# Dimensions of knowledge governance in a multi-PMO project context

Maria Mercedes Martinez Sanz, Isabel Ortiz-Marcos

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## ABSTRACT:

**Purpose** – Knowledge is recognized to be a key asset to achieve the strategic objectives of an organization. To that end, it is necessary to count on governance mechanisms that ensure the alignment between the knowledge resources and processes and the business strategy. Given that knowledge management is often performed by PMOs, this paper explores if the dimensions for PMOs governance suggested in the literature are valid also for knowledge governance and what problems do exist.

**Design/methodology/approach** – This research has been done using case study methodology. A large complex project in the IT industry was deeply analyzed. This project brings together most of the elements that can be found in current organizational contexts (e.g. geographical dispersed project teams, multicultural environment, technical complexity, etc.), thus reinforcing the applicability of the results obtained.

**Findings** – The study findings indicate that knowledge flows between PMOs take place along the dimensions defined for PMO governance, thus confirming the suitability of those dimensions also for the governance of Knowledge. This research also validates the connection between the barriers to knowledge sharing and the knowledge governance mechanisms, and provides empirical evidence of the importance of informal knowledge governance to foster knowledge sharing behaviors. This is of key importance to overcome daily operational issues. The observations made are in fact valuable lessons learnt for future projects and a valuable input for further research.

**Originality/value** – This study explores the similarities between PMOs governance and knowledge governance in multi-PMO settings on the basis of a case study, thus contributing additional empirical data to the literature. Previous work with this approach has not been found.

**Keywords** – Knowledge management; multi-PMO; knowledge alignment; knowledge governance; knowledge sharing barriers.

**Paper type** – Research Paper

## 1 INTRODUCTION

Knowledge is one of the organization´s most important assets in strategic terms. It is what makes an organization different from its competitors. The ability of an organization to identify the critical knowledge and to transfer it internally is a key factor for any organization´s success. (Bolisani & Bratianu, 2017) (Bollinger & Smith, 2001) Despite of it, existing knowledge sharing practices are often not effective (Riege, 2005).

Knowledge management in organizations is often done by PMOs. Frequently, several PMOs with different sizes, responsibilities and levels of authority coexist in organizations, in particular in the large ones (Tsaturyan & Müller, 2015). Several studies demonstrate that PMOs do not operate in isolation but that there are interactions between them. This commonly causes tensions and misalignments that can influence the organizational performance (Aubry, 2012). This scenario is applicable to large projects as well. The implementation of governance

mechanisms is essential to guide the PMOs towards the objectives of the organization (Too, 2014) (Thiry, 2007).

The case study presented in this paper evaluates if the knowledge and communication flows in a large multi-PMO project in the IT industry can be explained in the light of the dimensions of an integrated approach to multi-PMO governance and which barriers do exist.

## 2 THEORETICAL FRAMEWORK / LITERATURE REVIEW

### 2.1 PMOs Governance

The concept of the PMO emerged in the 50s in the defense and aerospace industry (Whitty, 2016). Later on and in connection with the Y2K, there was an exponential growth of PMOs in the IT industry. Since then, many organizations have implemented multiple PMOs for a variety of purposes at different levels in their organizational structures (Desouza, 2006).

There is not a unique definition of what a PMO is. The PMBOK Guide 6th Edition defines the PMO as "a management structure that standardizes the project-related governance processes and facilitates the sharing of resources, methodologies, tools and techniques." (PMI, 2017).

PMOs vary in their size, structure and responsibility (Desouza, 2006) (Hobbs, 2008). According to their mandate and to the position they hold at the organization, PMOs can be classified into (Müller, 2013) (PMI, 2013) (Aziz, 2014) (Chris Kaufman, 2007):

- **Project** or **Program Management Office**, oriented to execution and focused on the successful delivery of projects. For large programs, it also may provide support for contracts or procurements, personnel and other resources, as well as legal issues.

- **Portfolio Management** or **Business Unit Office**, oriented to the delivery of business results. This type of PMO operates at a department level. It focusses on the construction of a portfolio to achieve the business goals of the organization and on the quality of the execution of the projects and programs. It does not have a specific start and end as does a program or a project management office.

- **Corporate Project Office,** oriented to support the execution of the organization´s business strategy or organizational changes. It functions at the portfolio level ensuring that projects and programs align to the organizational strategy and will deliver the expected benefits.

Many organizations also incorporate some specialized groups under the concept of PMO (PMI, 2013) (Dai, 2004):

- **Center of Excellence,** oriented to centralize and develop all the knowledge of the organization in a business area or in a technical area.

- **Project Support Office,** oriented to provide administrative or economic control services to a department, to a program or to the whole organization.

All these types of PMOs can coexist in an organization. In many cases, in particular in large organizations, there are multiple PMOs at various levels of the organizational hierarchy.

One of the reasons for that is the execution, all at once, of complex projects or programs that require a PMO of their own. Another reason is the creation of PMOs dedicated to serve the needs of each department or organizational unit. These situations may lead to inconsistencies across different projects, programs or departments (Aziz, 2014).

There is empirical evidence that PMOs do not operate in isolation but that there are interdependencies between them (Aubry, 2012). Modern organizations consider that PMOs play a key role in linking strategy, projects and structures (Whitty, 2016). Many times, there is not a clear and shared understanding of the objectives, responsibilities or level of authority of each PMO, and this often cause tensions between the PMOs at the same or at different organizational levels (Tsaturyan & Müller, 2015) (Pellegrinelli, 2009) (Aubry, 2009) (Hobbs, 2008). This calls for the need to implement governance mechanisms.

There is little academic research about governance of multi-PMO organizations. Tsaturyan et al. (Tsaturyan & Müller, 2015) suggest a four-dimensional framework for multi-PMO governance that combines the concept of integration as a governance mechanism, and the network governance perspective (Aubry, 2012). In the model proposed, PMOs stay unique and autonomous, but could be unified by formal and informal linkages so that they can work together as a unified whole. The framework establishes four critical dimensions for PMO governance: structural, procedural, regulative (values, goals) and relational. The structural and procedural dimensions would be the main constructs for establishing formal linkages, whereas the regulative and relational dimensions would serve informal integration by creating flow among the network of PMOs. Formal and informal networks among the PMOs are then the main constructs of integration for multi-PMO organizations governance.

This model is in line with the one proposed by Artto et al. (Artto, et al., 2011), who define the integration structure of an organization as vertical and horizontal. The vertical one, is based on centralization (coordination and decision-making) and standardization (plans, procedures and rules), whereas the horizontal integration is based on communication rather than on the formal authority. They include integration mechanisms such as information systems and social mechanisms, such as incentives.

For the purpose of this study, we assume that the dimensions to consider for multi-PMO governance include the dimensions mentioned above, being structural, procedural and information systems the ones that would guide vertical integration and regulative and relational the ones that would guide horizontal integration.

## 2.2 Knowledge Management in Project Management

Knowledge management is one of the main factors for future projects success as it aids organizational learning (Desouza, 2004).

The use of critical knowledge generated when Project Management processes are applied and the ability to use it in later stages or projects is a challenge for all organizations (Kasvi, 2003). We have spent many years working on projects, and delays and cost overruns are frequent (Kasvi, 2003) (Ahern T., 2014). These issues make us consider that we should keep knowledge of previous experiences regarding Project Management.

Project management knowledge has been collected in bodies of knowledge (e.g. Association of Project Management (APM), 2013; Project Management Institute (PMI, 2017); standards (e.g., International Organization for Standardization (ISO, 2018); competency standards (e.g. International Project Management Association (IPMA, 2006); methodologies (e.g. Office of Government Commerce (OGC), 2005; PMAJ, 2005) and maturity models (e.g. PMI, 2008;

Software Engineering Institute (SEI), 2006) but companies do not have systematic lessons learned processes (T. & Carayannis, 2008) (Swan, 2010) and/or they are rarely successfully employed (Carrillo, et al., 2013).

While the debate in the literature recognized the limitations of traditional project research, there is no consensus on how we can obtain knowledge about them (Drouin, 2013) (Söderlund, 2004). A process perspective can accommodate diverse views of projects, from traditional projects as tasks with little learning expected to projects as temporary organizations with some knowledge formation due to inherent knowledge uncertainty (Holste, 2010) (Ahern T., 2014).

Researchers have published experiences at different sectors. For Blaize Horner Reich, Andrew Gemino, Chris Sauer (2012 and 2014) investigate how IT-enabled business projects can be managed to contribute value to the customer organization taking into account a knowledge view of this issue. Findings show that project managers who achieve Knowledge Alignment among the people and the artefacts can have a significant positive impact on the achievement of business value from the project.

Others have analyzed approaches to learning within projects. They highlight that may be different to those of learning across projects and in the wider organization (Easterby-Smith, 2000). The guidance (Bosch-Sijtsema, 2014) currently available concentrates on how to conduct lessons learned in terms of capture rather than the problem of dissemination and implementation of lessons (Disterer, 2002) (Julian, 2008) (Schindler, 2003) (Loo, 2002). Some authors have awarded this function to the Project Management Office (PMO) (Desouza, 2006) but there are not many experiences of success.

Petra M. Bosch-Sijtsema (Bosch-Sijtsema, 2014), explores how sharing and generating practice-based and distributed knowledge occurs through interaction in interorganisational projects and how this is managed.

In terms of dimensions of knowledge, the classification into explicit and tacit is the most extended (Nonaka, 1994). Explicit knowledge can be easily codified and transferred in the form of written documents such as manuals, procedures or drawings. On the contrary, tacit knowledge is individualistic in nature and is partly composed of cognitive dimensions such as individual experiences, personal perspectives, mental models or beliefs (Polanyi, 2009) (Goffin, 2011) (Nonaka, 1994).

Polanyi (Polanyi, 2009) proposed two dimensions of tacit knowledge: technical and cognitive. The cognitive dimension includes beliefs, valued, ideals, vision, goal, schemata and mental models (Gore, 1999). In the technical dimension are considered aspects as informal personal expertise or know-how, problem-solving capability and knowing-in-action, among others (Easterby-Smith, 2011) (Nonaka, 1994).

Traditionally, focus of research was on explicit knowledge (Zhang, 2012); however, from a business perspective, it is the tacit knowledge the one that represents a competitive advantage for companies.

Relatively little is still known about the nature of barriers to tacit knowledge sharing (Olaniran, 2017). Previous research found that factors to be limiting tacit knowledge sharing in organizations include lack of trust among the workers and their unwillingness to share their experience (Lam, 2010).

Teece (Teece, 2000) and Holste and Fields (Holste, 2010) indicate that face-to-face interaction remains the best method of sharing tacit knowledge. Tacit knowledge can be shared

in formal and informal settings. In both cases individuals must be ready and have the capacity to share their know-how or understanding and to use the skills acquired (Foos, 2006).

Olaniran (Olaniran, 2017) highlights how difficult it is to share tacit knowledge and at the same time, how essential it is to gain value achieving greater success. Given the similarity of the Oil and Gas projects with the project examined in this research (project teams working across different locations, time zones, and cultural and organizational differences) the barriers to tacit knowledge sharing in Oil and Gas projects published by this author have been considered as reference to carry out the research here presented (see Table 1).

| Barriers to Tacit Knowledge Sharing | Nature |
|---|---|
| Lack of personal desire for knowledge among the GDPT members; personalization of team achievement; personal attributes; tendency to personalize knowledge for competitive advantage; tendency to preserve one's knowledge for economic advantage such as employment; concerns about the trustworthiness of the knowledge; concerns about the acceptance of the knowledge; lack of openness to sharing the knowledge among the team members; fear of individuals losing the knowledge ownership; and fear of losing credibility | Personal |
| Language problems across the GDPTs; time restraints due to different local time zones; competitiveness among individuals and across organizations, and national cultural differences | External |
| Poor informal collaboration across the GDPTs; disunity or conflicts across the GDPTs; team attributes; and lack of set-up process for sharing the knowledge | Team |
| Lack of mutual trust among the individuals and teams; unwillingness to use the available communication channels to share the knowledge; lack of shared vision; conflicting interests among the GDPTs and their members; reduced opportunity of interacting privately among the team members; concerns that knowledge shared in GDPTs may be critically scrutinized across the teams; lack of trusted communication methodology among the GDPT members; lack of trusting awareness of the knowledge possessed by the GDPT members; and short duration of interactions among GDPTs and their members | Personal, Team |
| Organizational obligations; and lack of organizational support for the knowledge sharing | Organizational |
| Lack of general sense of security | Personal, Team, and Organizational |

*Table 1 – The barriers to tacit knowledge sharing in the GDPTs and their nature. Source: Olaniran O. J., 2017*

## 2.3 Knowledge governance and PMOs

Knowledge management is recognized as one of the primary functions of the PMOs. Leveraging knowledge in the form of best practices and lessons learned, and serving as a central repository of information are the most common tasks associated to PMOs as for knowledge management is concerned. The integrative role of PMOs serve, among others, as the context for achieving knowledge goals for the organization (Pemsel, 2014).

Knowledge management takes place at all organizational levels: strategic, tactical and operational. At the strategic level, focus could be on the improvement of policies and practices; at the tactical level, focus could be on monitoring the application of standards and methodologies; at the operational level, emphasis might be on using existing knowledge to solve technical problems and on acquiring new knowledge to refine procedures and on expanding the organizational know-how.

Whatever the roles of each PMO are in connection to knowledge management, it seems clear that there is a need to coordinate the knowledge processes and outcomes at each level

and throughout the whole organization, since there is empirical evidence that knowledge management affects business value through knowledge alignment (Costa, 2018). Knowledge sharing is essential to achieve alignment and a common understanding because "*congruence of knowledge cannot readily be achieved without sharing"* (Reich, 2014). For Yong Cao, knowledge governance influences knowledge sharing by defining, formally and informally, how the organization manages the activities related to knowledge. Formal knowledge governance includes organization structure, reward systems and leadership, whereas informal knowledge governance relates to networks, company culture, management style, organization fairness and managerial support. He states that formal knowledge governance has a direct impact on informal knowledge governance (Yong Cao, 2012). Knowledge Governance is an evolving concept that has been defined as "choosing the organizational structures and mechanisms that can influence the processes of using, sharing, integrating and creating knowledge in preferred directions and towards preferred levels" (Foss, 2010). S. Pemsel et al. extended this definition to include the enabling formal and informal mechanisms that "will allow knowledge management to happen and to control its achievements" (Pemsel, 2014). It specifically refers to the individuals´ willingness and ability to accept and adopt those mechanisms and so engage in desired knowledge processes.

To the best of our knowledge, the similarities between the governance of multi-PMOs organizations and knowledge governance have not been explored yet. This article investigates, through a case study, if knowledge alignment and governance can be explained in the light of the dimensions of multi-PMO governance. Specifically, it examines the mode/type of interactions in the target project to reveal the vertical and horizontal knowledge flows and then evaluates if those flows happen along the dimensions suggested for governance in a multi-PMO setting: structural, procedural, Information systems, regulative and relational.

## 3 RESEARCH METHODOLOGY

### 3.1 Case study

In 2016, a Spanish multinational was awarded a contract to provide IT services to a company of a large multinational Group. This company (called the "Client" further on) specializes in the continuous design and operation of IT infrastructures for the whole Group. It employs 5.500 professionals across nine countries and makes use of global providers and partners for supplementary capabilities.

In order to reduce costs, the Client decided to concentrate all the services of one of its operational areas on one unique provider (called the "Provider" further on). The new provider would serve the companies of the Client in four countries (two in Europe and two in USA and Mexico) and would operate from a software factory in LATAM. To solve urgent or particular issues, it would also provide local services in each of the four countries through small and highly specialized teams located at the Client premises in each country.

Therefore, the new operational model on which the study was run includes three major groups of stakeholders:

- **Client team.** Based at the Group headquarters in Spain, it is accountable of the relations with the "business side" of the Group. It sets the priorities and controls that the provider performs according to the expected quality level. During the first phase of the contract, it was also responsible to transfer the functional knowledge of the software applications to the provider team. Internally, the Client team is led by a PMO (Software Services Office) in charge of coordinating several operational units that are specialized in each of

the business areas. The PMO reports to a Corporate Services Manager of the Client. An expert leads each operational unit and all of them report to a PMO (Software Services Office).

- **Provider team.** It is structured into two main groups at different settings:

    - **Local teams.** Located at the Group central premises of the Client in Spain. These teams work closely with the Client teams. Internally, they are organized into specialized business units led by an expert in the business area and coordinated by a PMO (Service Management Office). They are focused on those tasks that require interaction with the end users (i.e. specifications, design, incidents management,…). They work closely with the Factory team as well. The local teams of the Provider act as the link with the Client team in setting priorities, or solving problems. The Service Management Office coordinates the local workload and determines which tasks are sent to the factory. Internally, the local team reports to a Business Operations Manager and to a Delivery Manager.

    - **Factory teams.** They are located at one of the Providers´ premises in LATAM. They are not formally organized into specialized business units although people tend to serve in the same unit to take advantage of the knowledge acquired. They are the core of the service and are responsible of the operational tasks. There is a Production Office in charge of coordinating the workload internally. The Factory team reports to a Business Operations Manager in LATAM and to a Production Manager.

Organization and main Interactions between the major stakeholders are shown in Figure 1. For clarity purposes, this figure doesn´t include stakeholders at other management levels of both organizations.

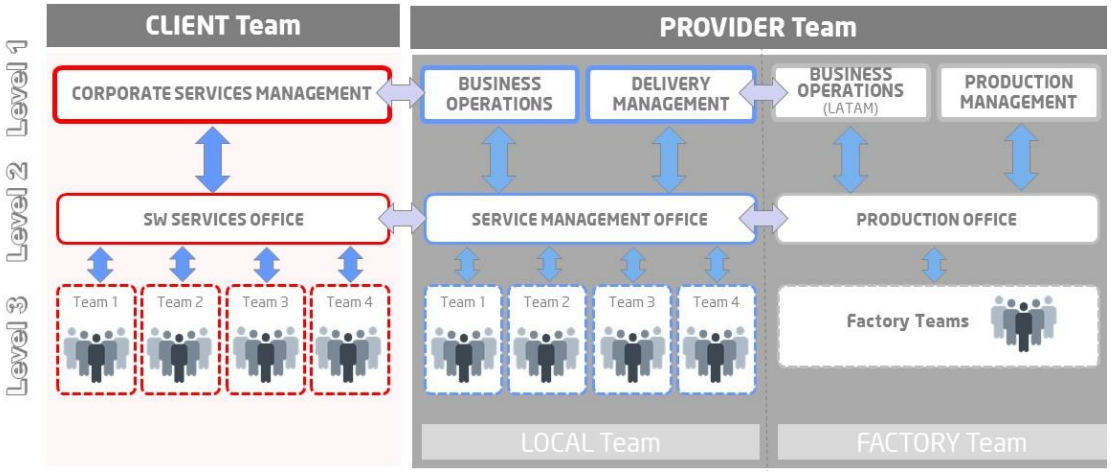


*Figure 1 - Organization and main stakeholders interactions*

## 3.2 Data collection.

Three techniques were employed for data collection in the field: document review, observation, and semi-structured interviews.

- **Document review**. Document review included the performance reports (around 28 corresponding to the Steering Committees held every two weeks and 62 corresponding to weekly Management Meetings), meetings minutes (most of them coming from Technical daily meetings), activity list, issue log, and mails in specific cases. The review of these documents provided important background information about the context for the transfer of knowledge and helped to identify problems related to it.

- **Observation.** The researcher had the opportunity to attend meetings and phone calls, to observe situations that were described in the interviews, and to observe other events that are meaningful from a knowledge management perspective. This has allowed to obtain a holistic understanding of the problems under study, has helped to categorize the problems found, and has definitely reinforced the validity of the results obtained through the interviews. The list of knowledge sharing barriers suggested by Riege (Riege, 2005) were used as the basis for observations.

- **Semi-structured interviews.** The data were collected through in-depth interviews, following a semi-structured approach. This research technique is an interview protocol where the researcher uses a set of questions previously defined. It ensures that the same information is elicited from respondents, making interviews more systematic and comprehensive. Any gaps in the data collected are easier to identify as well. The use of a predefined set of questions does not mean that unplanned questions may be asked during the interviews or that the researcher pursues some questions at a greater length. In this case study, interviews were one-on-one and included two parts: the first one was aimed at the identification of the profiles with which the interviewee normally worked, and in the second one, each of the relationships were analyzed to identify the barriers to the transfer of tacit knowledge. The interviews were held in a relaxed environment, with the researcher acting as a facilitator. Each one lasted one hour approximately.

Eighteen people were interviewed altogether: ten from the Local team and eight from the Factory team, representing all the stakeholders involved in providing the service to the Client. All of them had a technical background in computer science. Some member of the Local team were working for the Client with previous providers before and knew the business in depth. Table 2 shows the profiles of the interviewees.

Each interview was documented during the session in the wording of the respondents to ensure that the answers were accurately collected.

| Interviewees | Years of Experience | Role | Organizational Unit |
|---|---|---|---|
| Interviewee 1 | 6-10 years | SMO | LOCAL Team |
| Interviewee 2 | More than 15 years | Team Lead | LOCAL Team |
| Interviewee 3 | More than 15 years | Team Lead | LOCAL Team |
| Interviewee 4 | 11-15 years | Team Lead | LOCAL Team |
| Interviewee 5 | 11-15 years | Analyst | LOCAL Team |
| Interviewee 6 | 6-10 years | Analyst | LOCAL Team |
| Interviewee 7 | 6-10 years | Programmer | LOCAL Team |
| Interviewee 8 | 6-10 years | Programmer | LOCAL Team |
| Interviewee 9 | 5 years or less | Programmer | LOCAL Team |
| Interviewee 10 | 5 years or less | Programmer | LOCAL Team |
| Interviewee 11 | More than 15 years | PO | FACTORY Team |
| Interviewee 12 | 6-10 years | Analyst | FACTORY Team |
| Interviewee 13 | 11-15 years | Analyst | FACTORY Team |
| Interviewee 14 | 5 years or less | Programmer | FACTORY Team |
| Interviewee 15 | 5 years or less | Programmer | FACTORY Team |
| Interviewee 16 | 5 years or less | Programmer | FACTORY Team |
| Interviewee 17 | 5 years or less | Programmer | FACTORY Team |
| Interviewee 18 | 5 years or less | Programmer | FACTORY Team |

*Table 2 – Profiles of the participants*

### 3.3 Data analysis

First, all the eighteen interaction maps (one per participant) were combined into one single map. Second, all the transcripts were classified according to the matrix in Figure 2, adapted from (Sun, 2003).

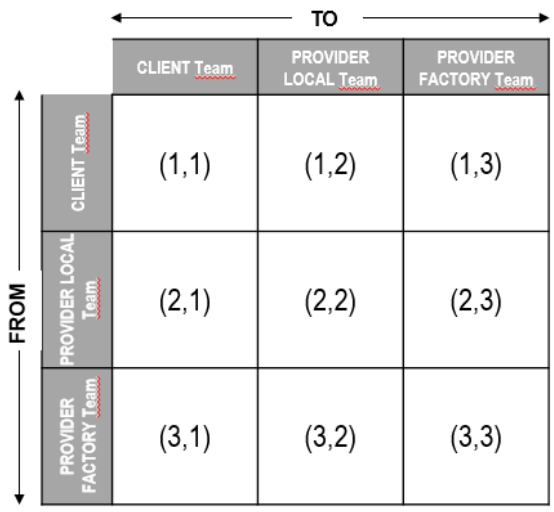


*Figure 2 –Paths of knowledge transfer*

Next, each response was analyzed and categorized using the classification by Olaniran (Olaniran, 2017) with slight modifications. This classification establishes four main types of barriers:

- **Personal**. These restrictions result from the characteristics and personality of each individual and from the perception of how his knowledge is perceived by others and the use that they are going to make of the knowledge they contribute.

- **Team**. The team-related barriers are related to its inherent characteristics such as its environment and structure (Holste, 2010), team culture referred to the ways of doing things and the general climate that make teams interact and collaborate between them.

- **Organizational**. Organizational barriers come from differences in organizational cultures, organizational goals and polices.

- **External**. This type includes barriers such as language, national culture, competitiveness or other market conditions. These obstacles are beyond the control of individuals and organizations.

Table 3 lists the full list of barriers to tacit knowledge sharing and their nature used in this research. The barriers that in the original list (Table 1) were classified into more than one nature were re-classified into the one that better applied in this case study. Three barriers were added as a result of the analysis: “Poor individual concentration due to frequent multitasking in GDPTs”; “Lack of time due to workload and pressure”; and “Low commitment with the project”.

| Barriers to Tacit Knowledge Sharing | Nature |
|---|---|
| Lack of personal desire for knowledge among the GDPT members; | Personal |
| Personalization of team achievement; | Personal |
| Personal attributes; | Personal |
| Tendency to personalize knowledge for competitive advantage; | Personal |
| Tendency to preserve one's knowledge for economic advantage such as employment; | Personal |
| Concerns about the trustworthiness of the knowledge; | Personal |
| Concerns about the acceptance of the knowledge; | Personal |
| Lack of openness to sharing the knowledge among the team members; | Personal |
| Fear of individuals losing the knowledge ownership; | Personal |
| Fear of losing credibility | Personal |
| Lack of mutual trust among the individuals and teams; | Personal |
| Conflicting interests among the GDPTs and their members; | Personal |
| Concerns that knowledge shared in GDPTs may be critically scrutinized across the teams; | Personal |
| Lack of trusting awareness of the knowledge possessed by the GDPT members; | Personal |
| Lack of general sense of security | Personal |
| Low committment with the project; | Personal |
| Poor informal collaboration across the GDPTs; | Team |
| Disunity or conflicts across the GDPTs; | Team |
| Team attributes; | Team |
| Lack of set-up process for sharing the knowledge | Team |
| Lack of shared vision; | Team |
| Reduced opportunity of interacting privately among the team members; | Team |
| Lack of trusted communication methodology among the GDPT members; | Team |
| Short duration of interactions among GDPTs and their members | Team |
| Unwillingness to use the available communication channels to share the knowledge; | Organizational |
| Organizational obligations; | Organizational |
| Lack of organizational support for the knowledge sharing | Organizational |
| Poor individual concentration due to frequent multitasking in GDPTs | Organizational |
| Lack of time due to workload and pressure; | Organizational |
| Language problems across the GDPTs; | External |
| Time restraints due to different local time zones; | External |
| Competitiveness among individuals and across organizations, | External |
| National cultural differences | External |

*Table 3 – The barriers to tacit knowledge sharing and their nature.*
*Source: Adapted from Olaniran O. J., 2017*

A content-analysis approach was used to identify the barriers in the answers collected in the interviews. The knowledge acquired through observation and document review was key to grasp the very nature of the barriers and to make the classification. It was ensured the plausibility of the categorization by independently verifying the conceptual sense of the results.

Finally, dynamic tables were built in Excel to summarize the results and to help to obtain conclusions.

## 4 RESULTS AND DISCUSSION

- In this section, it is not clear how and where documents and observations were used to support the analysis. Please, make explicit how did you triangulate the data sources.

Although during the interviews all the possible knowledge flows were captured, flows (1,1), (1,2) and (1,3) were not considered in the analysis. Flow (1,1) is internal to the client,

and flow (1,3) should be an exception because the Client team didn't contact the Factory team directly. The barrier identified in flow (1,2) was related to organizational obligations, and since it applied in both ways, it was included in flow (2,1).

Figure 3 shows the number of barriers identified in each knowledge transfer path. There are three paths that concentrate the 80% of the problems identified: (2,3), (3,1) and (3,2).All these paths involve teams geographically dispersed, path (2,3) seems to be the most problematic. Paths (2,2) and (3,3), that represent collocated teams, are the least problematic. It is interesting to note that although paths (2,3) and (3,2) involve the same teams, the results (74 vs 16) show that problems probably are not perceived the same on each side.

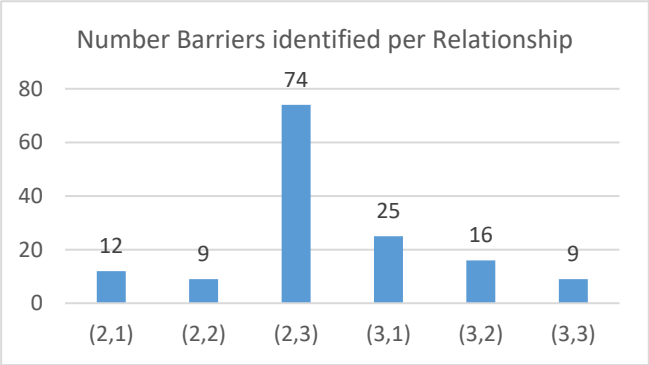


*Figure 3 –Nr. Barriers vs Paths of knowledge transfer*

Attending to the nature of the barriers, Figure 4 shows the global results in % for each category and for each individual path.


*Figure 4 - % Barriers by Nature (Global and in each KT Path)*

At a global level, the sources of the problems seem to concentrate on Personal and Team issues, whereas External and Organizational barriers are not so relevant. When the global % are analyzed in each path separately, this global finding varies. Paths (2,3), (3,1) and (3,2) follow a similar pattern than the global one (Fig 4C, Fig 4D, Fig 4E): Personal and team barriers are the most relevant. These barriers are also the most relevant for path (2,1), although in this case and in (2,2) there are no External ones (Fig 4A, Fig 4B). Team barriers are the most important in flows (2,2) and (3,3), and the % is higher in (2,2) (Fig 4B, Fig 4F).

Figure 5 displays all the barriers according to the number of answers collected. The 80/20 Rule (Pareto Principle) was used to identify those that should be the focus of an action plan. Half of the barriers included on the list seem to have little or no impact at all in this case study.

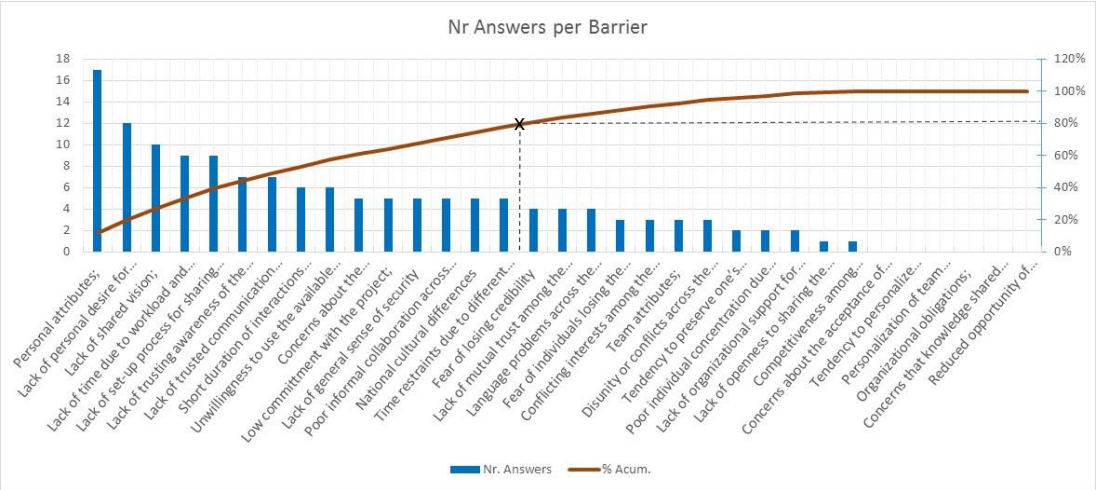


*Figure 5 – Priorization of barriers according to the 80/20 Rule*

Table 4 lists these "focus barriers" ordered by their importance and nature.

IMPORTANCE

| Main Barriers to Tacit Knowledge Sharing |
|---|
| **Personal:**<br>• Personal attributes;<br>• Lack of personal desire for knowledge among the GDPT members;<br>• Lack of trusting awareness of the knowledge possessed by the GDPT members;<br>• Concerns about the trustworthiness of the knowledge;<br>• Lack of general sense of security<br>• Low committment with the project; |
| **Team:**<br>• Lack of shared vision;<br>• Lack of set-up process for sharing the knowledge<br>• Lack of trusted communication methodology among the GDPT members;<br>• Short duration of interactions among GDPTs and their members<br>• Poor informal collaboration across the GDPTs; |
| **Organizational:**<br>• Lack of time due to workload and pressure;<br>• Unwillingness to use the available communication channels to share the knowledge; |
| **External:**<br>• Time restraints due to different local time zones;<br>• National cultural differences |

*Table 4 – Main Barriers to Tacit KS found in this Case Study*

### Personal barriers

At the individual level, results show that personal attributes related to the communication skills are the most important barrier. In particular, this affects flow (2,3) where people find it difficult to summarize the functional knowledge of the software applications acquired over time and to focus on the knowledge the factory team needs to solve specific problems. Local teams have a deep functional knowledge of the software applications they work with and assume certain business rules as obvious and known. They developed "ways of doing" of which they are not aware of and, consequently, they are not capable to transfer that know-how. This finding is coherent with the observations related to the application of the processes defined for the whole project: people tended to follow their "old ways of doing", in particular, when pressure to get something done was high.

The level of experience is the main personal barrier in flows (3,1) and (3,2). The factory team is technically qualified but lacks the business knowledge behind the software. This makes them appear unexperienced when they have to ask some functional questions or participate in a meeting or a call. Communication skills also affect flow (3,2) in that people from the factory team "are not able to explain what they don´t understand" (Interviewee 3). This is consistent with the customer complaints registered in the management meetings minutes and related to factory team assignments to the project.

Local team complaints that the factory team "tend not to ask" (Interviewee 5). At training sessions or when reading the documentation, they ask very few questions. People at the factory seem not to dig enough into the concepts but they "remain at the surface" (Interviewee 5). Factory team assumes that "they will be supported by the Local team all the time and, they are not interested to investigate or to acquire any knowledge beyond the task at hand" (Interviewee 5). Requests to repeat some training sessions and the results from exams performed after training included in some reports corroborate this fact. This is perceived as a lack of interest for knowledge and it has a high impact on flow (2,3).

The lack of trust on the knowledge possessed affects flows (1,2), (2,1) and (2,3). In some units, the local team often revises the work done by the factory team. Given that it implies a work overload for them, they prefer to do the work themselves: "given that I will need to revise the work, I prefer to do it myself from the beginning" (Interviewee 8). Observation revealed that some local team members regularly worked outside their working hours to finalize their work, which corroborates this answer. A similar situation was registered in flow (2,1) between the local team and the factory team. The reason in that case was that the person involved was new to the project.

Concerns about the trustworthiness of the knowledge was captured in flow (2,1) and was related to the data provided for the follow-up meetings and to issues regarding the information update in the IT tools.

The implementation of the new operational model was a big change for everybody but especially for the local team. The personnel reductions and relocations had a high impact on the perception of job security by the local team and, they tried to hoard their know-how as a way to maintain their jobs. Observations on the workload distribution at the local team, in particular at the beginning of the project, seem to support this. The factory team also perceived a lack of trust due to frequent rotations of personnel between different units, especially during the first months of the project, as reported in the follow-up meetings.

Low commitment with the project was another barrier in flow (2,3). The local team complained that the factory team didn´t assume their responsibilities when things were

wrong. They even noted that “it is as if doing things wrong is the normal case; someone will correct it” (Interviewee 6).

### Team barriers

Lack of a shared vision is the most relevant barrier perceived at the team level and it impacts all flows, but especially flows (2-3) and (3-2). The local team complaints that “the factory team doesn´t understand what they do and why; they just execute orders” (Interviewee 2) and also that “It is as if they had their own objectives” (Interviewee 6). When the factory team was asked about their role in the project, all the answers collected referred to providing a quality service to the local team. There was a clear mismatch between the objectives of the local team and the objectives of the factory team, since the local team was working for the client and the factory team was working for the local team and not for the actual client. No clear reference to misalignments was found at the meeting reports, which reflects also misalignments between the operational and the managerial levels.

The lack of a process for sharing knowledge mainly affects flow (2-2) and has to do with the roles and responsibilities formally defined and the roles and responsibilities that were actually played. In fact, this issue affected not only the knowledge sharing process but also all the processes defined in the project at the operational level. People working for the client prior to the start of the project had some “inertia” to apply the “old ways of doing” (Interviewee 1). As a result, the project operational processes were not always homogenous across all the units, as found in the reports coming from the units before consolidation in one single follow-up report. This situation caused a great confusion in the new people joining the project, who were not always sure whom they should ask a question or address a problem. It had also an impact on the transfer of tacit knowledge because part of it flew in ways not foreseen like at ad-hoc meetings or at coffee conversations. The pace of the flows of information was another concern. It had an impact on the trustworthiness of the knowledge possessed. It is worth to mention that no misalignment happened at managerial levels in terms of processes, probably due to the use of common IT systems.

The rotation of people across different operational units at the factory team, distance and time restraints due to different local time zones were added difficulties at all interaction levels. Although the local and the factory teams had daily calls, most interviewees considered that the interaction opportunities with people overseas were not adequate to transfer some types of knowledge.

In general, people perceived they worked more in a transactional mode than as a team: “factory teams are more collaborative between them than with us” (Interviewee 8); “each one lives in its own bubble” (Interviewee 9). This denotes a poor collaboration across the project teams. The differences in the number of issues reported by those working teams located at a single site and the number of issues reported by teams geographically dispersed seem to support this finding. All the teams referred to the training sessions held face to face on-site as being most productive.

### Organizational barriers

Lack of time due to a high working pressure was the main organizational barrier at all levels, but especially for the local team (2,2). Tight schedules and the pressure to deliver on time didn´t allow them any additional time to transfer knowledge. Local teams did the work themselves as a solution. Data and information requests for the follow-up reports put additional pressure on teams.

Unwillingness to use available communications channels to share the knowledge were referred not to the skills of people to use the tools provided, but to the suitability of the tools to support the transfer of knowledge that was required in the project: “it is very difficult to explain the functionality of a system if you cannot share the screens” (Interviewee 11). This fact was reported in several follow-up documents and meeting minutes.

### External barriers

External barriers had the least impact on knowledge sharing. In fact, they are embedded in other barriers explained above.

As already mentioned, time restraints due to different local time zones had an impact on communication between the local teams and the factory teams. A meeting agreement to configure factory teams to cover an extended timetable supports this finding.

In this case study, the cultural differences refer to those personal behaviors that are observed in most individuals. Specifically, we refer to the continuous need for instructions of the factory team and to that they do not ask questions when they do not understand something. This barrier affects flow (2,3).

## 5 SUMMARY AND CONCLUSIONS

This study investigates the knowledge alignment and governance in the light of the dimensions of multi-PMO governance. A case study was conducted on a large project at a Spanish multinational in the IT industry to analyze vertical and horizontal knowledge flows between PMOs and operational teams geographically dispersed.

This project brings together most of the elements that can be found in current organizational contexts (e.g. geographical dispersed project teams, multicultural environment, technical complexity, etc.). Knowledge flows were identified by analyzing the barriers to knowledge sharing. It was used the classification of barriers suggested by Olaniran (Olaniran, 2017) for Oil&Gas projects.

The study findings confirm that the dimensions identified by (Tsaturyan & Müller, 2015) as critical for PMOs governance in multi-PMO organizations - structural, procedural, regulative (values, goals) and relational - are also valid to modelling knowledge governance in this kind of settings (Figure 6).

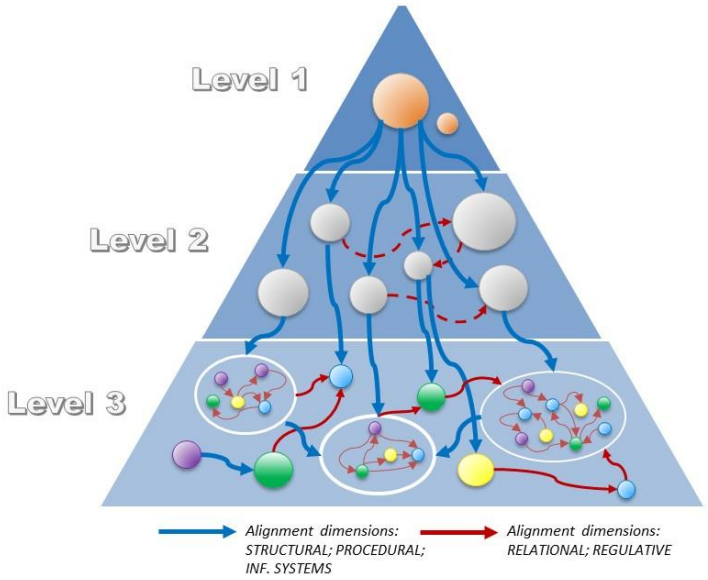


*Figure 6 – Dimensions for Knowledge Governance*

- From a **structural dimension**, the use of corporate information systems seems to ensure the vertical flow of information for project control from PMOs to the management level. Corporate IT systems had a positive influence in vertical alignment in terms of the data and information shared and reported, being an integrative element. Cross flows were also formal at these levels, through periodic Steering Committees. Double reporting had an influence on priorities setting and might have an influence on the misalignment of the objectives of organizational units working at different locations.

- The **procedural dimension** needs to be considered not only on the vertical but also on the horizontal direction. Personal variables can influence the adoption of new or revised procedures. The case study shows that previous experience and existing knowledge influenced negatively the adoption of the operational processes specifically defined for the project, in particular, by those people who were working for the client before the project started. This was observed both, at the local team and at the factory team located in LATAM. The case study also shows that slight differences in the client´s processes and practices followed by teams at various settings also influenced the adoption of the project operational processes and caused confusion and misalignment in the interactions between them rotations and changes in personnel assignments between teams didn´t help in the processes homogenization effort. This finding aligns with the results by N. Drouin about the influence of cultural differences on vertical leadership (Drouin, 2018). Work overload and time pressure should be considered as negative factors as well.

- The **relational dimension** is predominant in horizontal flows, and is key to overcome the issues that arise in other dimensions. In the case study, the relational and personal aspects showed to influence the knowledge flows between the teams at the operational level and helped to overcome the problems at the procedural dimension. Communication skills were very important in the transfer of the know-how, but it was trust in different ways what really influenced the knowledge flows in the horizontal and in the vertical directions. Periodic face-to-face interactions showed to be the most efficient way to set the basis for communication and knowledge transfer between teams working remotely. These results support the importance of the informal and flexible

relational norms for project governance (Müller, 2015), also reinforce the need of a balanced leadership for project success (Drouin, 2018), and the convenience to strengthen informal knowledge governance to foster knowledge sharing behaviors (Yong Cao, 2012).

- From a **regulative dimension**, the case study seems to show that national cultures have an influence in communication - even when it comes to teams in the same organization and with a similar culture -, and is especially important in horizontal flows. Other factors such as distance or time restraints due to different local time zones have an additional impact on the way people interact, affecting more the horizontal flows than the vertical ones.

Theoretical implications drawn from this study contribute to knowledge governance research by validating the applicability of the four-dimensional approach to PMO governance in multi-PMO environments (Tsaturyan & Müller, 2015) to the governance of knowledge in complex project configurations. Further, this research seems to indicate that the barriers to tacit knowledge sharing rather depend on the characteristics of the project or organizational setting than on the industry itself. The classification of barriers to tacit knowledge sharing into Personal, Team, Organization and External in the Oil&Gas industry is also consistent for GDPTs in the IT industry. Finally, the use of knowledge sharing barriers to identify knowledge flows has proved to be useful since people seem to be more aware of who they relate with when issues appear.

Implications for managers relate to the importance of horizontal leadership and the relational dimension at the operational level. Knowledge flows between operational teams are essential for project performance and success. The existence of formal processes and procedures is not enough to ensure knowledge flows in the horizontal dimension. The first step is to build relationships and setting good relational norms. Managers play a key role in the creation of a trustful environment where teams feel confident to share what they know.

This research has a number of limitations. First, it is limited to one single organization in one industry (IT) and in one country (Spain) and, therefore, the results cannot be generalized. Second, much of the evidences were collected using interviews and the perceptions and interpretations of reality given by the respondents may be influenced by the unstable and changing context of the project. On the positive side, this research provides field data and a deep insight into the specifics of an organization, which would not be possible by using other methods.

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