the data and most of the projects received ratings for moderate levels of integration.

Processes

Based on Javernick-Will and Hartmann (2011)'s previous work, knowledge management/sharing processes can be classified in three main categories: combination, socialization and "interactive online platforms" combining combination and socialization. All of the project managers (9/9) mention organizational databases, reporting and lessons learnt programs; but only the two project managers from the projects achieving high integration mentioned the importance of quality reporting, taking into account different perspectives (not only the project managers, but also technical and financial perspectives of the project) as well as the importance of quality documentation. For instance, the oil and gas organization designates a person per project to report lessons learnt. 7/9 project managers mentioned the use of socialization methods such as seminars, conferences, workshops to share the lessons learnt from past projects. In addition, the project scoring the highest level of integration has a training program based on socialization. It sends the staff to different local offices to gain different perspectives on the work in different locations and have a more global experience. Only one project manager mentioned "online interactive platforms" such as online forums to openly ask questions and find people in an easier way, which confirms that this method is still in an infancy stage for organizations.

Difficulties and Recommendations

An issue that was mentioned by 3/9 project managers was the lack of time to share knowledge, which conflicted with the necessity of transferring knowledge in a timely manner to ensure that the transfer is efficient. This is consistent with Javernick-Will (2010)'s study, which mentions lack of time as

a barrier to knowledge sharing. 4/9 project managers mentioned the importance of considering the firm as a learning organization with a learning culture. This is consistent with Chinowsky and Carrillo (2007)'s study, which shows that organizational culture and knowledge management are key to motivate project teams to share knowledge and understand the benefits of knowledge integration in the longer term.

The two projects that received lower ratings on the integration dimension mention a lack of resources to share knowledge as well as a lack of formal methods defined by the corporate organizations. Without these two components, it makes it particularly difficult to focus on knowledge sharing, especially in project-based organizations such as in the construction industry where the main focus of the project team is the short-term performance of the project rather than long-term organizational performance. As a result, most of the projects either focused more on local adaptation than on organizational knowledge integration or equally on both (7/9 project managers interviewed).

The analysis of the interviews also showed that achieving high levels of integration at the global level of the organization is more difficult than at the local level as people are separated geographically and by time zones (Javernick-Will 2012). As a result, the ability to favor integration at the global level differentiates high levels of integration from moderate levels of integration. For instance, projects 9 and 10 achieve moderate levels of integration mention high knowledge integration at the local offices level, but no knowledge or strategy integration at a larger scale, as explained in the interviews.

In addition, the role of headquarters' supervision and corporate visits to local project locations were mentioned by five of the project managers as impacting organizational knowledge integration. For instance, one project manager raised the problem of a lack of understanding from the corporate executives of the daily issues faced at the project level and another project manager highlighted the importance of the way headquarters made decisions, explained them and took into account the staff's opinion; if this was not done correctly, it could lead to tensions. In addition, flexibility of the organizations' policy and procedures is also key when working internationally, as they must be adapted to the local requirements and needs.

Conclusion on Integration Findings

To summarize, projects that received higher ratings of organizational integration exchanged knowledge with the different organizational levels (locally and globally) while projects with lower levels of integration will limit their knowledge exchanges at the local level. In addition, difficulties associated with organizational integration are mainly due to a lack of time, a lack of resources and a focus on the short-term project performance.

Relationship between Adaptation and Integration

Project managers' perceived importance of local adaptation and organizational integration

The analysis of the updated questionnaire provided information on the project managers' perceived importance of local adaptation and organizational integration for the project's success and the organizational performance. Tables 17 through 19 show the relative frequencies of the perceived importance of local adaptation and knowledge integration for all the 31 projects, for the high versus low adaptation and for the high versus low integration projects.

Tables 17 to 19: Project manager's perceived importance of local adaptation and knowledge integration for the project and organizational success

Table 17: Relative frequencies based on the 31 projects managers' answers

	All 31 Projects			
	Local Adaptation		Knowledge Integration	
Perceived Importance	Project's Success	Organizational Success	Project's Success	Organizational Success
Great Importance	68%	42%	13%	35%
Moderate Importance	29%	52%	65%	48%
Little Importance	3%	6%	23%	16%

Table 18: Relative frequencies based on the 20 high adaptation projects and 11 low adaptation projects

	20 High Adaptation Projects				11 Low Adaptation Projects			
	Local Adaptation		Knowledge Integration		Local Adaptation		Knowledge Integration	
Perceived Importance	Project's Success	Organizational Success	Project's Success	Organizational Success	Project's Success	Organizational Success	Project's Success	Organizational Success
Great Importance	75%	60%	10%	50%	45%	9%	18%	18%
Moderate Importance	25%	35%	60%	40%	45%	82%	55%	55%
Little Importance	0%	5%	20%	10%	9%	9%	27%	27%

Table 19: Relative frequencies based on the 17 high integration projects and 14 low integration projects

	17 High Integration Projects				14 Low Integration Projects			
	Local Adaptation		Knowledge Integration		Local Adaptation		Knowledge Integration	
Perceived Importance	Project's Success	Organizational Success	Project's Success	Organizational Success	Project's Success	Organizational Success	Project's Success	Organizational Success
Great Importance	59%	47%	18%	47%	71%	36%	7%	14%
Moderate Importance	35%	47%	71%	47%	29%	57%	64%	57%
Little Importance	6%	6%	12%	6%	0%	7%	29%	29%

Table 17 shows that 97% and 78% of the project managers who completed the questionnaire respectively consider local adaptation and organizational knowledge integration to be of at least moderate importance for the project's success and 94% and 83% for the organizational success. As a result adaptation and integration are both considered as important for project and organizational success.

In addition, 68% of the 31 project managers consider local adaptation to be of great importance for the project's success and 52% for the organizational success. In contrast, knowledge integration is considered to be of moderate importance for the project (65%) and organizational success (48%). This can be related to the fact that projects achieve higher levels of adaptation than integration at the project level, as project managers perceive adaptation as more important than integration. This is also linked to the project based nature of the AEC industry with adaptation more directly associated to short-term project performance than integration, which is more important for long-term organizational performance.

When we compare the perceptions of project managers for projects that achieve high levels versus low levels of adaptation, we find that projects with high adaptation ratings consider adaptation to be of great importance for the project (75%) and organizational success (60%) whereas low adapted projects have project managers that consider adaptation as of moderate importance for project and organizational performance (respectively 45% and 82%). In contrast, the majority of project managers, whether their projects received high or low integration ratings perceived knowledge integration to be of moderate importance for the project and organizational success. However, project managers of projects that received low integration scores considered adaptation to be more important than integration and projects that scored high on integration considered adaptation to be less important than those scoring low on integration.

This shows that there is a relationship between the project's level of adaptation and integration and the project manager's perception of the importance of adaptation and integration for the project and the organization. We can also imply from this that there may be a tradeoff or a balance between adaptation and integration at the project level depending on the project scope and the organization: if adaptation is perceived as more important for the project and organization, the project team will focus more on adaptation and will probably achieve higher levels of adaptation and vice versa.

This is coherent with the analysis of the interviews of the nine project managers. Indeed, project managers that achieved high levels of adaptation considered adaptation to the local environment to be

more important than integration for the project's success. In contrast, the projects with moderate or low adaptation levels either considered adaptation and integration of equal importance for the project's success, or knowledge integration (bringing to the host country the company's knowledge, processes and procedures) as the main focus. One project manager whose project scored as moderate for adaptation mentioned that neither adaptation nor integration was the main focus for the project (knowledge about the local environment had already been gathered before the start of the project) and that their main concern for the project was to "*provide safe and secure diplomatic embassies throughout the world"*.

Relationship between adaptation and integration based on the updated questionnaire analysis

We asked the project manager to identify whether they thought adaptation and integration were positively correlated, negatively correlated or not correlated in order to have a better understanding of the relationship between the two concepts. 25/31 of the project managers consider that there is a positive correlation between local adaptation and organizational integration, meaning that the two notions are related and the project team/ organization need to work on both simultaneously. Five project managers considered that there was no correlation between the two concepts, that is the project team and organization need to work on both independently. Only one project manager considered that there was a negative correlation between the two concepts, meaning that they are conflicting notions and the project team must only focus on one to be successful. This shows that 81% of the project managers believe that they need to consider both local adaptation and organizational integration when working internationally. This confirms that both adaptation and integration are important and necessary at the project level, even though the project team may focus more attention on either adaptation or integration depending on the project type, scope and organizational strategy. Project managers do not seem to perceive adaptation and integration as conflicting notions at the project level. However, the integration responsiveness framework showed that the pressures for local responsiveness and global integration could be competing and conflicting. As a result, studying the relationship between those two concepts at the project level is important.

We analyzed the data in sets, based upon the mid-point of the potential range of overall adaptation and integration scores (300), to separate high adaptation/integration levels from projects with low adaptation/integration levels. We observed that 39% of the projects received ratings of high for both adaptation and integration while 19% of the projects scored low for both adaptation and integration (please refer to table 5). This displays a wide range of adaptation and integration across projects and shows that it may be difficult for project teams to simultaneously adapt and integrate successfully, as less than half of the project teams are able to achieve this level. This is further confirmed in the qualitative analysis of the interviews, where all 9-project managers agreed that achieving the right balance between local adaptation and organizational integration is a challenge at the project level.

Relationship between adaptation and integration based on the interview analysis

For instance, all of the project managers mentioned the necessity of adapting some of the organizational processes and standards to the local environment: "*we bring our philosophy and details on how to do things and then adapt to the specific environment where the project is".* In order to be able to do this, it was necessary for project teams to prepare procedures for working internationally and understanding the local environment, as one project manager explained: "*Having that program/ process in place to help that transition or that adaptation of your people and of the way you do business ahead of time".* As a result, being prepared and having past experience working internationally facilitates the adaptation process. However, this adaptation process varies according to the project location, the project scope and the establishment of the organization in the local market. Indeed, "*It is not going to be a one size fits all recipe. Making sure of having the ability to respond to the local requirements and grow business in that area."* is very important on all projects. Therefore, it is important to note that the ability to reach the right balance is highly dependent on the flexibility of the organization and project team. Having too much organizational integration in terms of systems and procedures can be too constraining and impede the adaptation of local offices to the business' climate and requirements: "*Having flexibility and autonomy across the regions to respond to opportunities and growing to teach our areas is really*

essential and I think that's been one of the success elements of [Organization]." In addition, respondents mentioned good relationships and communication between people. They were convinced that the different levels of the organization are working together towards a common goal and having the right people working on the project are necessary to being able to both adapt and integrate: "*I think it comes down to the actual individuals. You can put policies and procedures in place but if you don't have the right people who can do it then you are not going to succeed so having the right individuals with the right mind set plays a big role."*

This challenge of achieving the right balance between local adaptation and global integration is also present at the organizational level. A project manager interviewed even explained that achieving the right balance could be more challenging at the organizational level: *"It probably doesn't affect every project that much. I do think for the organization it's very important if we want to be a growing company, if we want to keep expanding into new markets then we need to be able to continuously adapt to the local environments. So I think it's very important at the company level."*

As a result, the need for a similar balance exists not only at the project level, but also at the organizational level: the organization needs to leverage local adaptation strategies with global integration strategies as it expands internationally in various markets. Respondents indicated that risks existed if you only focused on one and neglected the other. For instance, if you focus too much on global integration, it can lead to a lack of responsiveness to the local market, which in turn, erodes competiveness of the firm in the local market. One respondent explained this well: "*I think when focusing too much on global integration you run the risk of not adapting to the local culture, values, and systems. So you end up not being a preferred supplier."* Likewise, there are risks if there is too much focus on local adaptation, where the team is dependent on the success of the activity in this particular market. This is even more important in the construction industry where market cycles are common (Chen and Messner 2010). This is illustrated by the following quote from a project manager: "*You can start off in a particular business and, as they say, put all your eggs in one basket, and you go too far and then you're not able to react, you're not able to diversify the way you should. You don't focus on one particular area like for example*

[Organization] would not want to focus strictly on China and put all of their efforts in developing and establishing all of their processes and things around China versus Europe or the Middle East. So there is a balance between the two that makes you an effective global or an international company."

As a result, the success of an organization globally is highly dependent on the strategy it develops in order to respond to those local adaptation and global integration pressures: *"I think it's a matter of how you implement it, of putting the right strategy in place to strike that balance."* The ability to reach the right balance between those pressures is also highly dependent on the organizational culture, policies, procedures, international experience, how they are applied at the project level by the project team and the ability to be flexible in processes and procedures and recognize the need of adapting to local environments. As a result, responding to these competing and sometimes conflicting pressures of local adaptation and organizational integration at the project level is as an important challenge as projects are the first level of the organization directly involved in responding to those pressures. Project managers highlight the importance of acquiring the right balance for the project success and the organizational success, as this is part of the challenges that enable global companies to be successful in their international operations.

In conclusion, the qualitative analysis of the interviews using NVivo and the cross case comparisons help to better understand the processes that differentiate high adaptation (respectively integration) projects from low adaptation (respectively integration) projects. It also provides information on the relationship between local adaptation and organizational integration at the project level. As a result, phase four helps to answer the third research question: how can project teams adapt to new local environments *and* integrate knowledge within the rest of the organization simultaneously?

DISCUSSION

This research (1) relates projects levels of adaptation and integration to the challenges existing in a project-based industry, (2) provides a better understanding of the relationship between adaptation and integration at the project level, and (3) offers recommendations on how to achieve high levels of adaptation and high levels of integration based on the cross-case comparison of processes used by projects teams achieving high versus low ratings. The next paragraphs describe these main contributions in more details.

Higher focus on adaptation at the project level

The analysis of the updated questionnaire and of the interviews showed that (1) more projects achieved higher levels of adaptation than integration, indicating that higher levels of integration appear to be more difficult to achieve at the project level than higher levels of adaptation and that (2) project managers perceived adaptation as more important than integration for projects' success. Due to the project-based nature of the AEC industry, project managers may focus more intently on the short-term performance of a project versus the long-term performance of the organization. Indeed, adapting to the local environment is directly associated to short term project performance as a lack of adaptation can lead to conflicts with the local community, misunderstandings, decreased project performance and damaged reputations (Orr and Scott 2008). In contrast, the benefits of integration may not be perceived as contributing directly to the current project's performance and are, instead, a long-term organizational objective. As a result, project teams and project managers might not consider organizational integration as a priority and do not focus on it as much as on local adaptation. In addition, organizational integration in multinational project-based organization is challenging due to the difficulty of exchanging knowledge between projects in different locations (Landaeta 2005, Javernick-Will 2012) and of implementing efficient knowledge management strategies accepted and used by the employees globally in the organization (Carillo and Chinowsky 2006).

Processes differentiating high versus low adaptation projects and high versus low integration projects

Based upon past work, it is assumed that higher levels of adaptation and integration lead to higher levels of project and organization performance. However, it is difficult for project teams to both adapt and integrate successfully. Therefore, it is important to analyze what differentiates projects that achieve high levels of adaptation and integration from the ones that achieve low levels of adaptation and integration to better understand what enables those projects to successfully achieve high levels of adaptation and integration.

Projects that had high adaptation employed more aggressive methods to adapt to the local environment, including reducing the number of expatriates and increasing the number of locals through training. In contrast, projects with low adaptation continued to rely on expatriates in the local environment and sent them to study the local environment prior to the project.

High-integrated projects appeared to be using more in-person discussions (such as meetings and face-to-face), which enable a richer information exchange in comparison to low integrated projects that used more emails and phone. The ability to exchange with global levels of the organization also differentiated high integration from low integration projects. Low integration project managers also highlighted a lack of resources and corporate support for organizational integration.

Need to achieve a balance between adaptation and integration at the project level

The analysis of the interviews provided information on the relationship between adaptation and integration at the project level and showed that a balance between the two is needed, as both adaptation and integration are important for succeeding at the global scale: *"You need that global exchange of knowledge to facilitate growth, improvements, efficiency, and the technical expertise to make judgment calls; but it is also very important that the business adapts locally to the local systems, politics, cultures, legislation or whatever it might be"*. Most of the project managers adapt some of the organizational processes and standards to satisfy the local environment requirements.

However this is a challenge as too much organizational integration could lead to a lack of flexibility and understanding of clients' requirements and trigger a loss of competitive advantage, while too much focus on adaptation to a particular market could lead the organization to depend on this local market and be at the origin of risks for the organizational performance at the global scale, which is even more important in a cyclic industry such as the AEC industry.

LIMITATIONS AND FUTURE RESEARCH

This research presents four main limitations that could be areas of interest for future studies:

Include the environmental pressures in the questionnaire and scale

Despite the intuition that higher levels of adaptation and integration are associated with higher project performance, no significant relationship between projects levels of adaptation/ integration and project performance was found. This is probably because our study focused on the project teams' responses to adaptation and integration pressures and did not include environmental pressures that can impact the amount of local adaptation and organizational integration needed at the project level. Capturing these environmental pressures associated with local adaptation and organizational integration is very complex, as shown by Venaik et al. (2004), and would involve including a large number of parameters such as the organization type (Javernick-Will 2013), the project type and scope, the perceived differences between project host country and home country (Petersen et. al 2008), the organization's international experience and strategy when working internationally, the project location, and the project team's experience.

As a result, while our scale provides good information on projects' levels of adaptation and integration, it doe not enable to link these levels to project performance. As this research did not capture the complexities of the entire process, future research should focus on creating a framework including projects responses to adaptation and integration pressures and analyzing the environmental pressures for adaptation and integration that can impact projects' responses.

Validate of the questionnaire and scale for a larger sample size

This study creates a qualitative rating scale associated to a questionnaire to assess project levels of adaptation and integration. However, this research hasn't validated this scale for a large sample size as a lot of difficulties were encountered for organizations to participate in the study. Indeed as the

questionnaire asked information at the project level, agreement of the client in addition to the agreement of the organization was needed. Future research should try to validate this scale and update it.

Survey and interview people with different roles in the project team

For convenience, project managers in the AEC industry completed the questionnaire. As a result, the answers gathered were the subjective answers of one person from the project team and may not reflect the comprehensive opinions and outcomes of the project team. Future research should survey several people with different roles within each project team.

Relate projects' levels of adaptation and integration to organizational performance

Our unit of analysis was the project, and our study focused on relating the levels of adaptation and integration with project performance, but did not relate these levels to organizational performance. While the project performance for project-based organizations is important, it does not capture the long-term performance of the organization. Because a focus on adaptation is thought to benefit the project-level and a focus on integration is thought to benefit the global organization's performance, it would be interesting for future research to study this relationship.

In conclusion, future research should focus on (1) creating and validating a framework assessing projects responses to adaptation and integration pressures in relationship with the environmental pressures impacting these responses; and (2) relate the projects levels of adaptation and integration obtained from the validated framework to project and organizational performance

CONCLUSION

This research explored the concepts of local adaptation and organizational integration at the project level in the AEC industry, a project based industry. It employed a mixed research method including (1) an exploratory phase consisting of a literature review, the creation of an exploratory questionnaire and its validation and update through follow-up interviews of project managers (2) the deployment of the updated questionnaire and the creation of the associated scale to assess projects levels of adaptation and integration, (3) a quantitative and analysis of the updated questionnaire and (4) a combined qualitative analysis of project managers' interviews and of the updated questionnaire.

This research develops a rating scale to qualitatively assess projects levels of adaptation and integration. This scale is created based on an exploratory study including the identification of adaptation and integration criteria used at the project level through an in depth literature review, the analysis of an exploratory questionnaire tested on 10 project managers and its validation and update based on follow up interviews of the project managers.

This paper also analyzed the relationship between adaptation, integration and project performance. Despite the intuition that higher levels of adaptation and integration were associated with higher project performance, no significant relationship was found between the overall adaptation and overall integration score and project performance in terms of cost, schedule, client's expectations and team's expectations. However, we did find based on the analysis of the cross tabulations significant relationships between individual adaptation/ integration variables and project performance. This can be explained by the focus of this research on the project teams' responses to adaptation and integration pressures, without evaluating environmental pressures (such as the organization type, the organization's international experience and strategy, the project type, scope and location) that impact the response needed by project teams in terms of adaptation and integration.

In addition, this paper studies the relationship between adaptation and integration at the project level. The findings show that a balance between local adaptation and organizational integration is needed

and that achieving this balance is a strategic challenge at the project level that is dependent on numerous parameters such as the project scope, project location and organizational strategy.

In conclusion, studying local adaptation and organizational integration at the project level in a project-based organization is complex. Future research should focus on creating a framework including projects responses to adaptation and integration pressures and analyzing the environmental pressures impacting projects' responses.

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APPENDIX 1: EXPLORATORY QUESTIONNAIRE

Adaptation and Integration for Multi-national Project-based Organizations

Introduction

Thank you for participating in a study regarding knowledge mobilization for project based organizations working internationally. The objective of this research is to understand how project teams succeed in adapting to a new local environment *and* integrating the knowledge they acquire while working on projects with the rest of the organization.

Your individual privacy will be maintained in all published and written data resulting from this study.

We expect the project to benefit you and your company by providing recommendations to address these demands of adaptation and integration. Completing the questionnaire will take approximately 30 minutes.

By selecting Start Survey you affirm that you understand the above information and voluntarily consent to participate in this research project entitled: "Adaptation and integration for multi-national project-based organizations."

Definitions that you may need will appear on the left handside of the related page.

Demographic and Project Data

1. Please enter your name and organization.
(This information is collected only to help us track participation. We will not use either in any reported findings). *

The next questions will ask information about the international project you are currently working on. We ask that you focus on this project throughout the questions. The project data is collected for comparison during analysis only.

2. Please list the type of project (e.g. roads, bridges, pipelines, buildings, refinery, manufacturing...). *

3. What is the project location? Please name the city and country. *

4. What is the approximate project value ($) ? *

5. What is the approximate percentage of completeness of your part of the project at the time of the survey? *

- [ ] 0-25%
- [ ] 25-50%
- [ ] 50-75%
- [ ] 75-100%

6. Does the organization have operations in the host country beside this project (including any past, present and future projects, or permanent operations)? *

- ( ) Yes
- ( ) No

7. Please estimate the percentage of local knowledge (knowledge related to the host country including culture, regulation...) that is needed for this project. *

Knowledge Exchange during the Project

For the purpose of this survey, we define knowledge as the information, rules, algorithms and heuristics that are needed to complete the tasks related to your work. In this study, we will focus on local, technical and organizational knowledge:

- *local knowledge*: knowledge related to the host country environment that are relevant to the project including culture, regulations,...
- *technical knowledge:* professional skills, competencies, and technical expertise needed to work on a project
- *organizational knowledge:* knowledge related to the organization including strategies, processes, procedures....

In this study, we consider a knowledge exchange to occur when an individual is affected by and learns from the experiences of others. This occurs at different levels:

- *Project teams*: the employees who are officially assigned to work on the current project
- *Organizational leadership*: management of business groups, divisions and headquarters.

8. During the course of the project, how much relevant *technical knowledge* (professional skills, competencies, and technical expertise needed to work on the project) did you gather/receive from each of the following (please check one answer for each row): *

	No relevant knowledge	Very little relevant knowledge	Little relevant knowledge	A moderate amount of relevant knowledge	Some relevant knowledge	A lot of relevant knowledge
The office in the project's host country *	( )	( )	( )	( )	( )	( )
The rest of the organization (e.g. other project teams, headquarters, etc) *	( )	( )	( )	( )	( )	( )
The host country including the client government, intended project beneficiaries, local stakeholders, embassy, consulate... *	( )	( )	( )	( )	( )	( )
The global community including other companies, professional associations and organizations (ASCE, CII, World Bank) and global news distributors (The Economist) *	( )	( )	( )	( )	( )	( )

Please list any other source from which you received technical knowledge.

9. During the course of the project, how much relevant *local knowledge* (knowledge related to the host country environment that is relevant to the project including culture, regulations...) did you gather from each of the following (please check one answer for each row): *

	No relevant knowledge	Very little relevant knowledge	Little relevant knowledge	A moderate amount of relevant knowledge	Some relevant knowledge	A lot of relevant knowledge
The office in the project's host country *	○	○	○	○	○	○
The rest of the organization (e.g. other project teams, headquarters, etc) *	○	○	○	○	○	○
The host country including the client government, intended project beneficiaries, local stakeholders, embassy, consulate... *	○	○	○	○	○	○
The global community including other companies, professional associations and organizations (ASCE, CII, World Bank) and global news distributors (The Economist) *	○	○	○	○	○	○

Please list any other source from which you received local knowledge.

Organizational knowledge

10. How frequently do you share knowledge with people outside your project team, but within the organization (other project teams and organizational leadership)? *

	Approximately once per day	Multiple times per week	Approximately once per week	Approximately once per month	Approximately once per quarter	Approximately once per year
Knowledge shared with other project teams *	○	○	○	○	○	○
Knowledge shared with organizational leadership (business groups, headquarters...) *	○	○	○	○	○	○

11. To determine the direction of the flow of information and knowledge, please select the response which best describes your project team's knowledge exchange with others in the organization. *

	Only receive	Mostly receive	Receive and give	Mostly give	Only give
Knowledge exchange with other project teams *	○	○	○	○	○
Knowledge exchange with organizational leadership (business groups, headquarters) *	○	○	○	○	○

12. Please select the top two reasons for why you share your knowledge with your project team, with other project teams, and with the organizational leadership. Please check two boxes per row. *

	The company provides time or resources for me to share my knowledge	Sharing knowledge helps to better the performance of the project	The company's performance will affect my personal performance	It is normal practice in the company (the company expects employees to share)	My knowledge sharing efforts are recognized by my peers	If I help others, they will one day help me in return	I have voluntarily committed to share my knowledge and I want to honor that commitment	The company requires me to share my knowledge	Other
Reasons for sharing knowledge with your project team *	☐	☐	☐	☐	☐	☐	☐	☐	☐
Reasons for sharing knowledge with other project teams *	☐	☐	☐	☐	☐	☐	☐	☐	☐
Reasons for sharing knowledge with organizational leadership (business groups, headquarters...) *	☐	☐	☐	☐	☐	☐	☐	☐	☐

Please list any other reason for why you share knowledge with others in your organization. Indicate, if applicable, with whom this applies.

13. Please select the top two reasons that make you hesitant to share your knowledge with your project team, with other project teams, and with the organizational leadership. Please check two boxes per row. *

	Maintaining job position	Trust	Maintaining power - If I have the knowledge, I maintain power	I do not know the context in which my knowledge will be applied	I am concerned about who would gain access to the knowledge I shared	I haven't developed a relationship with someone	No one asks me directly to share my knowledge	I don't have to share my knowledge	I do not feel comfortable with the knowledge exchange methods used in the company	Other
Hesitant to share knowledge with your project team *	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Hesitant to share knowledge with other project teams *	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Hesitant to share knowledge with the organizational leadership (business groups, headquarters...) *	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Please list any other reason that makes you hesitant to share your knowledge with others in your organization.

14. How is your performance evaluated and rewarded? (Please select all that apply). *

- ☐ Individual Performance (I am evaluated and rewarded based on my personal performance)
- ☐ Project Performance (I am evaluated and rewarded based on the project performs)
- ☐ Business Group/ Division Performance (I am evaluated and rewarded based on how the business group/ division performs)
- ☐ Organizational Performance (I am evaluated and rewarded based on how the organization as a whole performs)
- ☐ Other

Please provide any details on how you are recognized and/or rewarded in the organization.

Working on a Project in a Foreign Country

15. Please estimate the number of relationships the project team has in the local country for each of the following types of relations. (Please check one box per row). *

	0-10	10-50	50-100	100-200	200-500	>500
Formal regulatory relations: interface with local arms and agencies of government that grant approvals, permits and licenses (transport and highways, police, building department) *	○	○	○	○	○	○
Formal market relations: transactions with local firms in the marketplace that provide products and services (tool suppliers, material vendors, subcontractors) *	○	○	○	○	○	○
Informal community relations: interactions with local community groups and stakeholders *	○	○	○	○	○	○
Informal project relations: noncontractual dealings with other local firms on a project *	○	○	○	○	○	○

16. Please estimate the percentage of project team members who are staffed on site, in the host country (regional offices) or in other global offices. *

	0-25%	25-50%	50-75%	75-100%
Staff located on site *	○	○	○	○
Staff located in the host country (regional offices) *	○	○	○	○
Staff located in other global offices *	○	○	○	○

17. Please estimate the percentage of tasks outsourced to other locations versus the percentage of tasks performed in the host country. *

	In the home market	In the project location
Percentage of tasks outsourced		
Percentage of tasks realized internally		

18. Please estimate the number of expatriates and the number of the total staff (locals + expatriates). *

	Number
Expatriates working on the project *	
Total staff working on the project (locals + expatriates) *	

19. Do expatriates receive training prior to working in the local area (culture, charm school...)? *

- ○ Yes
- ○ No

20. Did the organization provide time to get more familiar with the new local environment, meet with local officials...? *

- ☐ Yes
- ☐ No

21. To what extent does the organization/ project team share local knowledge about the new country market (i.e. intelligence about the culture, the economic and political situation in the country) with other parts of the corporation? *

	Very little	Moderately	A great deal
Knowledge shared with the organization *	○	○	○
Knowledge shared with the project team *	○	○	○

Company's Management

22. Please rate the extent to which corporate executives monitor and coordinate the local project's operations. *

Very little ○ Moderately ○ A great deal ○

23. Please rate the extent to which local management is involved in the global organization's strategy formulation and implementation. *

Very little ○ Moderately ○ A great deal ○

24. Please rate the extent to which strategies of different business groups are independent. *

Very little ○ Moderately ○ A great deal ○

25. Please indicate the extent to which the project team focuses on adapting to the local market. *

Very little ○ Moderately ○ A great deal ○

26. What did/does the project team do to adapt to the local market? *

27. Please indicate the extent to which the project team focuses on integrating knowledge with the rest of the organization. *

Very little	Moderately	A great deal
○	○	○

28. What did/ does the project team do integrate knowledge with the rest of the organization. *

29. How does your organization achieve competitiveness in the global market? *

- ○ by building a strong local presence through sensitivity and responsiveness to national differences among countries;
- ○ by building cost advantages through global-scaled operations;
- ○ by exploiting their parent company's knowledge and capabilities through worldwide implementation and adaptation
- ○ by building interdependent resources with specialized subsidiary roles while maintaining flexible and joint operations among countries.

30. Please choose the answer that best qualifies your organization. *

- ○ The skills and resources of the organization are located around the world, but each overseas unit conducts its own operations without relying on the expertise of other units located elsewhere
- ○ The skills and resources of the organization are located around the world, but overseas units often cooperate with each other and depend on each other
- ○ The most vital and strategic skills and resources of your organization tend to be located at the parent company headquarters, while less important activities are located in the overseas units
- ○ The skills and resources of the organization are centralized and globally scaled

31. Please select the answer that best describes the overseas units role in your organization. *

- ○ The main role of your overseas operations is to implement parent companies strategies.
- ○ The primary role of your overseas units is to find out and take advantage of opportunities within the countries in which they operate.
- ○ The organization is integrated worldwide and our overseas units play an important role by contributing their individual strengths and know how towards its operation.
- ○ Our overseas operations receive and adapt products and services offered by the parent company to the best advantage in the countries in which they operate.

32. Please select the best answer on how knowledge is developed and shared across the company. *

- ○ New knowledge (e.g. product improvements) is developed at the parent company and then transferred to overseas units.
- ○ Research development activities are conducted and results retained at the parent company headquarters with little dissemination to the overseas units.
- ○ Research development activities are typically conducted jointly by parent company and overseas units with the knowledge gained shared worldwide in the organization
- ○ The new knowledge is developed in our overseas units tends not to be transferred to other locations in which the organization operates.

Additional Comments

33. Do you have any comments that you would like to add?

34. Would you be willing to participate to a follow-up interview? *

- ○ Yes
- ○ No

If yes, can you please provide a phone number to reach you? (This information will not be shared: it will only be used for the interview.)

Thank You!

Thank you for taking our survey. Your response is very important to us.

APPENDIX 2: QUALITATIVE ANALYSIS OF EXPLORATORY QUESTIONNAIRE

The analysis of the first questionnaire was very exploratory and aimed to qualitatively assess projects levels of adaptation and integration based on the project managers' answers to the questionnaire. Two researchers analyzed the questionnaire separately and the project ratings were validated with the follow up interviews. As a result, the analysis of this questionnaire allowed us to identify questions that enabled to differentiate different levels of adaptation and integration.

The questionnaire included general questions on the project, on adaptation, on integration and questions on the organizational strategy when working internationally (developed based on Leong and Tan (1993)'s study). We identified rating and explanatory questions for both adaptation and integration. Rating questions were directly used to assess projects levels of adaptation and integration while explanatory questions were used to analyze differences. Adaptation and integration were studied separately and each answer choices were associated to high, moderate or low levels of adaptation/ integration based on information gathered from past studies with the in depth literature review. Projects ratings were assessed based on the comparison of the project managers' answers and on the number of high, moderate or low answers to the rating questions. Tables 20 and 21 represent the analysis of the project managers' answers for adaptation and integration respectively.

Table 20: Qualitative analysis for adaptation of the exploratory questionnaire

	HIGH		MODERATE HIGH			MODERATE		MODERATE LOW	
Project	**10**	**9**	**3**	**5**	**1**	**2**	**7**	**8**	**4**
Organization	**A**	**A**	**L**	**T**	**D**	**D**	**S**	**S**	**L**
RATING QUESTIONS									
8.1. Relevant technical knowledge gathered from the office in the project's host country 8.2. Relevant technical knowledge gathered from the host country	A lot A lot	A lot A lot	A lot Some	Some Moderate	Very little Very little	A lot A lot	Very little Some	Some Little	Moderate Moderate
9.1. Relevant local knowledge gathered from the local office in the host country 9.2. Relevant local knowledge gathered from the host country	A lot Some	A lot A lot	A lot Moderate	Moderate Moderate	Some Some	A lot A lot	Some A lot	Very little A lot	Moderate Moderate
15.1. Number of formal regulatory relations the project team has with the local country 15.2. Number of formal market relations the project team has with the local country 15.3. Number of informal community relations the project team has with the local country 15.4. Number of informal project relations the project team has with the local country	10 to 50 10 to 50 10 to 50 10 to 50 30	10 to 50 10 to 50 10 to 50 0-10 100	10 to 50 0-10 0-10 0-10 50	10 to 50 10 to 50 10 to 50 10 to 50 500	10 to 50 10 to 50 200-500 200-500 1000	0-10 0-10 0-10 0-10 550	0-10 10 to 50 10 to 50 0-10 3000	0-10 0-10 0-10 0-10 22	0-10 10 to 50 0-10 0-10 50
18. Percentage of expatriates working on the project compared to total staff	0	0,2	0,02	0,04	0,02	0,11	0,04	0,32	0,1
19. Training for expatriates prior to working in the local area 20. Time provided by the organization to get more familiar with the new local enviroment	No Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	No No	No No	Yes No	No No
25. Extent to which the project team focuses on adapting to the local market	A great deal	A great deal	A great deal	Moderately	Moderately	Moderately	Moderately	A great deal	Moderately
29. How does the organization achieve competitiveness in the global market A. By building a strong presence through sensitivity and responsiveness to national differences among countries C. By exploiting their parent company's knowledge and capabilities through worlldwide implementation and adaptation	A high adpatation	A high adpatation		A high adpatation	A high adpatation	A high adpatation	C moderate adpatation	C moderate adpatation	C moderate adpatation
31. Answer that best describes the overseas units role in your organization A. The main role of your overseas operations is to implement parent companies strategies. B. The primary role of your overseas units is to find out and take advantage of opportunities within the countries in which they operate. D. Our overseas operations receive and adapt products and services offered by the parent company to the best advantage in the countries in which they operate	B high adaptation	B high adaptation			A low adaptation	A low adaptation	D moderate adpatation	A low adaptation	A low adaptation
EXPLANATORY QUESTIONS									
6. Operations in the host country beside this project	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
7. % of local knowledge needed for this project	A lot of local knowledge needed (80%)	A lot of local knowledge needed (75%)	A lot of local knowledge needed (80%)	A lot of local knowledge needed (80%)		Very little local knowledege needed (10%)	A lot of local knowledge needed (75%)	Very little local knowledege needed (20%)	A moderate amount of local knowledege needed (50%)
9.3. Relevant local knowledge gathered from the global community	Very little	Very little	None	Little	Some	A lot	Moderate	Very little	Very little
16. % staff located on site 16. % staff located in the host country (regional offices) 16. % staff located in other global offices	50-75%	75-100%	75-100%	50-75%	75-100%	50-75%	25-50%	25-50%	0-25%
26. Actions taken by the project team to adapt	Use local standards, resources and practices	Research client needs/ develop project teams and systems to meet specific client needs	Talked with local leaders	Survey and training	Interpersonal style changes, extra effort with communication	Interaction with local people, businesses	Incorporate environmental concerns/ requirements	Contract with local engineering firms	The project team was composed of several local consultants

Level of Adapation
Low
Moderate
High

Table 21: Qualitative analysis for integration of the exploratory questionnaire

	MODERATE HIGH		MODERATE					MODERATE LOW	
Project	**5**	**2**	**9**	**8**	**3**	**7**	**10**	**4**	**1**
Organization	**T**	**D**	**A**	**S**	**L**	**S**	**A**	**L**	**D**
RATING QUESTIONS									
8. Relevant technical knowledge gathered from the rest of the organization 8. Relevant technical knowledge gathered from the office in the host country	A lot Some	Very little A lot	Moderate A lot	A lot Some	Little A lot	Very little Very little	Little A lot	Some Moderate	A lot Very Little
21. Extent to which the organization shares knowledge about the new country market with the project team	Moderately	Moderately	Moderately	Moderately	Moderately	Moderately	A great deal	Moderately	Moderately
9. Relevant local knowledge gathered from the rest of the organization 9. Relevant local knowledge gathered from the office in the host country	Moderate Moderate	A lot A lot	Moderate A lot	Little Very little	Moderate A lot	Moderate Some	Some A lot	Little Moderate	Very Little Some
10. Frequency of knowledge sharing with other project teams 10. Frequency of knowledge sharing with orgnaizational leadership	multiple times per week multiple times per week	once per quarter multiple times per week	multiple times per week once per week	multiple times per week once per week	once per year once per month	once per week multiple times per week	once per month once per month	once per month once per week	once per month once per month
11. Direction of flow of knowledge exhange with other project teams 11. Direction of flow of knowledge exhange with organizational leadership	Receive and give Receive and give	Receive and give Receive and give	Receive and give Mostly give	Mostly receive Receive and give	Only give Receive and give	Receive and give Mostly receive	Mostly give Mostly give	Receive and give Mostly give	Mostly give Mostly give
EXPLANATORY QUESTIONS									
22. Extent to which corporate executives monitor and coordinate the local project's operations	A great deal	Moderately	Moderately	A great deal	Moderately	Very little	Moderately	Moderately	Moderately
23. Extent to which local management is involved in the global organization's strategy formulation and implementation	Moderately	A great deal	A great deal	A great deal	Moderately	Very little	Moderately	Very little	Moderately
27. Extent to which the project team focuses on integrating knowledge with the rest of the organization	Moderately	A great deal	Moderately	Moderately	Moderately	Moderately	Moderately	Moderately	Moderately
30. Answer that best qualifies your organization A. The skills and resources of the organization are located around the world, but each overseas unit conducts its own operations without relying on the expertise of other units located elsewhere B. The skills and resources of the organization are located around the world, but overseas units often cooperate with each other and depend on each other C. The most vital and strategic skills and resources of your organization tend to be located at the parent company headquarters, while less important activities are located in the overseas units D. The skills and resources of the organization are centralized and globally scaled	A low integration	C low integration	B high integration	C low integration	A low integration	D high integration	A low integration	B high integration	A low integration
32. How knowledge is developped and shared across the company A. New knowledge (e.g. product improvements) is developed at the parent company and then transferred to overseas units. B. Research development activities are conducted and results retained at the parent company headquarters with little dissemination to the overseas units. C. Research development activities are typically conducted jointly by parent company and overseas units with the knowledge gained shared worldwide in the organization D. The new knowledge is developed in our overseas units tends not to be transferred to other locations in which the organization operates.	C high integration	A moderate low integration	C high integration	A moderate low integration	C high integration	C high integration	D low integration	C high integration	A moderate low integration
14. How is your performance ealuated and rewarded? A) Individual performance, B) Project performance, C) Business group/ division performance, D) Organizational performance 14. Please provide any details on how you are recognized and or rewarded in the organization	Individual, project, business group, organizational performance	Project performance	Individual, project performance	Individual, project, organizational performance	Individual, project, business group, organizational performance	Individual, project, business group performance	Individual, project, organizational performance	Indivivdual performance	Individual, project, business group, organizational performance
24. Extent to which strategies of different business groups are independent	Moderately	Moderately	Moderately	Moderately	Moderately	A great deal	Moderately	Moderately	Moderately
28. Actions taken by the project team to integrate knowledge with the rest of the organization	Training	Periodic reporting	Presentations	Share resource/ Job rotation	Monthly project reviews with management	Lessons learned program, best practices input, project experience reports for specific activities	Relationships and discussion with other project managers/ Contributing to issues and problems which arise on similar projects/ bids	Monthly project updates took place as did annual project presentation	Formal and informal reports

Level of Integration	
	Low
	Moderate
	High

APPENDIX 3: SAMPLE INTERVIEW QUESTIONS

This appendix presents the some of the interview questions. First some general questions on the context and on project and organizational levels of adaptation and integration were asked, then more specific questions on local adaptation on the one hand and on organizational integration on the other hand and finally some questions concerning the relationship between adaptation and integration.

General Questions

1. Could you give a brief description of the project?
2. Can you tell us about your role in the project?
3. Does your organization focus more attention on knowledge integration with the rest of the organization or adaptation to a local environment? And why?
4. Does your organization develop management strategies to improve local adaptation/ global integration? Could you give examples for each?
5. In your opinion, how is integration/ adaptation related to project/ organization's performance?
6. Do you think that one is more important for the success of a project in general/ this project in particular? And why?
7. How would you rate the level of adaptation/ level of integration/ performance of this project compared to other projects you worked on?
8. Do you agree with the following statement based the qualitative analysis of the questionnaire answers?

   Example of the type of statement for one project: the project team seems to focus more on adapting to the local environment versus integrating with the organization. As a result, according to our analysis, this project received high scores for adaptation and moderate high for integration.

Adaptation

1. As you indicated in the survey, this project is not the first one in the area.
    a. How and when did the organization enter the project location?
    b. How does the project team adapt to the project location and environment?
    c. Can you explain the steps taken to understand the local area, people and environment?
    d. What issue would have been most difficult to deal with if your project was the first one in the area?
2. Does the level of adaptation/ methods used for adaptation in a new area vary (depending on the project type, location, and client for example)? If so, how?
3. What were the main difficulties encountered when you were in the process of adapting to the local environment and norms?
    a. How did you address these?
    b. Would you make any changes to how you adapt for a project in the future?
4. Please estimate the importance of adapting to new local environments for the project and organization's success.
5. What is the most important aspect to achieve good adaptation in the local market?

Integration

1. Are there any formal methods for integrating knowledge implemented by the organization (e.g. such as reporting requirements or mandatory meetings)? Could you please describe them and tell us which are the most effective ones?
2. What does the project team do to maintain contact and exchange knowledge with others in the organization? How do you know who to ask questions of? How do others know what your knowledge and experience are?

3. How is the local knowledge about the new country shared with the rest of the organization? How are the lessons learned (mistakes, successes, etc.) shared with the other project teams from this project or other past projects?
4. Is it important to you to maintain contact with others to share knowledge and experiences in the organization?
    a. Why is it important? Why not? (What motivates you to exchange knowledge with employees in other project teams, business groups and the organization?)
    b. Is it important to the organization?
5. In your opinion what is the main criteria to achieve successful knowledge integration with the rest of the organization?
6. What is the most difficult part in integrating?
7. In the survey you indicate different frequencies of knowledge exchange depending if it is with the organizational leadership (headquarters, etc.) or with other project teams. Do you consider the knowledge shared with the organization and the knowledge shared with other project teams of equal importance? If not, why do you think that one is more important than the other? Is it easier to share knowledge with other projects teams or with the organization? Business practices?
8. In the survey, you indicated that the local management is moderately involved in the global organization's strategy formulation /implementation. Do you think more involvement would help improve the global integration of knowledge?
9. In the survey, you indicated that corporate executive moderately coordinate and monitor local project operations.

    Do you think more integration would improve or hurt the project performance? Why?
10. In the survey, you indicated that strategies of different business groups are a great deal independent. Do you think this is a good thing? Would more common division policy help improve the performance of the organization?

Back to General:

1. Do you think the global integration of knowledge and local adaptation to the project environment could be improved in your organization? In your project team?
2. Do you think of local adaptation and global integration as conflicting notions? Why or why not? If yes, in your opinion, how can a tradeoff between the two be achieved? How can they be linked together?
3. Given our topic, is there anything we didn't ask that we should have or do you have other comments regarding integration and adaptation to share with us?

APPENDIX 4: UPDATED QUESTIONNAIRE

Adaptation and Integration for Multi-national Project-based Organizations

Introduction

Thank you for participating in this study regarding adaptation and integration for multi-national project-based organizations. Completing this questionnaire will take approximately 15 minutes. Definitions that you may need will appear on the related page.

Your company and individual privacy will be maintained in all published and written data resulting from this study.

By selecting Start Survey, you affirm that you understand the above information and voluntarily consent to participate in this research project.

Next

Demographic and Project Data

The next questions will ask information about an international project that you recently completed or that is almost complete. We ask that you focus on only this project throughout the questionnaire. The project data is collected for comparison during analysis only.

✱1. Please enter your name and organization.
Reported findings will not contain individual, project or organization information.

Name:

Organization:

✱2. Please list the project type (e.g. roads, bridges, pipelines, buildings, refinery, manufacturing...).

✱3. Where is the project located? Please name the city and country.

City/Town:

Country:

✱4. Is this the first project your organization has completed in this country?

Yes No

✱5. What is the approximate project value ($)?

✱6. Does your organization have a local office in the host country where the project is located?

Yes No

✱7. When did your organization start working in the host country?

< 5 years 5 to 9 years > 9 years

✱8. Please estimate the percentage of expatriates (project team members within your organization that are NOT from the project's host country) working on the project.

***9. Please select the three methods that best reflect how the project team/ organization adapted to the new project environment.**

- [ ] Training of expatriates to become familiar with the new local environment (language, culture, charm school...)
- [ ] Prior personal experience of a project team member(s)
- [ ] Trial project (smaller project carried out before the full-scale project to test the local environment)
- [ ] Sending people in advance to study the host country
- [ ] Gathering information (laws, regulations, permitting, risks) on the local country
- [ ] Outsourcing as many tasks as possible to local subcontractors

In this study, we consider a knowledge exchange to occur when an individual is affected by and learns from the experience of others. In a global organization, knowledge exchanges that occur outside the project team can happen at three intra-organizational levels:
- Headquarters: organization's headquarters
- Local offices: organization's offices located in the host country
- Rest of the organization: other offices and project teams around the world

***10. During the course of the project, how much RELEVANT knowledge did you receive from each of the following? Please check one answer per row.**

	None	A little	A moderate amount	A lot
Knowledge received from the headquarters	○	○	○	○
Knowledge received from the local offices	○	○	○	○
Knowledge received from the rest of the organization	○	○	○	○
Knowledge received from the host country including the government, intended project beneficiaries, local stakeholders, embassy, consulate...	○	○	○	○

***11. Please select the answer that best describes how frequently you share knowledge (give or receive) with people outside your project team, but within your organization.**

	Once per day	Multiples times per week	Once per week	Once per month	Once per quarter	Once every 6 months
Knowledge shared with the headquarters	○	○	○	○	○	○
Knowledge shared with the local offices	○	○	○	○	○	○
Knowledge shared with the rest of the organization	○	○	○	○	○	○

***12. Please select the answer that best describes the direction of knowledge exchange between your project team and others within the organization.**

	Receive	Give	Receive and give
Knowledge exchange with the headquarters	○	○	○
Knowledge exchange with the local offices	○	○	○
Knowledge exchange with the rest of the organization	○	○	○

***13. Please select the two methods used most frequently by your project team to transfer and share knowledge within your organization.**

	Reports, hard copies and text driven material	Email	Phone	Face to face personal discussions	Workshops/ Seminars	Meetings	Intranet, share points, online forums
With the headquarters	☐	☐	☐	☐	☐	☐	☐
With the local offices	☐	☐	☐	☐	☐	☐	☐
With the rest of the organization	☐	☐	☐	☐	☐	☐	☐

Performance

✱14. Did the project perform to the established budget?

> 10% budget under run	5 to 10% budget under run	5 % budget under run	On budget	5 % budget overrun	5 to 10% budget overrun	> 10% budget overrun
○	○	○	○	○	○	○

✱15. Did the project perform to the established schedule ?

> 10% schedule under run	5 to 10% schedule under run	5 % schedule under run	On schedule	5 % schedule overrun	5 to 10% schedule overrun	> 10% schedule overrun
○	○	○	○	○	○	○

✱16. To what extent did the project meet the client's expectations?

1 Did not meet expectations	2 Somewhat worse than expected	3 Conformed to expectations	4 Somewhat better than expected	5 Better than expected
○	○	○	○	○

✱17. To what extent did the project meet the project team's expectations?

1 Did not meet expectations	2 Somewhat worse than expected	3 Conformed to expectations	4 Somewhat better than expected	5 Better than expected
○	○	○	○	○

18. What benefits did the project team/ organization gain from completing this project (e.g. increased market share, entering a new market, knowledge acquisition...) ?

General Questions

For the purpose of this study, we define:
- local adaptation as the methods implemented by the project team/ organization to acquire knowledge about the host country of the project (norms, regulation, culture...)
- global integration as the knowledge transfer across the global organization (for instance, with other project teams, other divisions and the headquarters).

✱19. Please indicate the extent to which the project team focuses its attention on:

	To a very little extent	To a little extent	To a moderate extent	To some extent	To a great extent
Adapting to the local market	○	○	○	○	○
Integrating knowledge with the rest of the organization	○	○	○	○	○

✱20. Please rate the extent to which you believe your project team succeeded in:

	To a very little extent	To a little extent	To a moderate extent	To some extent	To a great extent
Adapting to the local market	○	○	○	○	○
Integrating knowledge with the rest of the organization	○	○	○	○	○

✱21. Please rate the importance of adapting to the local environment for:

	No importance	Little importance	Moderate importance	Great importance
The project's success	○	○	○	○
The organization's success	○	○	○	○

✱22. Please rate the importance of integrating knowledge with the rest of the organization for:

	No importance	Little importance	Moderate importance	Great importance
The project's success	○	○	○	○
The organization's success	○	○	○	○

✱23. Please select the answer that best reflects how your organization operates in the global market.

- ○ By building a strong local presence through sensitivity and responsiveness to national differences among countries.
- ○ By adapting some of the organizational methods to the local country and culture.
- ○ By implementing the organization's global standards

✱24. Please select the answer that best describes the way your organization works and shares knowledge.

- ○ By developing globally-scaled operations using the knowledge acquired through various projects and shared worldwide within the organization.
- ○ By using the knowledge developed in their local division combined with the headquarter's knowledge.
- ○ By focusing on the on-going project operations and the knowledge available within the project team.

✱25. Please choose the answer that, in your opinion, best describes the relationship between local adaptation and organizational knowledge integration.

- ○ There is a positive correlation between local adaptation and organizational knowledge integration. The two notions are related and the project team/ organization need to work on both simultaneously.
- ○ There is no correlation between local adaptation and organizational knowledge integration. The project team and organization need to work on both independently.
- ○ Local adaptation and organizational knowledge integration are negatively correlated: they are conflicting notions and the project team must only focus on one to be successful.

26. Please estimate the percentage of relationships external to the project team but internal to the organization for each category. The percentage of relationships should total 100.

External to the organization in the host country (local contractors, local institutions…)	
Internal to the organization in the host country, external to the project team (e.g. local offices)	
Internal to the organization outside the host country, external to the project team (other divisions and headquarters)	

Thank you for your participation in the study!

27. If you would like to directly receive the results from this study, please enter your email address.

Prev Done

APPENDIX 5: UPDATED QUESTIONNAIRE ANALYSIS

The aim of this study is to create a questionnaire with the associated scale to rate the level of local adaptation to the host country and organizational knowledge integration of project teams in order to relate this level to project performance. As a result, the questionnaire includes four types of questions: general project information, adaptation, integration and performance questions. The scale and associated questionnaire can be used to assess the level of adaptation and integration of any international construction project.

Although the analysis process follows the same steps for adaptation and integration, we analyzed separately adaptation and integration, as they are different notions. For each project, we calculated an adaptation and an integration score.

The following section explains and justifies the analysis process used to obtain projects' adaptation and integration scores. For instance, the choice of each rating and explanatory question and the qualitative rating of each answer is explained.

Local adaptation:

To be able to rate the level of adaptation of a project team, it is important to define *local adaptation*. For the purpose of this study, we consider local adaptation as the methods used to reduce the risks associated with working internationally and that are due to the differences between the home and the host country.

The questionnaire includes six rating and five explanatory questions for adaptation.

Adaptation Rating Questions:

Q1: Please estimate the percentage of expatriates working on the project.

Q1 rates the percentage of expatriates working on the project (project team members within your organization that are not from the host country) compared to the total staff (expatriates + locals).

Expatriates are needed when entering a new market to provide experienced project management, technical knowledge and bring the company's culture and standards to the project. These expatriates may vary in their experience, with "Cosmopolitans" having more experience working internationally, but still bringing technical knowledge and/or organizational knowledge to the project (Haas 2005). However if the expatriates have little experience working on international projects and no experience in the specific host country, conflicts with the working partners in the host country can arise due to institutional differences (Mahalingam and Levitt 2007) and institutional exceptions (Orr and Scott 2008). Orr and Levitt (2011) highlight the importance of local knowledge and the advantage of local staff over expatriates to reduce those conflicts. In their study, they use the ratio of expatriate to total staff as an indicator of embeddedness.

In the interviews, project managers mentioned that the number of expatriates was lower when the organization had worked in the host country for several years and on several projects. When this happens, they have more experience in the local market and have transferred organizational knowledge to help integrate the team with the overall organization. When they first enter, however, they need to gain this knowledge. Depending on the entry mode, the experience and the size of the organization, three main strategies are developed by organizations to adapt to the local market (Orr and Levitt 2011):

- "Increasing the supply of local knowledge" by sending expatriates in the host country prior to the start of the project to study the local environment, having culture/ language training for expatriates, sending them to charm school, hiring local people within the organization… All these method participate in gathering more local knowledge within the project team and having a higher level of local knowledge about the local project location through accelerated learning rates, increased learning periods in order to better react to differences between the home and the host country.
- "Decreasing the demand for local knowledge which can be done by reducing the level of embeddedness and the number of local relationships by working with local contractors and consultants.

- And "reducing the consequences of a knowledge deficit" by preparing contingency plans, cultivate adaptability to unforeseen events by being more flexible, accounting for contingencies, and insure against uncertainties such as political, market, currency exchange risks…

In these strategies, only the first is concerned with adapting to the local project area. These last two strategies require less adaptation to the local environment and generally use more expatriates.

As a result, a lower percentage of expatriates indicates a higher level of adaptation. Looking at the ratio of expatriates to total professional staff from Orr and Levitt (2011)'s study, and at a quote from a contractor's interview from (Scott et al. 2011) we can consider 50% of expatriates on a project as the cross-over point for the level of adaptation, with more than 50% considered as low adaptation. These sets are skewed to the lower side as most project teams have less than 50% of expatriates.

Percentage of expatriates working on the project	0-10%	10-20%	20-30%	30-50%	>50%
Adaptation qualitative rating	High	Moderate High	Moderate	Moderate Low	Low

Q2: During the course of the project, how much RELEVANT knowledge did you receive from each of the following?

Amount of relevant knowledge	None	Little	A moderate amount	A lot
Knowledge received from the local office in the host country				
Knowledge received from the host country				

This question helps to quantify the sources of local country knowledge (external to the project team). When an organization enters a new local market, it needs to gather information from the market to reduce the liability of foreignness (Zaheer 1995) and the risks associated with institutional differences and exceptions (Orr and Scott 2008). The amount of relevant local knowledge within the project team (either provided internally by locals or gathered through external sources) is therefore very important to reduce the risks associated with global projects, which is key, especially in the AEC industry. Local knowledge entails institutional knowledge (laws, regulations, values, norms, local culture) and business knowledge

(knowledge of the customers, suppliers, competitors) of the new local market (Petersen and Pedersen 2002). This knowledge can be gathered from:

- Individuals and organizations within the local country itself, including the government, the intended beneficiaries, the local stakeholders, embassy and consulate, *or*
- Individuals within the local offices in the host country (if applicable). The local offices can provide information on the culture, the competency of local contractors, the contract methods, the laws and regulations, etc. that are very important for a project.

As local knowledge is most frequently gathered from a combination of sources (primarily from the host country when the organization first enters the new market and then from the local offices in the host country after the organization has been established in the host country for a while), we considered the two sources of knowledge to be of equal importance and to take the average of the amount of local knowledge gathered from each source. The average was most representative of the total amount of relevant local knowledge gathered. In addition, taking the average contributes in differentiating the amount of relevant knowledge gathered by the project team, which is in better alignment with our research goal to create a rating scale assessing the level of adaptation of project teams. As a result, more local knowledge gathered within the project team indicates a higher level of local adaptation.

The following table presents the combinations of answers and the associated adaptation qualitative rating for the question.

Combination of answers selected	A lot- a lot	A lot – moderate	Moderate – moderate	Moderate – none	None – none
		A lot – a little	Moderate – a little	A little- a little	A little-none
			A lot –none		
Adaptation qualitative rating	High	Moderate High	Moderate	Moderate Low	Low

Q3: Please indicate the extent to which the project team focuses its attention on adapting to the local market.

Q4: Please indicate to what extent you think your project team succeeds in adapting to the local market.

Q3 rates the extent to which the project team focused its attention on adapting to the local environment, in other words, how much time/ effort was put forth in adapting to the local environment. Q4 rates the project manager's perception on how well its project team succeeds in adapting. Considering the two aspects together is very important as a team can receive a high rating in focusing on adaptation because they have noticed a knowledge gap (Petersen et al. 2008) or institutional difference (Orr and Scott 2008) due to a lack of adaptation. In contrast, if they have a lot of experience in the host country, they can focus less on adapting to the local environment and still achieve a high level of adaptation.

The five answer choices for each question could be directly assigned to a qualitative adaptation rating as shown in the following table

Answer Choice	To a great extent	To some extent	To a moderate extent	To a little extent	To a very little extent
Adaptation qualitative rating	High	Moderate High	Moderate	Moderate Low	Low

Q5: Please select the answer that best reflects how your organization operates in the global market.

This question provides information on the organization's strategy when adapting to local environments. The three answer choices reflect three different levels of adaptation.

a) By building a strong local presence through sensitivity and responsiveness to national differences between countries → High adaptation
b) By adapting some of the organizational methods to the local country and culture → Moderate adaptation
c) By implementing the organization's global standards → Low adaptation. (Leong and Tan 1993) show that the "adoption of standardized international business routines" in managing foreign activities, can lead to a low level of adaptation.

This question is formulated based on a study by (Leong and Tan 1993) who identified characteristics of four types of organizations (multinational, international, transnational and global) described in Barlett and Ghoshal local responsiveness and global integration framework. For this question, we adapted the demonstrated findings in the "competitiveness achievement in the global

market" category for the four types of organizations that reflect different levels of adaptation (high adaptation and low adaptation). This question allows us to determine if the organization has implemented project-level strategies that focus on adaptation.

Statements for moderate high and moderate low levels of adaptation were not provided, as the differences between statements would have been too small, which would confuse project managers completing the questionnaire. This question was created by merging two questions from the first questionnaire in order to make it less confusing for the project managers.

Q6: The last rating question for adaptation is the first sub part of the following question asking the project managers to evaluate the percentage of relationships external to the project team:

- ***In the host country, external to the organization (local contractors, local client, local institutions…***
- *In the host country, internal to the organization (local offices)*
- *Outside the host country, internal to the organization (headquarters, rest of the organization).*

This question provides a general overview of how the project team distributes its relationships and the composition of the project network. Only the first portion of the question relates to adaptation. As a result, we only considered the percentage of relationships outside the organization in the host country to rate the level of adaptation of the project team, as a higher percentage of relationship indicates a higher level of adaptation. Relationships with the local environment are shown to be very important in several studies (Javernick-Will 2009; Scott et al. 2011).

When assigning a qualitative adaptation rating to the percentage of relationship mentioned, we took into account the fact that the respondents had to allocate a percentage amongst three categories and that the sum of these should equal 100%. We therefore chose 33% and 66% as cutting points. The sets for the percentage are shown in the following table:

Answer Choice	>66%	50 to 66%	33 to 50%	25 to 33%	<25%
Adaptation qualitative rating	High	Moderate High	Moderate	Moderate Low	Low

Adaptation Explanatory Questions

Some questions were asked to provide further information on the project and help justify the project's levels of adaptation.

Examples of explanatory questions regarding adaptation include the time that the organization has been working within the host country and the existence of a local office in the project host country. These were selected because several studies highlight the importance of the perceived difference of the host country with the organization's host country as well as the time elapsed since the first entry in the local market (Lord and Ranft 2000b; Petersen and Pedersen 2002; Petersen et al. 2008).

When project managers are aware of the differences between the host country and the home country, they are more careful and focus more attention on gathering local knowledge and adapting to the new local environment (Petersen et al. 2008). Whereas when the two countries seem similar (common history, common language, legal system…), problems may arise from unexpected differences and from the lack of focus on local adaptation (Orr and Scott 2008).

In addition, the time elapsed since the first entry in the local market is important, as the perceived level of local knowledge and local adaptation needed, can vary depending on this variable. Petersen et al. (2008) explain that when first entering a foreign market, the knowledge gap between the knowledge possessed and the knowledge needed first increases before decreasing. This perceived knowledge gap is highest after five years of operation in the host country and then decreases until it reaches the level perceived when the organization first entered the new market. This is explained by the fact that unexpected problems arise when first working on the project, widening, the knowledge gap. Importantly, the knowledge gap never disappears entirely as local knowledge constantly needs to be gathered (for example laws/ regulations constantly change).

Another explanatory question was the international experience of the organization as it can be used to evaluate the local adaptation ability of firms (Petersen and Pedersen 2002).

We asked the project managers to select the three preferred methods that best reflected how the project team/ organization adapted to the local environment from the following choices:

- Training of expatriates to become familiar with the new local environment (language, culture, charm school…)
- Prior personal experience of project team member(s)
- Completing trial projects (smaller project carried out before the full-scale project to test the local environment)
- Sending people in advance to study the host country
- Gathering information (laws, regulations, permitting, risks) on the local country
- Outsourcing as many tasks as possible to local contractors.

These answer choices represent the most common methods used and mentioned in literature (Javernick-Will 2009; Orr and Scott 2008; Scott et al. 2011) to adapt to the local environment.

Organizational Integration

The analysis process of the level of organizational integration is very similar to the local adaptation analysis. For the purpose of this study, we define organizational integration as the knowledge / information transfer and sharing within the global organization. We identify three entities in the organization with which project teams can exchange knowledge:

- the headquarters: the organization's headquarters,
- the local offices in the host country
- the rest of the organization: other offices or project teams located around the world.

Seven questions are used to evaluate the level of integration with one explanatory question.

Integration Rating Questions

Q1: During the course of the project, how much RELEVANT knowledge did you receive from each of the following?

Amount of relevant knowledge	None	Little	A moderate amount	A lot
Knowledge received from the headquarters				
Knowledge received from the local office in the host country				
Knowledge received from the rest of the organization				

Knowledge exchange with the rest of the organization is very important in order to avoid repeating past mistakes or "reinventing the wheel" (Javernick-Will and Hartmann 2011). Lord and Ranft (2000b) study the level of knowledge sharing between the different divisions operating in the country. Cummings (2004b) shows that knowledge sharing is even more valuable between people from different roles, positions, geographical locations and business units as they have different perspectives and sources of knowledge. This why it is important to measure the amount of knowledge exchanged at the three different levels in an organization to assess the level of knowledge integration within the organization.

This question is similar to Q1 of adaptation, except that the knowledge sources are different. For the integration analysis, we focus on the knowledge exchanged outside the project team, but within the organization. As a result we ask about the knowledge received from the headquarters, from the local offices in the host country, and from the rest of the organization (other project teams or other offices around the world). A larger amount of relevant knowledge received from the organization indicates a higher level of integration. As we are focusing on the amount of relevant knowledge received rather than on its source, we considered that all the knowledge sources were of similar importance and analyzed the response to this question similarly to Q1 from adaptation. The following table presents the combinations of answers and the associated average that led to each qualitative rating of integration for the question.

Combination of answers selected	A lot/ a lot/ a lot	A lot/ a lot/ moderate	A lot/ moderate/ none	A lot/ none/ none	Little/ none/ none
		A lot/ a lot/ little	A lot/ little/ little	Moderate/ moderate/ none	None – None – None
		A lot/ a lot/ none	A lot/little/ none	Moderate/ little/ little	
		A lot/ moderate/ moderate	Moderate/ moderate/ moderate	Moderate/ little/none	
		A lot/ moderate/ little	Moderate/ moderate/ little	Moderate/ none/ none	
				Little/little/none	
Integration qualitative rating	High	Moderate High	Moderate	Moderate Low	Low

Q2: Please select the answer that best describes how frequently you share knowledge (give or receive) with people outside your project team, but within your organization.

Knowledge sharing frequency	Once per day	Multiple times per week	Once per week	Once per month	Once per quarter	Once every 6 months
Knowledge received from the headquarters						
Knowledge received from the local office in the host country						
Knowledge received from the rest of the organization						

The frequency of knowledge exchanges needs to be taken into account when measuring organizational integration, as knowledge exchanges are a considerable part of knowledge transfer within an organization. As a result, several authors include this parameter in their papers: Cummings (2004b) studied the frequency of knowledge exchanges between the project team from the division and from other divisions, Monteiro et al. (2008) the frequency of various type of knowledge flows at different levels in the organization and Javernick-Will (2011) uses the frequency of exchange to study the factors impacting knowledge sharing connections.

This question asks the project managers to rate the frequency of their exchanges with the entities of the organization from which the project team receives knowledge. The project team can receive knowledge from different levels of the organization (headquarters, local office and the rest of the

organization). Our focus is to assess knowledge integration using the frequency of knowledge exchanges with the rest of the organization in general, without necessarily differentiating the knowledge source.

While we could have used the average or the maximum frequency between the different knowledge sources, the median was used as it takes into account the different frequencies between the three sources of knowledge without favoring high frequency exchanges nor penalizing low frequency exchanges as knowledge exchanges can be very frequent and not very valuable, whereas one infrequent knowledge exchange could be more valuable. Another parameter to consider is that those frequencies can also vary depending on how the organization works and the role of each entity. As a result, taking the median of the frequencies of the knowledge exchange at the three organizational levels is the method that best enables us to combine the three sources of knowledge considering those parameters. As long as knowledge was exchanged frequently enough with one part of the organization, knowledge is integrated within the organization. The following table shows the values of the median and the associated integration qualitative rating.

Median of the answer choices frequency of knowledge sharing with the three sources	Once per day Multiple times per week	Once per week	Once per month	Once per quarter	Once every 6 months
Integration Qualitative Rating	High	Moderate high	Moderate	Moderate low	Low

Q3: Please select the answer that best describes the direction of knowledge exchange between your project team and others within the organization.

Knowledge sharing direction	**Receive and Provide**	**Receive**	**Provide**
Knowledge received from the headquarters			
Knowledge received from the local offices in the host country			
Knowledge received from the rest of the organization			

This question studies the direction of knowledge exchanges with others in the organization. This parameter is important to consider as if the knowledge exchange is reciprocal, it will we more efficient. As a result, knowledge integration within an organization will be higher if the exchanges are bidirectional

and reciprocal. In addition, the lack of reciprocity of knowledge exchange (outflow versus inflow) can help to explain isolation and underperformance of certain business units (Monteiro et al. 2008). Javernick-Will (2011) also used the direction of the knowledge exchange to assess knowledge sharing connections, arguing that one-way flow of knowledge is detrimental to overall performance.

To value the direction of the knowledge exchange at the three organizational levels studied, we considered that "receive and provide" at the three levels provided the highest level of integration, that "receive and provide" at the two levels was a moderate high level of integration, that "receive and provide" at only one level was a moderate low and that only receive or only provide or a combination of only receive or only provide was considered to be a low level of integration for the project team.

Q4: Please indicate the extent to which the project team focuses its attention on integrating knowledge with the rest of the organization.

Q5: Please indicate to what extent you think your project team succeeds in integrating knowledge with the rest of the organization.

Q4 rates the extent to which the project team focuses its attention on integrating knowledge with the rest of the organization, in other words, how much time/ effort is spent sharing and exchanging knowledge. Q5 rates the project manager's perception on how well the project team succeeds in integrating/ sharing knowledge with the rest of the organization. Considering the two aspects is necessary, as high frequency knowledge exchanges and the use of knowledge transfer methods don't necessarily relate with the quality and the need of the knowledge exchanged.

The analysis of the answers to these two questions is very similar. The following table presents the integration qualitative ratings associated with the answer choices for these two questions.

Answer Choice	To a great extent	To some extent	To a moderate extent	To a little extent	To a very little extent
Integration qualitative rating	High	Moderate High	Moderate	Moderate Low	Low

Q6. Please select the answer that best describes the way your organization works and shares knowledge

This question and its analysis are very similar to Q5 of adaptation. It provides information on the organization's strategy for knowledge sharing and management. The three answer choices reflect three different levels of organizational knowledge integration:

a) By developing globally-scaled operations using the knowledge acquired through various projects and shared worldwide within the organization → High integration
b) By using the knowledge developed in their local division combined with headquarters' knowledge → Moderate integration
c) By focusing on the on-going project operations and the knowledge available within the project team → Low integration

Similar to the adaptation question, this question was constructed based upon the study by Leong and Tan (1993) who identified characteristics of four types of organizations (multinational, international, transnational and global) described in Barlett and Ghoshal local responsiveness and global integration framework. For this question, we adapted the demonstrated findings in the "configuration of assets and capabilities, the role of overseas operations and the diffusion of knowledge" for the four types of organizations that reflected different levels of integration (high, moderate and low integration). This question allows us to determine if the organization has implemented project-level strategies that focus on organizational knowledge integration.

As stated in the adaptation questions section, statements for moderate high and moderate low levels of integration were not provided, as the differences between statements would have been too small, which would have made it difficult for the project managers to select only one answer. This question was created by merging two questions from the first questionnaire in order to make it less confusing for the project managers.

Q7. The last rating question for organizational integration is the third sub part of the following question asking the project managers to evaluate the percentage of relationship external to the project team:

- *In the host country, external to the organization (local contractors, local client, local institutions…)*
- *In the host country, internal to the organization (local offices)*
- ***Outside the host country, internal to the organization (headquarters, rest of the organization).***

This question provides us a general overview of how the project team distributes its relationships, but we focus on the third subpart of the question. The percentage of relationships internal to the organization but outside the project host country provides information on the level of organizational integration with the rest of the organization and the headquarters, as a higher percentage of relationship indicates a higher level of organizational integration.

To assign a qualitative integration rating to the percentage of relationship mentioned, we considered the fact that the respondents had to allocate a percentage amongst three categories and the sum of these should equal 100%. We therefore chose 33% and 66% as cutting points. The sets for the percentage are showed in the following table:

Answer Choice	>66%	50 to 66%	33 to 50%	25 to 33%	<25%
Integration qualitative rating	High	Moderate High	Moderate	Moderate Low	Low

Integration Explanatory Questions

In order to assess how the project team was integrating with the rest of the organization, we asked the project managers to select methods used most frequently by the project team/ organization to share knowledge with your organization. The project managers were asked to select two preferred methods from the following choices:

- Reports, hard copy and text driven material
- Email
- Phone
- Face to face, personal discussion

- Workshops, seminars
- Intranet, share points, online forums
- Meetings

These categories were created based on the literature review of the methods available to gather and share knowledge within the organization (Leong and Tan 1993).

Project Performance

One of the objectives of this study is to relate the projects' level of adaptation and integration to project performance. In order to do this, we asked project performance questions in the computer-based questionnaire.

Despite the different approaches used and the various success criteria identified to measure performance, the most frequently used metrics to assess performance at the project level are time, quality and cost (Atkinson 1999; Lim and Mohamed 1999; Sadeh et al. 2000; Songer and Molenaar 1997). For the purpose of this study, we based our performance measures on those most common success criteria and adapted our questions from those used by Molenaar and Songer (1998).

Q1: Did the project perform to established budget?

This question rates the performance of the project based on the success criteria cost.

Answer Choice	5 to 10% budget under run	5% budget under run	On budget	5 % budget over run	5 to 10% budget over run
	>10% budget under run				>10% budget over run
Performance qualitative rating	High	Moderate High	Moderate	Moderate Low	Low

Q2: Did the project perform to established schedule?

This question rates the performance of the project based on the success criteria schedule.

Answer Choice	5 to 10% schedule under run	5% schedule under run	On schedule	5 % schedule over run	5 to 10% schedule over run
	>10% schedule under run				>10% schedule over run
Performance qualitative rating	High	Moderate High	Moderate	Moderate Low	Low

Q3: To what extent did the project meet the client's expectations?

This question rates the performance of the project based on the success criteria quality.

Answer Choice	Better than expected	Somewhat better than expected	Conformed to expectations	Somewhat worse than expected	Did not meet expectations
Performance qualitative rating	High	Moderate High	Moderate	Moderate Low	Low

Q4: To what extent did the project meet the project team's expectations?

This question rates the performance of the project based on the project team's expectations:

Answer Choice	Better than expected	Somewhat better than expected	Conformed to expectations	Somewhat worse than expected	Did not meet expectations
Performance qualitative rating	High	Moderate High	Moderate	Moderate Low	Low

Related performance questions:

Explanatory performance questions referred to less direct performance measures such as other benefits from the project.

What benefits did the project team/ organization gain from completing this project (e.g. increased market share, entering a new market, knowledge acquisition...)?

This question was used to identify less obvious benefits of working internationally at the project team level and at the organization level.

We also looked at the perceived importance of adapting to the local environment and integrating knowledge within the organization for project and organizational success. This was also used to see whether local adaptation or organizational integration was considered as more important. The analysis of this question was also related to the interview analysis of the relationship between adaptation and integration at the project level and the possible need of a trade-off.

Conclusion

The analysis of the various answer choices for the rating questions allows assigning qualitative adaptation/ integration rating to each answer choice. This enables assigning numerical adaptation/ integration score for each rating question and to compute an overall adaptation and integration score for each project using the weights assigned to each rating question by the expert panel.

APPENDIX 6: PAIRWISE COMPARISON INSTRUCTIONS

Adaptation and Integration for Multi-national Project-based Organizations

Introduction to the research:

Theoretically, multinational construction and engineering organizations need to adapt to new local environments and to integrate knowledge between projects and divisions in the organization.

One of the sub-objectives of our research is to create a scale to assess the level of adaptation and integration of project teams based upon responses to a questionnaire. The questionnaire is based upon a literature review of adaptation, integration and performance and the analysis of an exploratory questionnaire and follow-up interviews of 10 project managers. This current phase of the study uses pairwise comparison to assign weights to the various adaptation/ integration questions (or variables) to build our scale and calculate overall projects scores for (1) adaptation and (2) integration.

Pairwise Comparison Method

The pairwise comparison method consists of comparing two variables to decide which one is more important and to what extent. The comparison is conducted using a 9-point scale (Saaty, 1980), with the following definitions and explanations for each score:

Score	Definition	Explanation
1	Equal importance	Two factors contribute equally to the objective
3	Somewhat more important	Experience and judgment slightly favor one activity over the other.
5	Much more important	Experience and judgment strongly favor one activity over the other.
7	Very much more important	Experience and judgment very strongly favor one over the other.
9	Absolutely more important	The evidence favoring one activity over another is of the highest possible order of affirmation.
2,4,6,8	Intermediate values	When compromise is needed

We ask that you compare the importance of each pair of questions by completing the highlighted cells of two matrices: one for adaptation and one for integration. You will find matrices for each via the tabs in this excel spreadsheet. For each highlighted cell, please compare the importance of each pair of questions using the above scale. When your scores have been assigned, please check the consistency of your scores, as described below.

How are the highlighted cells of the matrices completed?

Each column and each row represent a question. The participants should fill the highlighted cells by rows and compare the question of the selected row with the remaining questions of the columns and assign a score for each of them. You only need to complete the highlighted cells (upper-right half of the matrix) as the bottom-left half will automatically be completed (If the score of question i to question j is n, then the score of question j to i is 1/n).

Note that it is possible for two questions to have the same importance and weight (indicated by assigning a score of 1).

How do I check that my answers are consistent?

The weights given in each cell of the matrix should be consistent to the extent possible. This is easily checked by the consistency ratio, which should be < 0.1. The Excel spreadsheet automatically calculates the consistency ratio for each matrix. If it is > 0.1 it means that some of your weights are not consistent.

If you receive a score > 0.1, we ask that you please go back and adjust your weights to make sure that each pairwise comparison is transitive and consistent in the level of importance. For example if Q1 is somewhat more important than Q2 and Q2 much more important than Q4, then Q1 should be at least very much more important than Q4.

To help guide you, an example is provided on the each of the following tabs.

Example

SCORING

*If Q1 is somewhat more important than Q4, then you should put a 3 in the yellow highlighted cell of the matrix.

*If Q1 is of equal importance as Q3 then you should put a 1 in the red highlighted cell of the matrix.

*If Q1 is absolutely less important than Q2, then you should put a 1/9 in the green highlighted cell of the matrix.

CONSISTENCY CHECK

By consistency, Q2 is absolutely more important than Q3, as Q1 is of equal importance than Q3 and Q1 is absolutely less important than Q2. You should therefore put a 9 in the blue highlighted cell of the matrix.

	Q1	Q2	Q3	Q4
Q1	1	1/9	1	3
Q2		1	9	
Q3			1	
Q4				1

Instructions for the adaptation pairwise comparison:

Please complete the highlighted cells of the matrix for adaptation (found on rows 18-25) and then check the consistency ratio. For each highlighted cell, compare questions in pairs using the scoring explanation provided from L13-S17. After you have scored each highlighted cell, please check your consistency via the consistency ratio in the cell O21.
The definition of adaptation and the question explanations are provided above the matrix.

Helpful Hint: In order to make the process of completing the matrix easier, we highly recommend that you first rank the questions by order of importance on a separate piece of paper. This will help you visualize the relative importance of two questions when comparing them and facilitate consistent scoring.

To start, please provide a rating score in C18. To do this, answer the question: Q1 is …. important compared to Q2.
If it is more important, put a number between 3 to 9 chosing the most appropriate level of importance described in the table on the right.
If it is less important put 1/n, n being a number between 3 to 9 depending on the most appropriate level of importance described in the table.

Definition of Adaptation:

Local adaptation as the methods used to reduce the risks associated with working internationally and that are due to the differences between the home and the host country.

Question Explanation

Q1 Rates the ***percentage of expatriates*** (project team members within your organization that are not from the host country) working on the project compared to the total staff (expatriates + locals). [A lower percentage of expatriates indicates a higher level of adaptation].

Q2 Rates the ***amount of local knowledge gathered*** by the project team either from the local host country or from the local offices in the host country. [A higher level of local knowledge gathered indicates a higher level of adaptation].

Q3 Rates the extent to which the project team ***focuses its attention on adapting*** to the local environment. [Higher focus on adaptation indicates a higher level of adaptation].

Q4 Rates the extent to which the project manager ***believes its project team succeeds in adapting*** to the local environment. [Higher level of perception that project team has succeeded in adapting indicates a higher level of adaptation].

Q5 Evaluates ***how the organization operates in the global market*** [If a respondent selected, "By building a strong local presence through sensitivity and responsiveness to national differences among countries.", this indicates a higher level of adaptation].

Q6 Rates the ***percentage of relationships the project team has within the host country*** (externally to the organization) in comparison to the percentage of relationship with the rest of the organization (in the host country and around the world). [A higher percentage of relationships in the host country indicates a higher level of adaptation].

	Q1	Q2	Q3	Q4	Q5	Q6	Sum of rows	Normalized sum of the rows
Q1	1						1	#DIV/0!
Q2	#DIV/0!	1					#DIV/0!	#DIV/0!
Q3	#DIV/0!	#DIV/0!	1				#DIV/0!	#DIV/0!
Q4	#DIV/0!	#DIV/0!	#DIV/0!	1			#DIV/0!	#DIV/0!
Q5	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	1		#DIV/0!	#DIV/0!
Q6	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	1	#DIV/0!	#DIV/0!
Sum of columns	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	1	#DIV/0!	
							Total of sum of rows	

Instructions for the integration pairwise comparison:

Please complete the highlighted cells of the first matrix in rows 19-25 and then check the consistency ratio. For each highlighted cell, compare questions in pairs using the scoring explanation provided from L13-S17. After you have scored each highlighted cell, please check your consistency via the consistency integration and the question explanations are provided above the matrix.

Helpful Hint: In order to make the process of completing the matrix easier, we highly recommend that you first rank the questions by order of importance on a separate piece of paper. This will help you visualize the relative importance of two questions when comparing them and facilitate the obtention of a consistent matrix.

To start, please provide a score in cell C20. To do this, answer the question: Q1 is …. important compared to Q2.
If it is more important, put a number between 3 to 9 chosing the most appropriate level of importance described in the table on the right.
If it is less important put 1/n, n being a number between 3 to 9 depending on the most appropriate level of importance described in the table.

Definition of Integration

For the purpose of this study, we define organizational integration as the knowledge / information transfer across projects in the global organization.

Questions Explanations

Q1 Rates the amount of ***relevant knowledge exchanged between the project team and the rest of the organization*** (other local offices in the host country, other offices around the world, the headquarters). [Higher intraorganizational knowledge exchange indicates a higher level of integration].

Q2 Indiates the ***frequency of the knowledge exchanges*** between the project team and the rest of the organization. [Higher frequency indicates a higher level of integration].

Q3 Indicates the ***direction of the knowledge exchanges*** (bi-directional or unidirectional). [Bi-directional knowledge exchanges indicates a higher level of integration].

Q4 Rates the extent to which the project team ***focuses its attention on sharing knowledge with the rest of the organization***. [Higher focus on sharing knowledge indicates a higher level of integration].

Q5 Rates the extent to which the ***project manager believes that the project team succeeds in sharing knowledge with the rest of the organization***. [Higher levels of perception that the project team shares knowledge indicates a higher level of integration].

Q6 Evaluates ***how the organization operates in a global environment***. [If a respondent selected "By developing globally-scaled operations using the knowledge acquired through various projects and shared worldwide within the organization", this indicates a higher level of integration].

Q7 Rates the ***percentage of relationships the project team has with the rest of the organization*** (outside the host country) in comparison to the percentage of relationship in the host country (both internal and external to the organization). [A higher percentage of intraorganizational relationships external to the host country indicates a higher level of integration].

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Sum of rows	Normalized sum of the rows
Q1	1							1	#DIV/0!
Q2	#DIV/0!	1						#DIV/0!	#DIV/0!
Q3	#DIV/0!	#DIV/0!	1					#DIV/0!	#DIV/0!
Q4	#DIV/0!	#DIV/0!	#DIV/0!	1				#DIV/0!	#DIV/0!
Q5	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	1			#DIV/0!	#DIV/0!
Q6	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	1		#DIV/0!	#DIV/0!
Q7	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	1	#DIV/0!	#DIV/0!
Sum of columns	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	1	#DIV/0!	
								Total of sum of rows	

Consistency check for adaptation and for integration

Consitency ratio	CR	#DIV/0!
If CR > 0.1 pairwise comparison inconsistent, you need to check the consistency of your weights		

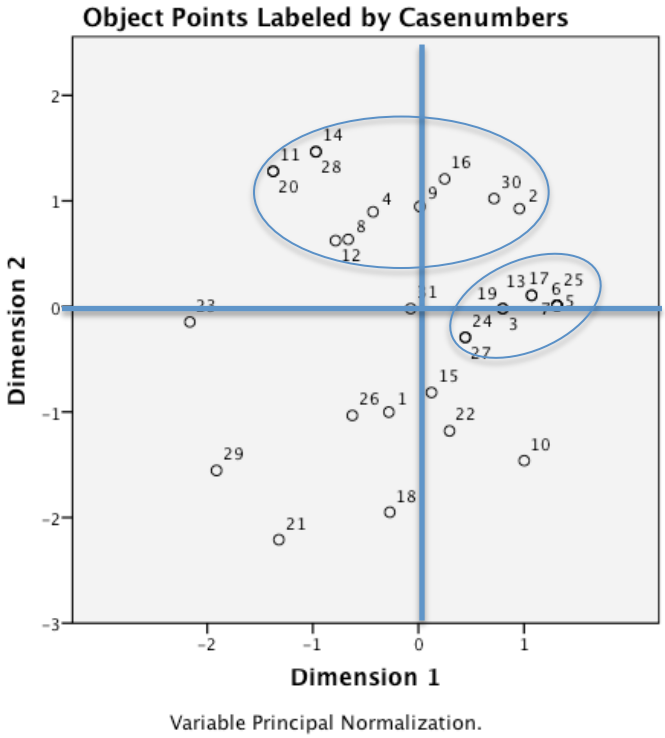
APPENDIX 7: CATPCA OUTPUT

CATPCA on the adaptation variables

Object Scores

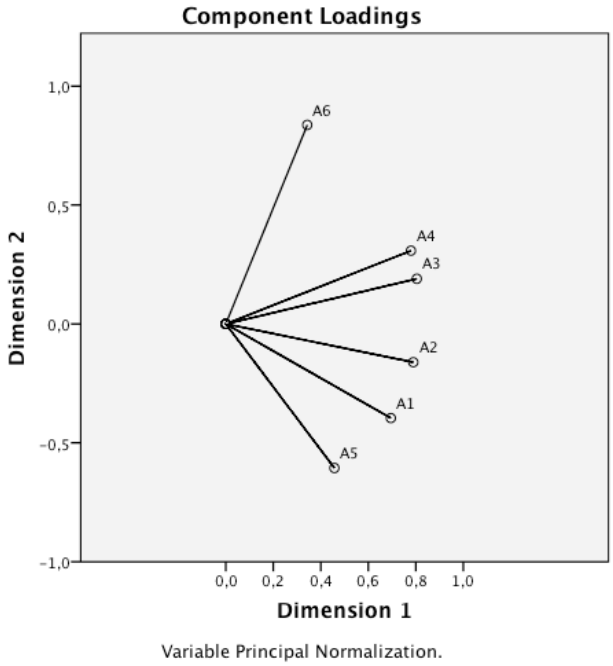
Case Number	Dimension	
	1	2
1	-,280	-1,001
2	,956	,926
3	,799	-,021
4	-,430	,896
5	1,311	,010
6	1,311	,010
7	1,311	,010
8	-,665	,636
9	,013	,947
10	1,002	-1,461
11	-1,376	1,280
12	-,785	,624
13	1,072	,105
14	-,972	1,466
15	,124	-,815
16	,248	1,208
17	1,072	,105
18	-,271	-1,949
19	,799	-,021
20	-1,376	1,280
21	-1,322	-2,210
22	,294	-1,179
23	-2,165	-,147
24	,443	-,293
25	1,311	,010
26	-,626	-1,033
27	,443	-,293
28	-,972	1,466
29	-1,913	-1,554
30	,716	1,021
31	-,074	-,020

Variable Principal Normalization.

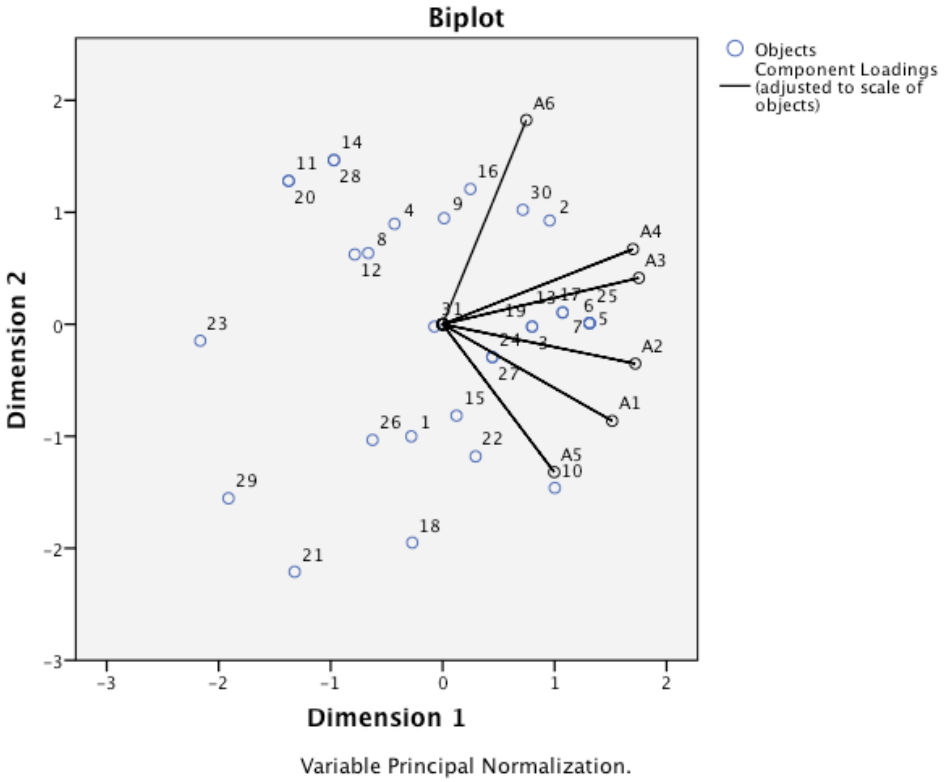


Component Loadings

	Dimension	
	1	2
A1	,695	-,396
A2	,789	-,161
A3	,804	,190
A4	,780	,308
A5	,457	-,606
A6	,343	,837



Biplot Component Loadings and Objects



Variable Principal Normalization.

CATPCA on the integration variables

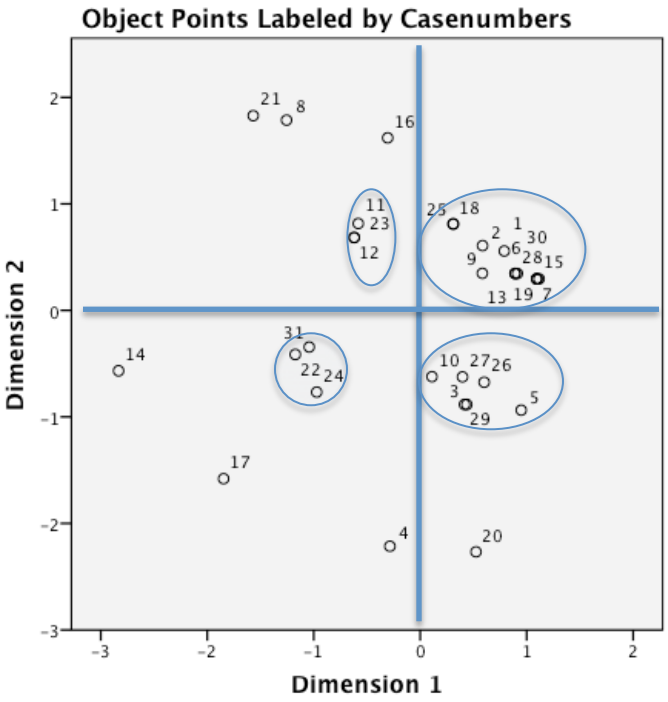
Object Scores

Case Number	Dimension	
	1	2
1	,789	,557
2	,586	,608
3	,437	-,884
4	-,285	-2,215
5	,948	-,936
6	,912	,346
7	1,095	,296
8	-1,256	1,787
9	,584	,348
10	,111	-,622
11	-,582	,816
12	-,621	,684
13	,891	,346
14	-2,834	-,568
15	1,095	,296
16	-,306	1,620
17	-1,847	-1,580
18	,310	,812
19	1,116	,296
20	,524	-2,267
21	-1,569	1,828
22	-1,173	-,414
23	-,621	,684
24	-,972	-,767
25	,310	,812
26	,601	-,675
27	,397	-,624
28	,891	,346
29	,416	-,884
30	1,095	,296
31	-1,043	-,344

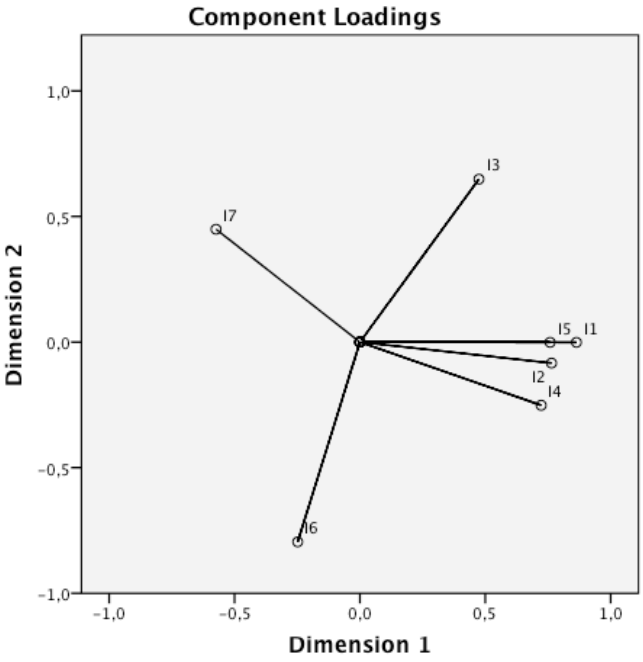
Variable Principal Normalization.

	Dimension	
	1	2
I1	**,863**	-,001
I2	**,764**	-,084
I3	,475	**,649**
I4	**,723**	-,252
I5	**,758**	-,001
I6	-,248	**-,795**
I7	-,574	,449

Variable Principal Normalization.

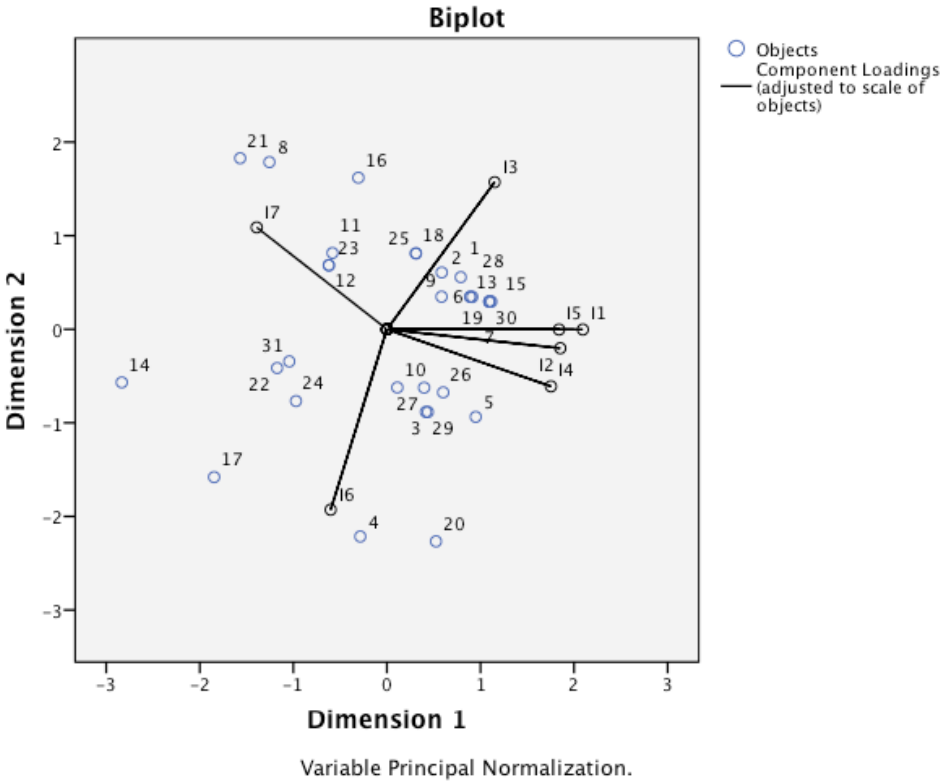


Variable Principal Normalization.



Variable Principal Normalization.

Biplot Component Loadings and Objects



APPENDIX 8: CROSS TABULATIONS OUTPUT

A higher percentage of expatriates in the project team is associated to a higher performance in terms of satisfying the clients' expectations.

Crosstab

			Perf3b		Total
			0	1	
A1b	0	Count	6	9	15
		Std. Residual	-1,1	1,3	
	1	Count	13	3	16
		Std. Residual	1,0	-1,3	
Total		Count	19	12	31

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	5,552[a]	1	,018	,029	,023	
Continuity Correction[b]	3,950	1	,047			
Likelihood Ratio	5,748	1	,017	,029	,023	
Fisher's Exact Test				,029	,023	
Linear-by-Linear Association	5,373[c]	1	,020	,029	,023	,020
N of Valid Cases	31					

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 5,81.

b. Computed only for a 2x2 table

c. The standardized statistic is -2,318.

A higher percentage of expatriates in the project team is associated to a higher performance in terms of satisfying the project team's expectations.

Crosstab

			Perf4b		
			0	1	Total
A1b	0	Count	7	8	15
		Std. Residual	-,9	1,2	
	1	Count	13	3	16
		Std. Residual	,8	-1,1	
Total		Count	20	11	31

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	4,045[a]	1	,044	,066	,050	
Continuity Correction[b]	2,675	1	,102			
Likelihood Ratio	4,154	1	,042	,066	,050	
Fisher's Exact Test				,066	,050	
Linear-by-Linear Association	3,914[c]	1	,048	,066	,050	,043
N of Valid Cases	31					

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 5,32.

b. Computed only for a 2x2 table

c. The standardized statistic is -1,978.

A positive relationship between the amount of relevant knowledge gathered from the rest of the organization and performance to the expected project cost.

Crosstab

			Perf1b		Total
			0	1	
I1b	0	Count	17	6	23
		Std. Residual	,6	-,8	
	1	Count	3	5	8
		Std. Residual	-1,0	1,3	
Total		Count	20	11	31

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	3,438[a]	1	,064	,095	,079	
Continuity Correction[b]	2,031	1	,154			
Likelihood Ratio	3,337	1	,068	,095	,079	
Fisher's Exact Test				,095	,079	
Linear-by-Linear Association	3,327[c]	1	,068	,095	,079	,067
N of Valid Cases	31					

a. 1 cells (25,0%) have expected count less than 5. The minimum expected count is 2,84.

b. Computed only for a 2x2 table

c. The standardized statistic is 1,824.

A positive relationship between the amount of relevant knowledge gathered from the rest of the organization and performance in terms of satisfaction of the project team's expectations.

Crosstab

			Perf4b		
			0	1	Total
I1b	0	Count	17	6	23
		Std. Residual	,6	-,8	
	1	Count	3	5	8
		Std. Residual	-1,0	1,3	
Total		Count	20	11	31

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	3,438[a]	1	,064	,095	,079	
Continuity Correction[b]	2,031	1	,154			
Likelihood Ratio	3,337	1	,068	,095	,079	
Fisher's Exact Test				,095	,079	
Linear-by-Linear Association	3,327[c]	1	,068	,095	,079	,067
N of Valid Cases	31					

a. 1 cells (25,0%) have expected count less than 5. The minimum expected count is 2,84.

b. Computed only for a 2x2 table

c. The standardized statistic is 1,824.

A positive relationship between the extent to which the project manager believes the project team succeeds in adapting to the local environment and the performance in terms of satisfaction of the project team's expectations.

Crosstab

			Perf4b		
			0	1	Total
A4b	0	Count	6	0	6
		Std. Residual	1,1	-1,5	
	1	Count	14	11	25
		Std. Residual	-,5	,7	
Total		Count	20	11	31

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	4,092[a]	1	,043	,066	,053	
Continuity Correction[b]	2,396	1	,122			
Likelihood Ratio	6,028	1	,014	,066	,053	
Fisher's Exact Test				,066	,053	
Linear-by-Linear Association	3,960[c]	1	,047	,066	,053	,053
N of Valid Cases	31					

a. 2 cells (50,0%) have expected count less than 5. The minimum expected count is 2,13.

b. Computed only for a 2x2 table

c. The standardized statistic is 1,990.

But no relationship between the extent to which the project manager believes the project team succeeds in integrating with the rest of the organization and the performance in terms of satisfaction of the project team's expectations.

Crosstab

			Perf4b		
			0	1	Total
I5b	0	Count	8	6	14
		Std. Residual	-,3	,5	
	1	Count	12	5	17
		Std. Residual	,3	-,4	
Total		Count	20	11	31

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	,606[a]	1	,436	,477	,343	
Continuity Correction[b]	,161	1	,688			
Likelihood Ratio	,606	1	,436	,477	,343	
Fisher's Exact Test				,477	,343	
Linear-by-Linear Association	,587[c]	1	,444	,477	,343	,219
N of Valid Cases	31					

a. 1 cells (25,0%) have expected count less than 5. The minimum expected count is 4,97.

b. Computed only for a 2x2 table

c. The standardized statistic is -,766.

A higher performance in terms of clients' expectations is associated to a unidirectional knowledge exchange with the rest of the organization.

Crosstab

			Perf3b		
			0	1	Total
I3b	0	Count	1	4	5
		Std. Residual	-1,2	1,5	
	1	Count	18	8	26
		Std. Residual	,5	-,7	
Total		Count	19	12	31

Chi-Square Tests

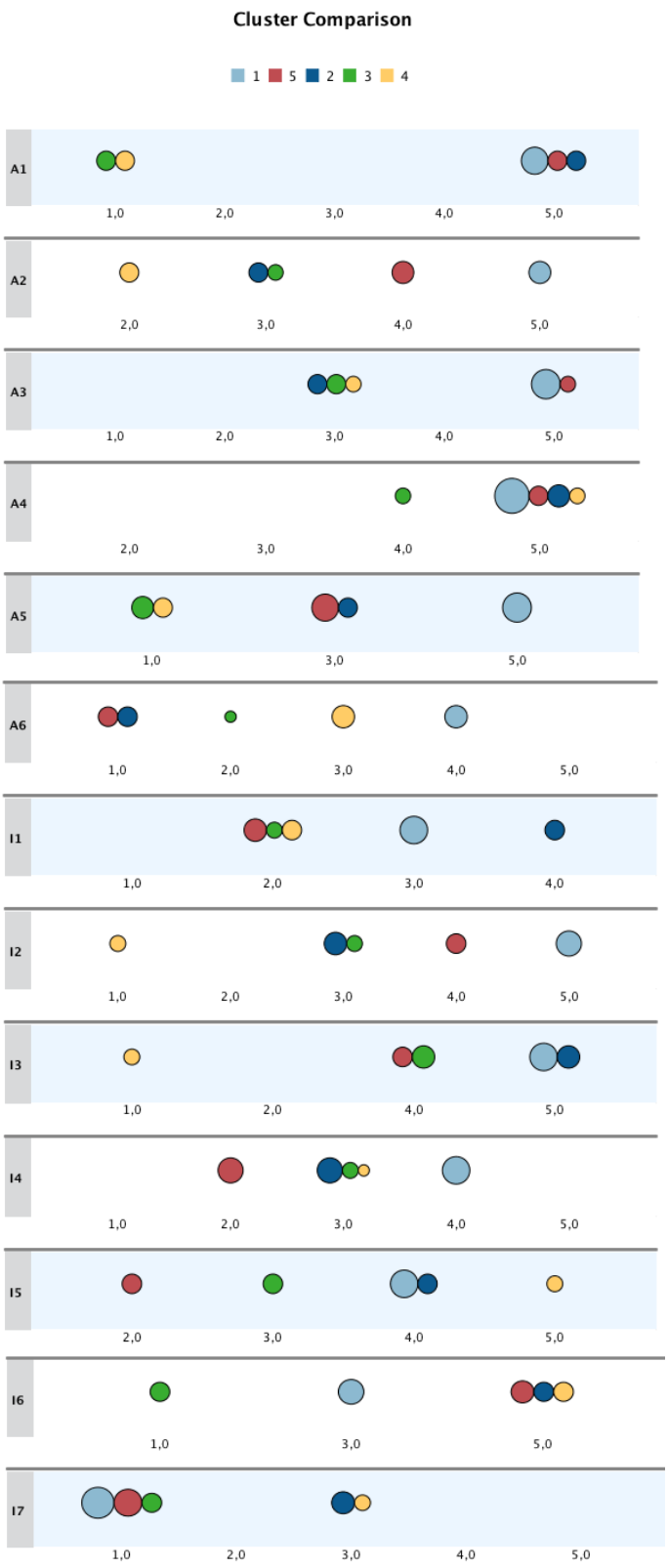
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	4,284[a]	1	,038	,060	,060	
Continuity Correction[b]	2,460	1	,117			
Likelihood Ratio	4,280	1	,039	,128	,060	
Fisher's Exact Test				,060	,060	
Linear-by-Linear Association	4,146[c]	1	,042	,060	,060	,055
N of Valid Cases	31					

a. 2 cells (50,0%) have expected count less than 5. The minimum expected count is 1,94.

b. Computed only for a 2x2 table

c. The standardized statistic is -2,036.

APPENDIX 9: CLUSTER COMPARISON VIEWER



APPENDIX 10: PROJECTS RANKED BY ADAPTATION AND INTEGRATION SCORES

Table 22: Projects ranked by adaptation scores

	Organization number	Project Number	Cluster Number	Overall Adaptation Score	A1	A2	A3	A4	A5	A6	Perf1 Performance to the established budget	Perf2 Perfromance to the established schedule	Perf3 Performance to the client's expectations	Perf4 Performance to the project team's expectations
High Adaptation Projects	**O4**	**P25**	**1**	**466**	5	5	5	5	3	5	3	3	3	3
	O1	**P5**	**1**	**446**	3	5	5	5	5	4	4	3	5	4
	O2	**P19**	**1**	**436**	5	4	4	5	5	4	4	3	3	4
	O2	**P13**	**1**	**430**	5	4	5	5	5	3	3	3	3	3
	O6	**P27**	**5**	**423**	5	4	4	4	3	5	4	2	4	3
	O2	**P17**	**5**	**420**	3	4	5	5	3	5	4	3	5	4
	O1	**P7**	**1**	**414**	5	5	5	5	3	3	2	3	4	4
	O9	**P30**	**1**	**414**	5	4	5	5	1	5	2	2	3	3
	O1	**P6**	**1**	**406**	2	5	5	5	5	3	3	3	3	3
	O1	**P3**	**1**	**394**	2	4	4	5	5	4	5	3	5	5
	O1	**P2**	**2**	**380**	5	5	5	5	1	3	5	3	5	5
	O2	**P15**	**1**	**366**	5	3	4	5	5	2	2	3	3	2
	O3	**P24**	**5**	**364**	3	4	4	3	3	4	3	3	4	2
	O1	**P9**	**1**	**364**	1	2	5	5	5	4	4	3	2	4
	O2	**P10**	**2**	**348**	4	5	5	5	3	1	3	1	3	3
	O10	**P31**	**5**	**342**	3	3	2	5	3	5	3	1	3	2
	O2	**P22**	**5**	**328**	4	2	5	5	5	1	3	1	2	2
	O7	**P28**	**3**	**315**	1	3	4	4	1	5	2	1	2	3
	O1	**P1**	**2**	**312**	5	3	3	5	3	2	4	3	3	3
	O2	**P16**	**2**	**302**	2	3	5	5	1	3	1	3	5	4
Low Adaptation Projects	**O1**	**P4**	**4**	**286**	5	2	3	5	1	3	3	3	3	3
	O2	**P12**	**3**	**276**	5	2	3	3	1	3	5	4	3	3
	O5	**P26**	**2**	**265**	5	4	3	4	1	1	3	3	3	3
	O2	**P18**	**5**	**254**	5	4	1	3	3	1	3	3	3	3
	O2	**P11**	**3**	**251**	1	2	3	4	1	4	3	3	4	4
	O2	**P14**	**4**	**245**	1	2	4	4	1	3	5	3	4	4
	O1	**P8**	**4**	**244**	1	2	2	5	3	3	5	4	4	3
	O2	**P20**	**4**	**243**	1	3	3	4	1	3	3	3	5	5
	O2	**P21**	**5**	**233**	5	2	2	2	3	1	3	3	3	2
	O8	**P29**	**2**	**215**	1	3	3	2	3	1	2	1	3	2
	O3	**P23**	**3**	**207**	1	3	3	2	1	2	1	1	2	2

Table 23: Projects ranked by integration scores

	Organization number	Project Number	Cluster Number	Overall Integration Score	I1	I2	I3	I4	I5	I6	I7	Perf1 Performance to the established budget	Perf2 Perfromance to the established schedule	Perf3 Performance to the client's expectations	Perf4 Performance to the project team's expectations
High Integration Projects	**O1**	**P5**	**1**	**394**	4	5	5	5	5	5	1	4	3	5	4
	O8	**P29**	**2**	**390**	3	3	4	5	3	5	4	2	1	3	2
	O2	**P20**	**4**	**379**	4	5	2	4	5	5	3	3	3	5	5
	O5	**P26**	**2**	**376**	3	5	5	3	4	5	3	3	3	3	3
	O1	**P1**	**2**	**369**	4	5	5	3	4	3	3	4	3	3	3
	O2	**P10**	**2**	**359**	4	3	4	3	3	5	3	3	1	3	3
	O2	**P19**	**1**	**349**	4	5	4	4	5	1	3	4	3	3	4
	O1	**P3**	**1**	**348**	4	3	5	4	3	5	1	5	3	5	5
	O9	**P30**	**1**	**340**	3	5	5	5	4	3	1	2	2	3	3
	O2	**P16**	**2**	**335**	3	3	5	3	3	1	5	1	3	5	4
	O1	**P6**	**1**	**328**	4	3	4	5	4	3	1	3	3	3	3
	O1	**P2**	**2**	**321**	4	3	5	3	4	1	3	5	3	5	5
	O1	**P4**	**4**	**320**	2	3	1	5	5	5	3	3	3	3	3
	O1	**P8**	**4**	**314**	2	1	4	3	4	3	5	5	4	4	3
	O6	**P27**	**5**	**313**	3	4	4	3	4	5	1	4	2	4	3
	O1	**P7**	**1**	**311**	3	5	4	4	4	3	1	2	3	4	4
	O2	**P15**	**1**	**311**	3	5	4	4	4	3	1	2	3	3	2
Low Integration Projects	**O2**	**P21**	**5**	**297**	1	4	4	2	2	3	5	3	3	3	2
	O1	**P9**	**1**	**291**	3	3	5	4	3	1	2	4	3	2	4
	O7	**P28**	**3**	**284**	3	3	4	5	5	1	1	2	1	2	3
	O4	**P25**	**1**	**282**	3	4	5	2	4	3	1	3	3	3	3
	O2	**P22**	**5**	**279**	2	4	5	2	2	5	1	3	1	2	2
	O2	**P14**	**4**	**277**	2	1	1	2	2	5	5	5	3	4	4
	O2	**P13**	**1**	**276**	3	3	5	4	4	1	1	3	3	3	3
	O2	**P18**	**5**	**264**	3	3	4	2	5	3	1	3	3	3	3
	O10	**P31**	**5**	**264**	2	2	5	2	3	5	1	3	1	3	2
	O2	**P11**	**3**	**217**	2	3	4	1	3	3	1	3	3	4	4
	O2	**P17**	**5**	**215**	2	1	2	2	3	5	1	4	3	5	4
	O3	**P23**	**3**	**211**	2	2	4	3	3	1	1	1	1	2	2
	O2	**P12**	**3**	**210**	1	2	4	3	3	1	2	5	4	3	3
	O3	**P24**	**5**	**197**	2	5	1	3	2	1	1	3	3	4	2