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An investigation of the role of communication in IT projects

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Abstract

Purpose – The purpose of this paper is to explore communication management in information technology (IT) projects and to identify barriers to communication, from both individual and organisational standpoints, and from distinctive stakeholders' points of view (project management office (PMO), project manager, IT and business personnel).

Design/methodology/approach – A case-based research in a large IT service provider was conducted, mixing qualitative and quantitative data. A literature review shed light on different epistemological fields, and different aspects of communication in IT projects were analysed and different perspectives were brought together in a communication integrated framework (CIF). Several data collection methods were combined. Structured and unstructured interviews of 78 participants (PMO, IT and business personnel), PMO archival data, and survey-based research were performed in order to achieve triangulation.

Findings – The contribution of the CIF to project communication management theory can be summarized as follows. First, the framework considers different perspectives, from the individual to the organisational, which affect communication during IT projects in the form of an integrated system approach. Second, the contingency perspective of different stakeholders are explored, particularly as regards the PMO, IT and business personnel. The case revealed an inconsistency: on the one hand, the importance of communication is exalted by all the analysed stakeholders, and on the other hand, the communication processes and practices proposed by the PMO and formalised in the company's project management (PM) methodology are neither followed nor prioritised by project managers.

Research limitations/implications – This study was dependent on self-reported perceptions. It embraced IT projects, and new studies should be done for other types of projects. The focus is within a specific organisation and its characteristics conditioned the findings.

Practical implications – CIF allows improving the assessment of the communication area in projects. An important managerial implication of this study is that the adoption of a standardised PM framework is not sufficient for the elimination of barriers to communication. The study suggests that firms should consider manners of developing the communication management process, as well as increasing the efficient use of performance report and communication tools to reduce detrimental conflict.

Originality/value – The paper proposes a framework. CIF allows to considering different perspectives, from the individual to the organisational level that affect communication in IT projects.

Keywords Project management, Information management, Case study

Paper type Case study

1. Introduction

Communication has occupied an outstanding position in the literature on project management (PM). Several authors argue that the communication area is strongly associated with the success or failure of information technology (IT) projects.

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However, are organisations prepared to adequately manage their communicative activities in IT projects? Organisations are apparently not prepared to do so because many publications discuss the gap between the literature and current practices, as well as critical communication barriers that should be overcome (Gillard, 2005; McChesneya and Gallagher, 2004; DeBrabander and Edstrom, 1977).

Project communication has been of interest to a number of scholars and practitioners and the bodies of knowledge (BoKs) establish guidelines for communication in projects. The use of BoKs, such as those presented in the project management body of knowledge (PMBok) (PMI, 2008) or in the capability maturity model (CMM/CMMI) (Humphrey, 1989), has increased in IT projects. In each of these widely used PM frameworks, special attention focuses on communication as a key area in the project context. However, some studies suggest that communication in projects has been managed in an informal manner (McChesneya and Gallagher, 2004).

In the organisational environment, barriers to communication are easily detected and difficult to overcome (Kurland and Pelled, 2000). The complex nature of communication arises from many factors, such as semantics, power politics, and organisational and technological issues (Effy and Sosik, 2000; Gillard, 2005; McChesneya and Gallagher, 2004; DeBrabander and Edstrom, 1977). This leads to one of the key aspects of communication in projects, the distinctive perspectives of stakeholders, considering several issues such as objectives and priorities (Atkinson, 1999; Barclay and Osei-Bryson, 2010; PMI, 2012), semantics (DeBrabander and Edstrom, 1977; DeBrabander and Thiers, 1984) and power asymmetries (Kirsch *et al.*, 2002), which can be a source of conflict but also contribute to the richness of project ecology (Grabher, 2004). From the organisational perspective standpoint, the project management office (PMO) should coordinate communication management (PMI, 2008), help to deal with stakeholders, and align decision-making.

In this context, different epistemological fields and aspects influence communication in IT projects, but there is a lack of integration among different research streams.

The purpose of this paper is to explore communication management in IT projects and to identify barriers to communication, from both individual and organisational standpoints, and from distinctive stakeholders' points of view (PMO, project manager, IT and business personnel). To address the lack of integration among streams in the literature, a conceptual framework was developed based on the literature review. To operationalise the key variables, a protocol based on the framework was developed and a case-based research was conducted, mixing qualitative and quantitative data due to the different degrees of maturity of the streams involved, which combine exploratory and confirmatory characteristics.

The article is organised as follows. The next section presents a summary of the theoretical discussion on communication in projects. Then, the methodological approach used in the study is presented in Section 3. Section 4 presents and analyses the results. Finally, Section 5 develops the conclusions and identifies the study's limitations.

2. Literature review

The theoretical basis for the study considered different epistemological fields and aspects of communication in IT projects, as mentioned in the introductory section. Despite the vast literature available, there is a lack of integration among research streams,

which are disconnected from one another. In the first stream, the BoKs establish key communication processes, techniques and tools. The second stream stresses the media richness and technological issues that impact information distribution and sharing. Both first and second streams explore the organisational perspective and the infrastructure that enables project communication, and are discussed in Section 2.1. A third stream explores the barriers to communication and the soft skills, seeking to understand not only the sources of conflict but also the synergies that arise. This third stream highlights the individual perspective and is discussed in Section 2.2. Finally, the communication integrated framework (CIF) in Section 2.3, in which the main constructs under study are explained graphically and in narrative form.

2.1 Organisational communication management

Empirical studies of project success have illustrated the relationships between communication and IT projects' success or failure (Johannessen and Olsen, 2011; Bartis and Mitev, 2008; Gillard, 2005; McChesneya and Gallagher, 2004; Bryde, 2003; Yeo, 2002; Effy and Sosik, 2000; Wateridge, 1995; McComb and Smith, 1991; Bostrom, 1989).

Johannessen and Olsen (2011) emphasise the importance of communication in projects, particularly those that are large and complex. They argue that companies should transition from the use of communication processes to the use of communication capabilities during projects.

From the organisational perspective, the PMO plays a significant role because its primary function is to develop and monitor compliance with organisational PM methodology (policies, processes, procedures and best practices). The PMO represents a bridge between the organisation's strategy and projects. It also coordinates communication across projects and collects data from projects, consolidating them and reporting to internal and external stakeholders (PMI, 2008; IPMA, 2006; OGC, 2005). In addition to organisational communication management guidelines, it is important to promote an in-depth stakeholder analysis. Some BoKs consider stakeholder-related issues a communication process (PMI, 2008; OGC, 2005). However, the PMBOK 5 edition creates a new knowledge area called project stakeholder management.

Furthermore, aspects related to performance reports and information sharing (media and genre) are also highlighted in the literature. The efficient performance requires intense and media-richness communication among project stakeholders.

The review of organisational communication management was organised into four groups extracted from the literature, as follows: project communication methodology, stakeholder analysis, performance report and information sharing (media and genre), as shown in Table I.

2.1.1 Project communication methodology. An analysis of the current academic and practitioner project literature reveals that the use of some widespread PM frameworks in IT projects has intensified (Jiang *et al.*, 2004; Grant and Pennypacker, 2006). In these frameworks, which include the PRINCE2 (OGC, 2005) and the PMBoK (PMI, 2008, 2012), significant attention is devoted to structured communication process.

The effectiveness of communication depends on a set of social processes (Weick and Roberts, 1993, p. 362). In the context of projects, all the phases of the project life cycle, including the legacy of lessons learned, are involved.

In the PMBoK (PMI, 2008), project communication management is one of nine knowledge areas and includes five processes for the provision of critical links among

Table I. Organisational communication management

Clusters	References
Project communication methodology	Jiang <i>et al.</i> (2004), Grant and Pennypacker (2006), Weick and Roberts (1993), Johannessen and Olsen (2011), PMI (2008), IPMA (2006), OGC (2005)
Stakeholder analysis	PMI (2008), Bartis and Mitev (2008), Atkinson (1999), Agarwal and Rathod (2006), Boonstra <i>et al.</i> (2008), Mitchell <i>et al.</i> (1997), Barclay and Osei-Bryson (2010), Johannessen and Olsen (2011)
Performance Report	Thompson <i>et al.</i> (2007), Desouza and Evaristo (2006), Bartis and Mitev (2008)
Information sharing	Yates and Orlikowski (1992), McChesneya and Gallagher (2004), Yetim (2006), Gillard (2005), Lo and Lieb (2008), Riegelsberger <i>et al.</i> (2003), Carvalho <i>et al.</i> (2013), PMI (2008), Fox (2001), Johnson and Lederer (2007), Pearson and Ball (1993), Mackenzie (2010)

people and information. These processes are as follows: identifying stakeholders, planning communication, distributing information, managing stakeholders' expectations, and reporting performance (PMI, 2008). In its new edition, the PMBOK changed the processes to plan communications management, manage communications and control communications (PMI, 2012). The processes related to stakeholder management have been transferred to a new knowledge area. In PRINCE2 communication is deployed in the communications procedure, tools and techniques, records, reporting, timing of communication activities, roles and responsibilities, stakeholder analysis, and information needs (OGC, 2005).

Despite these guidelines, McChesneya and Gallagher (2004) suggest that communication in projects has been managed in an informal manner.

2.1.2 Stakeholder analysis. Stakeholder expectation management is highlighted by several authors (Atkinson, 1999; Barclay and Osei-Bryson, 2010). Project success may have different meanings to different stakeholders, often resulting in mismatch among stakeholders' expectations, which can lead to project failure because project performance criteria reflect stakeholders' values (Barclay and Osei-Bryson, 2010).

The stakeholder analysis influence in PM literature increase recently, especially as a contingent variable in empirical researches. One indicator of the increase importance is the creation of a knowledge area so-called project stakeholder management, deployed in four processes: identify stakeholders, plan stakeholders' management, manage stakeholders' engagement and control stakeholders' engagement (PMI, 2012).

Explicitly involving stakeholders in project communication management can facilitate the management of different expectations and the mitigation of these expectations.

Thus, managing stakeholders' expectations will enable the encouragement of project acceptance, as suggested by Boonstra *et al.* (2008). In addition, Johannessen and Olsen (2011) suggest that projects should be considered social communicating systems, particularly when the project environment is turbulent and complex. However, identifying stakeholders and mapping their expectations not only in terms of the project's tangible requirements but also on an abstract level are not easy tasks (Atkinson, 1999).

A critical analysis of stakeholders can facilitate the selection of primary communication channels, and diverse taxonomies that can facilitate the prioritisation of stakeholders are found in the literature. The stakeholder salience model, proposed by Mitchell *et al.* (1997), allows for the classification of stakeholders according to three attributes: power,

legitimacy and urgency. According to Boonstra *et al.* (2008) and the PMI (2008), identifying stakeholders and classifying them according to degree of power and degree of interest in the system is an important issue in stakeholder management.

2.1.3 Performance report. According to Thompson *et al.* (2007), another important issue related to the project communication process is the quality of reporting in IS projects, particularly with regard to the communication link between team members, who are project managers' key sources of status information. The authors argue that there is a link between reporting quality and project outcome. Bartis and Mitev (2008) corroborate this view, arguing that project committees report success to top management even if systems do not satisfy users' needs and achieve project goals. Desouza and Evaristo (2006) highlight the key role of PMO in this context because it documents and disseminates project reports, lessons learned and best practices. Project reports can be formal and informal project, including project status, lessons learned, issues logs, project closure reports, and outputs from other PM knowledge areas (2008).

To mitigate the damaging effects of misreporting, Thompson *et al.* (2007) suggest that project executives establish trust-based communication environments with multiple sources to obtain status information and a periodic audit of the environment to identify potential problems.

2.1.4 Information sharing: media and genre. Research on communication has also focused on information distribution and the selection and efficiency of media and genre.

Yates and Orlikowski (1992) identify a degree of confusion regarding the differences among these concepts, and distinguish "between the physical means of communication (media) and the typified communicative action (genre)". They define the genre of organisational communication as "a typified communicative action invoked in response to a recurrent situation" (Yates and Orlikowski, 1992, p. 310), such as memos, meetings or performance reports, which "may be physically created, transmitted, and stored in various media".

McChesneya and Gallagher (2004) applied genre perspective to software engineering projects and concluded that communication genres can form the basis for process improvement because they represent the bottom-up, daily routine of working on a project. Yetim (2006) states that:

[...] reflections on genres become more important the more the differences in technological standards, social values, norms, and interests in global contexts interfere within the sphere of genre-based modelling of communication.

Conversely, Gillard (2005) argues that many companies focus financial resources on tools rather than managers' communication competency. Lo and Lieb (2008) explore decisions regarding the selection of communication media and consider several factors, such as distance, task type and trust. In short-distance communication, the selection of media is not affected by independent variables ("task equivocality" and trust) for several reasons, such as easy access to instant communication tools and face-to-face contact (Lo and Lieb, 2008). The choice of media is also contingent on project type and stakeholders.

However, different patterns of communication technology tool selection were identified with regard to for long-distance communication, and these patterns consider task and trust level. As "task equivocality" increases or the level of trust decreases, the communication technology tool with highest level of information richness is selected. Riegelsberger *et al.* (2003) also identify a relation between trust and computer-mediated communication.

Because barriers to communication can be associated with media that are selected, some authors favour consideration of the following: the speed necessary to distribute information, type of technology available, ability to support customisation and linguistic variety, levels of security required (passwords, privacy clauses, etc.), project characteristics (group size/project duration) and cost minimisation (PMI, 2008; Fox, 2001; Yates and Orlikowski, 1992).

Johnson and Lederer (2007) compare CEOs and CIOs' views regarding the relative richness of four communication media: face-to-face communication, e-mail, business memos and telephone contact. The authors conclude that organisations in which there was a greater shared vision regarding the future role of IT also reported more frequent CEO/CIO communication utilising face-to-face communication and e-mail, i.e. the communication channels were perceived to be richer. For Pearson and Ball (1993) the importance of informal communication increases in environments in which uncertainty is high.

2.2 Understanding barriers to communication

Barriers to communication can be easily detected in the organisational environment, where problems with the centralisation of information and issues related to dubious interpretations are apparent. Nevertheless, it is difficult to overcome these barriers because even gossip can affect power in the workplace (Kurland and Pelled, 2000).

Communication competencies extend beyond the ability to codify, transmit and decode information (PMI, 2008). These abilities are necessary but not sufficient prerequisites for project communication effectiveness. It is also necessary for the sender and the receiver to be imbued with a shared feeling. Unfortunately, this mutual understanding does not always occur. The lack of effectiveness in communication processes can be the result of barriers to communication that arise in the everyday organisational life, as will be discussed in this section.

Communication also involves soft skills, i.e. the management of interpersonal relationships and the notion of a project ecology as organizations embedded in a social context, rely on personal networks between the stakeholders involved (Grabher, 2004).

The primary aspects of barriers to communication perspective discovered during the literature review are summarised in Table II, clustered in four barrier categories: trust, semantics and mental models, priorities and environment.

2.2.1 Trust. For Mackenzie (2010), the more mainstream digital communication methods become within organisations, the more face-to-face communication decreases, which influences the development of trusting at-work relationships.

Some studies imply that an environment of trust is essential to communication (Fox, 2001; Larkey, 1996). When a trusting environment is lacking, people concentrate

Barriers to communication	References
Trust	Mackenzie (2010), Kurland and Pelled (2000), Fox (2001), Larkey (1996)
Priorities	Robey and Markus (1984), Gillard (2005), DeBrabander and Edstrom (1977), DeBrabander and Thiers (1984), Wang <i>et al.</i> (2005)
Semantics	Gillard (2005), DeBrabander and Edstrom (1977), DeBrabander and Thiers (1984), Bostrom (1989), Gupta <i>et al.</i> (1985), Souder (1988), Yang <i>et al.</i> (2008)
Environment	Gillard (2005), Yates and Orlikowski (1992), Fox (2001), PMI (2008)

Table II.
Barriers to communication

more on their suppositions and fears, which creates much noise. In contrast, when trust exists, people ask for help, speak openly and honestly, take risks, accept new challenges and conduct their activities with less anxiety and stress. An environment of trust is underpinned by at least two fundamental principals – encouragement (encouraging others to express their ideas) and esteem (effectively hearing what others are saying) – and these must be present if a solid basis for communication is to be created.

To create an environment of trust, Fox (2001) stresses the importance of five activities that involve people and assure a common understanding of ideas, actions and results. These activities are sharing thoughts and feelings, assuming commitments that one can fulfil, admitting errors, requesting and accepting feedback, and recognising and testing suppositions. The systematic use of these techniques in the organisation encourages their diffusion among collaborators.

2.2.2 Semantics and mental models. The semantic gap between IT personnel and other stakeholders is particularly relevant to this work. DeBrabander and Edstrom (1977) and DeBrabander and Thiers (1984) note that IT personnel utilise IT jargon, whereas users/managers use the semantics of management; thus, establishing semantic equivalence is an important step in systems development. The great challenge is to reconcile these distinctive views (Kirsch *et al.*, 2002).

Heedful interrelation and mindful comprehension are necessary for effective communication (Weick and Roberts, 1993). Project managers spend much time addressing conflicts and building semantic equivalence among stakeholders (Gillard, 2005; DeBrabander and Edstrom, 1977; DeBrabander and Thiers, 1984). In IT projects, IT semantics and management semantics coexist, but to achieve a collective mind and project success, team members must speak the same language and adopt similar conceptual frameworks (Bostrom, 1989; DeBrabander and Edstrom, 1977; DeBrabander and Thiers, 1984). IT jargon is not understandable to users and business professionals on the team, and they are generally responsible for the customer/user interface.

Gupta *et al.* (1985) identify the same types of barriers between R&D and marketing personnel: a lack of communication and a lack of understanding, which are strongly related to R&D performance and project success. Souder (1988) also demonstrates that ineffective communication has a significant effect on project results with regard to the new product development process.

Thus, an important stream of research concentrates on the collaborative elaboration of IT projects. Robey and Markus (1984) highlight the importance of rituals in systems development to the achievement of effective engagement. Majchrzak *et al.* (2005) note that teams that use more collaborative elaboration engender a higher degree of client learning and achieve better IS design phase outcomes. Moreover, Yang *et al.* (2008) argue that shared mental models enable the improvement of software development, team learning and performance.

Desouza and Evaristo (2006) argue that tacit knowledge obtained through projects is difficult to capture. Therefore, it is important to build a bridge between PM and knowledge management, creating collaborative communities for project managers that are centralised through the PMOs.

For complex inter-firm information system implementation, Ko *et al.* (2005) propose a model for transferring knowledge from consultants to clients, which encompasses three sets of factors: knowledge-related, motivational, and communication-related factors.

Kirsch *et al.* (2002) obtained empirical results that emphasise the key role that knowledge plays in choosing the mode of control. They recognise the importance of creating and maintaining true associations through client relationships with business personnel and IT process personnel.

2.2.3 Priorities. Project stakeholders have specific objectives, which can be in conflict. Presently, in many organisations, IT personnel and users fight for power and attempt to bias the decision-making process (Gillard, 2005; DeBrabander and Edstrom, 1977; DeBrabander and Thiers, 1984).

Conversely, Robey and Markus (1984) argue that “there is nothing inherently wrong with organisational politics”, but that “it is essential for those engaged in the process to be aware of what is really going on”. Wang *et al.* (2005) demonstrate that interaction between the user and IS is critical to project success and this variable is significantly associated with both types of conflict: that occurring between the user and IS and among IS team members.

Although user participation is an important factor of project success, there are several others situational factors to consider (MacKeen *et al.*, 1994).

Kirsch *et al.* (2002) warn that “business clients” are increasingly leading IT projects and exercise a greater degree of control over projects. By control, the authors mean, “all attempts to motivate individuals to achieve desired objectives, and it can be exercised via formal and informal modes”. Project managers and PMOs are also driven by different requirements and objectives and their priorities that must be aligned (PMI, 2008).

2.2.4 Environment. Some research focuses on different types of barriers to communication. Johansen and Gillard (2005) define barriers, or noise, as anything that interferes with communication processes. These barriers can arise from several sources, which include environmental factors.

Other studies are related to physical barriers that can be associated with technology issues, choice of media and their influence on communication patterns (Gillard, 2005; Yates and Orlikowski, 1992), as discussed in the following section.

It is important the availability of electronic communication and co-location strategy to enhance communication and the sense of community (PMI, 2008). The electronic communication includes e-mail, video conferencing, intranet, web-devices such as PM portal, KM portal other devices. These devices are critical to make such virtual teams feasible; however it should be compatible with the experience and profile of the project team. The co-location strategy includes meeting room, places to post visual management tools, and other conveniences.

2.3 Communication integrated framework

During the literature review, different epistemological fields and aspects of communication in IT projects were distinguished. Despite the vast literature available, it appears clear that there is a lack of integration among the epistemological fields, and one does not dialogue with the others. Thus, in the CIF both individual and organisational perspectives of communication have significant roles. The CIF forms the basis for the comprehensiveness assessment of communication management in IT projects in the current study.

As shown in Figure 1, different perspectives that affect communication in IT projects, from the individual perspective to the organisational perspective, should be

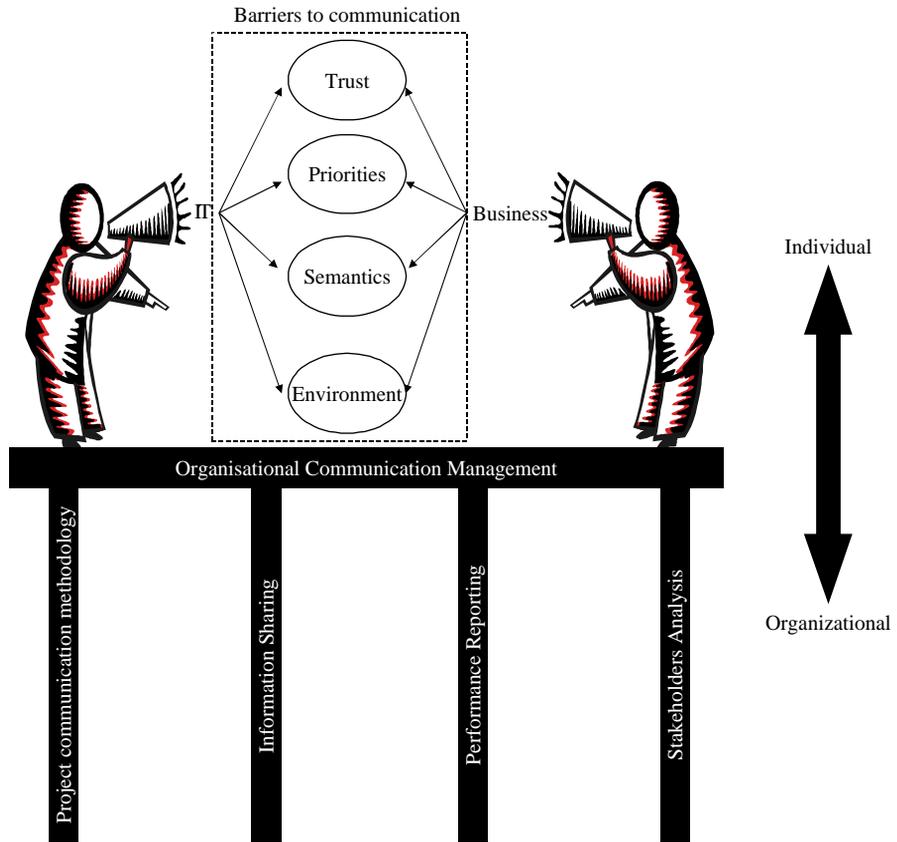


Figure 1.
Communication integrated
framework

appropriately explored. This framework encompasses the project communication management literature (Section 2.1) and barriers to communication (Section 2.2) and focuses on IT projects.

3. Research methodology

This study aims to explore communication management in IT projects and to identify barriers to communication, from both individual and organisational standpoints, and from distinctive stakeholders' points of view (PMO, project manager, IT and business personnel).

Thus, the case study was selected as the methodological approach and developed the following guidelines from the literature (Flynn *et al.*, 1990; Voss *et al.*, 2002; Eisenhardt and Graebner, 2007). First, the CIF was structured and its research questions were related to key constructs, whose relationships are summarised in the Appendix. Second, several data collection methods were combined. Structured and unstructured interviews of key participants (PMO, IT and business personnel), PMO archival data, and survey-based research were performed in order to achieve triangulation, as presented in the following sections. Discrepancies among these sources of evidence were noted and discussed.

As suggested by Voss *et al.* (2002), the starting point for case research is the construction of a conceptual framework to explain the general constructs and their relationships. A literature review shed light on different epistemological fields, and different aspects of communication in IT projects were analysed and different perspectives were brought together in a CIF outlined in the earlier sections (Figure 1). This research combines characteristics of confirmatory and exploratory research, because some aspects of the framework are in the confirmatory phase, such as the semantic gap between IT and business personnel (DeBrabander and Edstrom, 1977; DeBrabander and Thiers, 1984; Kirsch *et al.*, 2002) and the BoKs (PMI, 2008; OGC, 2005; IPMA, 2006), although its characteristic are mainly exploratory.

Several authors suggest a combination of data collection methods to avoid sharing the same weaknesses and to achieve triangulation (Flynn *et al.*, 1990; Voss *et al.*, 2002).

The studied company is a large, commercial information service provider with a focus on credit card processing. This organisation employs approximately 2,500 individuals and has annual billing of approximately R\$700 million. Approximately 15 per cent of the employees (379 employees) were involved in project activities, almost 50 per cent of whom were dedicated full-time work to project activities.

The context for the case was also important because the selected company is an adequate representative of the IT service sector. Other criteria for selecting the company were also considered such as whether it had a PMO and whether its employees were willing to be subjected to interviews, were also considered.

3.1 Sample and research protocol

The analysis followed a two-step procedure based in part on content analysis of the interviews with key stakeholders in the project area, followed by a survey-based approach in which a closed-answer instrument was applied on a significant sample of employees involved in project activities.

During the first step, interviews were conducted with employees at various levels of the organisation, including the coordinator in charge of the corporate PMO, the coordinators of the PMOs in the business units and IT and business project managers. The importance of understanding PMO roles, functions and archetypes is highlighted by Desouza and Evaristo (2006).

The interviewees were coded as shown in Table III. Most of the data were obtained using interviews in which open questions related to the CIF framework were asked.

Data were gathered using a semi-structured research protocol. Clarifications were made by using complementary questions throughout the interviews when necessary. Annotations were made and the interviews were tape recorded and transcribed for content data analysis.

Profile	No. of interviewees	Code
PMO	3	CPMO
Project manager from IT area	8	PMO _{BU} 1-3 PM _{IT} 1-8
Project manager from business area	6	PM _B 1-6
Total	17	

Table III.
Interviewees' classifications codes

The qualitative data were processed using descriptive statements and visual devices to create a bridge from the qualitative evidence to theory, as suggested by Eisenhardt and Graebner (2007), and the primary aspects of the CIF were codified as suggested by Miles and Huberman (1994).

During the second step, the quantitative data were collected to identify significant differences between IT and business personnel with regard to barriers to communication and confirm gaps among them with regard to perception. As Bryman (1989) notes, a survey requires data gathering, which, in organisational research fieldwork, indicates the use of self-reported surveys, in which the unit of analyses may be persons from the same organisation.

Questionnaires were distributed to 86 project managers and team members involved with current IT projects and participating in project activities full time, balancing systems and business professional profiles. All of the respondents were assured of confidentiality and were presented with the research goal and a brief presentation of questionnaire content. Of the 86 professionals initially contacted, 61 participated (71 per cent). A participant profile of the sample is provided in Table IV.

It is important to note that there is some bias in terms of gender, particularly with regard to IT personnel. Of the 34 IT employees who completed questionnaires, only 21 per cent were female, although women comprised 53 per cent of the business professional profile. The sample size is significant at the 0.05 level, with an error of 11.5 per cent, considering the population of employees who work on IT projects full time.

The survey questionnaire was divided into the following sections: interviewee characterisation, communication importance and key PM areas, barriers to communication (semantics, trust, environment and commitment), and the five PMBoK communication processes (stakeholder identification, planning, information distribution, project performance, and stakeholder expectation management). The issues covered include aspects of best management practices in project communication, primary barriers to communication and genre and technology issues. The questionnaire contained 16 multiple choice questions and two open-ended questions. A pilot application and interviews were performed. A total of 76 questionnaires were distributed, and 57 were returned

<i>1. Gender</i>	
Male (%)	66
Female (%)	34
<i>2. Age</i>	
< 30 years (%)	39
From 30 to 40 years (%)	46
> 40 years (%)	15
<i>3. Position</i>	
Project manager (%)	23
Team member (%)	77
<i>4. Years of experience in IT projects</i>	
< 3 years (%)	28
From 3 to 10 years (%)	46
> 10 years (%)	26
<i>5. Professional profile</i>	
IT personnel (%)	56
Business personnel (%)	44

Table IV.
Participant profile

(75 per cent contained valid responses). Of the questionnaires answered, 56 per cent were completed by systems professionals and 43 per cent by business professionals.

Data were analysed using descriptive statistics and parametric forms of analysis, such as the χ^2 test, to identify distinctive, significant differences between IT and business professionals.

4. Results

This section presents the primary qualitative and quantitative results, describing the respondents' statements whenever appropriate, and adheres to the CIF structure.

4.1 Organisational context

The studied company is a large company with three business units: a cards unit, a risk unit and a customer unit. The first unit manages registration processes, card issuing and billing, payment processing and other transactions. The risk unit is responsible for credit analysis, authorisation, fraud and collections. The business process unit handles all processes related to customer relationship management (CRM). The company has a corporate PMO and a PMO in each of the three business units. The corporate PMO develops and maintains a set of standards and methods, provides consulting and mentoring in the PM field, and manages project knowledge bases. Each business unit PMO employs a full-time project coordinator who controls the project teams and serves the unit's key customers.

In 2003, the corporate PMO adopted the PMBoK framework. Thus, the PM methodology adopted is organised according to nine knowledge areas (scope, quality, communication, risk, human resources, integration, procurement, time and cost) and five process groups (initiating, planning, executing, monitoring and controlling, and closing).

The project organisation structure can be classified as a weak matrix structure, in which project managers, despite being consultants or analysts in terms of hierarchy, manage projects but also report to a functional manager. The majority of projects at the company studied were large, complex projects that typically involved business process management (BPM) enabled by IT demanded for external clients.

4.2 Organisational communication management

4.2.1 Commitment to project communication methodology. As discussed in Section 2, project effectiveness depends on structured procedures that facilitate communication process. Thus, the first part of the research instrument addressed the importance of communication management in IT projects. Two questions were developed; the first addresses the importance of communication and the second addresses the importance of communication in comparison with the other eight PM knowledge areas, as proposed by PMBoK, because it is the PM framework adopted by the studied company. Answers to both questions were scored using a five-point Likert scale ranging from disagree (1) to agree (5). The second question presents the nine knowledge areas, which are randomly distributed throughout the questionnaire. Through the use of the ANOVA, differences in the perception of the importance of the nine knowledge areas between IT and business personnel were analysed using means and variances, as shown in Table V.

Table V indicates that, in terms of respondents' perceptions, the importance of communication in projects ranges from high to extremely high (mean: 4.5246).

		1. Importance of communication				
		Mean	<i>p</i> -value (mean)	SD	<i>p</i> -value (variance)	
IT personnel		4.5294		0.6622		
Business personnel		4.5185		0.5798		
Total		4.5246	0.947	0.6220	0.947	
		2. Comparative importance of the nine knowledge areas				
		Rank	Mean	<i>p</i> -value (mean)	SD	<i>p</i> -value (variance)
Communications						
IT personnel		3°	3.8824		1.4092	
Business personnel		8°	2.6296		1.5726	
Total		3°	3.3279	0.002 **	1.5992	0.659
Time						
IT personnel		7°	2.6471		1.7387	
Business personnel		7°	2.7778		1.5021	
Total		8°	2.7049	0.758	1.6263	0.087
Scope						
IT personnel		2°	3.9412		1.5752	
Business personnel		2°	3.4444		1.9480	
Total		1°	3.7213	0.275	1.7524	0.275
Cost						
IT personnel		8°	2.6471		1.5932	
Business personnel		9°	2.5556		0.8473	
Total		9°	2.6066	0.789	1.3074	0.001 ***
Quality						
IT personnel		1°	4.000		1.2309	
Business personnel		3°	3.2222		1.3960	
Total		2°	3.6557	0.024 *	1.3526	0.900
Risk						
IT personnel		6°	3.1176		1.4723	
Business personnel		1°	3.5185		1.1887	
Total		4°	3.2951	0.256	1.3582	0.352
Procurement						
IT personnel		9°	2.4706		1.7962	
Business personnel		4°	3.1481		1.9156	
Total		7°	2.7705	0.161	1.8654	0.401
Human resources						
IT personnel		4°	3.2353		1.6154	
Business personnel		5°	3.000		1.6641	
Total		5°	3.1311	0.579	1.6276	0.875
Integration						
IT personnel		5°	3.2353		1.6888	
Business personnel		6°	2.8519		1.9156	
Total		6°	3.0656	0.410	1.7876	0.086

Table V.
Importance of communication area

Notes: Significant at: **p* < 0.05, ***p* < 0.01 and ****p* < 0.001 levels; Levene's test for variances; *n* = 61

The results obtained for the first question indicate that there are no significant differences (*p*-value: 0.947) in the perception of the importance of communication between IT and business personnel.

The analysis of the aggregate data revealed that the three areas perceived as highly important were scope, quality and communication (see totals in Table V). It is important

to note that although the highest mean, 3.7213, was obtained for scope, indicating that it is considered the most important, this mean is not significantly higher than the others. During the interviews, the PMO corporative coordinator reported that there is a lack of commitment to the PM methodology, especially among the oldest project managers, which could explain the high standard deviation.

However, the ANOVA tests performed on the data obtained for the second question indicate significant differences in perception between the IT and business personnel in two areas: communication and quality (Table V). Thus, although the importance of communication is judged to be extremely high by both types of professionals, when all of the PMBoK knowledge areas were rated, communication only maintained its high rating among IT personnel and, in contrast, among business personnel, the mean for communication was the second lowest (2.6296). There is a significant difference (p -value: 0.002) between the perceptions of these two professional profiles. A similar result was found for quality. The respondents expressed criticism of the company's PM methodology, which included the following:

The PM methodology emphasis is on control based on documentation, which is stored and rarely used in several projects [...] the PM framework was dimensioned for large projects [...] We need an approach that is more flexible (reported by a project manager – IT personnel).

This result has an interesting implication. Although both types of professionals generally value communication, when a comparative analysis of the PM knowledge areas is performed, it is found that only systems professionals perceive it as highly important.

4.2.2 Design communication. To study the structured procedures designed to facilitate communication during projects, two questions were asked that related to the communication management plan. Answers to the question used to determine whether a formal communication management plan was widely used in the studied company were scored using a five-point Likert scale ranging from never (1) to always (5). The second question attempted to determine whether the existence of a formal communication plan contributed to the communication process and also involved the use of a five-point Likert scale, which ranged from useless (1) to extremely helpful (5), as shown in Table VI.

Table VI demonstrates that the use of a communication management plan (mean: 2.6721) is not widespread among IT projects in the company studied. Moreover, the same scenario was depicted for both professional profiles. During the interviews,

	Mean	p -value (mean)	SD	p -value (variance)
<i>1. Frequency of use</i>				
IT personnel	2.6471		1.3230	
Business personnel	2.7037		1.3248	
Total	2.6721	0.869	1.3130	0.428
<i>2. Contribution</i>				
IT personnel	4.2941		1.0009	
Business personnel	4.3704		0.8835	
Total	4.3279	0.757	0.9438	0.757

Table VI.
Communication management plan

only three project managers reported the use of a communication plan for every project. The majority of respondents stated that only the more complex projects incorporated this type of plan.

It was observed that although a communication plan is not frequently used for projects developed at the company studied, respondents were practically unanimous (total mean: 4.3279) in their statement that its existence facilitated the communication process.

4.2.3 Information sharing. The questionnaire includes a question on how information is shared during IT projects. The questions focus on the communication media and genres used and were presented in the form of a closed list; respondents could select more than one option. The list was not exhaustive, but although a blank space in which other forms could be listed was provided, no one utilised it. The question was organised like a matrix; the rows contained the genres and the columns contained the media choices. It was possible to select more than one media choice for each genre. Moreover, each respondent could select more than one genre (Table VII).

Both professional profiles presented the same pattern with regard to media choices because the three most-used media are the intranet (project database) (28 per cent total), face-to-face media (25 per cent total); and paper-based media (23 per cent total). However, the media varied according to the genre.

The intranet is used to store project data, particularly memos, project records and presentations. It was expected because the company studied used standard project procedures, which state that all project data must be stored in a project database on the intranet. The intranet data were not considered during the media evaluation because the genre was created using another media and simply stored on the intranet; thus, consideration of intranet data would have led to a double accounting of the genre (Table VII).

The three most used communication genres for information sharing are informal conversation (41 per cent), meetings (19 per cent) and project records (17 per cent). It is important to stress that no significant differences were found between the IT and business profiles with regard to communication genres.

According to respondent reports obtained during informal conversations, it has become necessary to use internet and telecommunication tools to render information transmission easier in the fact of everyday haste and disorder. Nevertheless, several of

Media	Genre						All (%)
	Informal conversation	Meeting	Memo (formal documents)	Project presentations	Project records	All	
Face to face	27	54	0	22	0	103	25
Internet (e-mail, chat, etc.)	54	0	0	0	0	54	13
Paper-based	0	0	45	0	51	96	23
Telephone	42	0	0	0	0	42	10
Videoconferencing	0	4	0	0	0	4	1
Intranet (project database)						118	28
All	123	58	45	22	51	417	100
All (%)	41	19	15	7	17	100	

Table VII.
Communication genres and media choice

those interviewed noted the importance of face-to-face communication because they judged personal contact to be decisive with regard to effective communication during projects.

Another question addressed lessons learned and knowledge gathering during the entire project life cycle. The results suggest that meetings focused on lessons learned were not widely used at the company studied (mean: 2.2787; standard deviation: 1.2129), and no significant differences between IT and business personnel were found (p -value: 0.244). Three interviewees criticised the company's process, stating the following:

- (1) "Lessons-learned meetings as performed in the company are just bureaucracy" – Interviewee PM_{B2}.
- (2) "There are few project managers who are concerned with lessons learned" – Interviewee CPMO.
- (3) "To upload the information on the intranet takes time, and it is our scarcest resource." – Interviewee PM_{B5}.

4.2.4 The performance reporting process and stakeholders analysis. The questionnaire contained two questions on the quality of performance reporting and commitment to its accuracy. The first question addressed the use of formal performance reports, and the second addressed the discussion and analysis of project performance results.

Although the company studied uses a specific template for performance reports, only 21 per cent of the current projects incorporated this document. However, the majority of respondents (84 per cent) reported that performance assessment meetings were held, and almost half (53 per cent) considered the number of meetings insufficient for the analysis of project performance. It was noted that IT personnel professionals (37 per cent) were less committed to performance reporting than business personnel (58 per cent).

The following are some of the insights obtained during the interviews:

- "There is no formal allocation of who is responsible for making the performance report and for which stakeholder. The business personnel talk all the time with the client, but they do not bother to update the status of software development by our group." PM_{IT3}.
- "The cost data are not reliable because the system does not prioritise the project unit, but the functional area; as the project has a good margin, no one prioritises this issue." PM_{B1}.
- "We focus on client requirements for specific deliverables." Interviewee PM_{IT7}.

The business units' PMOs manage project stakeholders based on continuous project performance follow-up. The primary document used for follow-up is the issue log book. Additionally, meetings are held in which stakeholders formally approve project deliverables and discuss the action plans for each issue in the log.

The research instrument included four questions on the lack of communication among project's stakeholders, specifically the lack of communication with clients/users, the lack of communication among team members and project managers, the lack of communication among team members, and the lack of communication with others stakeholders (Table VIII).

	Mean	<i>p</i> -value (mean)	SD	<i>p</i> -value (variance)
<i>1. Lack of communication: client/user</i>				
IT personnel	3.9706		0.8343	
Business personnel	3.8519		0.9074	
Total	3.9180	0.597	0.8621	0.500
<i>2. Lack of communication: team and project manager</i>				
IT personnel	3.2941		1.0307	
Business personnel	2.8889		0.8006	
Total	3.1148	0.098	0.9504	0.106
<i>3. Lack of communication: team members</i>				
IT personnel	3.1761		1.1407	
Business personnel	3.7778		1.1875	
Total	3.4426	0.049 *	1.1906	0.665
<i>4. Lack of communication: others stakeholders</i>				
IT personnel	3.7353		1.2627	
Business personnel	3.8148		1.3312	
Total	3.7705	0.812	1.2831	0.729

Table VIII.
Lack of communication
with stakeholders

Notes: Significant at: **p* < 0.05, ***p* < 0.01 and ****p* < 0.001 levels; Levene's test for variances; *n* = 61

When analysing Table VIII, one notes that the greatest communication gap is that involving client/users (mean: 3.9180), which is followed by that involving other stakeholders (mean: 3.7705). It is important to note that there are significant differences (*p*-value: 0.049) between the professional profiles with regard to perceptions of the lack of communication among team members. Although business personnel judged this lack to border on high (mean: 3.7778), IT personnel perceived it to be at a medium level. During the interviews, two senior process analysts on the business side mentioned a strong lack of communication with the IT members of project teams.

It is important to emphasise that during the free commentary portion of the interviews, with regard to the category of other stakeholders, several commented on the lack of communication with projects' sponsors, particularly among business personnel.

4.3 Barriers to communication

According to the CIF, the primary barriers to communication are clustered into the following categories: trust, semantics, priorities and environment. The final section of the questionnaire contained two questions. First, the respondent was to select the primary communication barrier category. For the second question, the four communication barrier categories were divided into eight items to address both types of conflict, that between users and team members and that among team members, as suggested by Wang *et al.* (2005). Moreover, these items included specific options related to the interaction between IT professionals and business professionals concerning the lack of trust and the semantic gap. For example, the semantics category was decomposed into a "semantic gap between IT and business personnel" and a "semantic gap between clients and team members." The second question was presented in the form of a closed list, and respondents could select more than one option, as well as "other".

The barriers indicated by the greatest number of respondents from both profiles during the general compilation were the "semantic gap between IT

and business personnel” (19 per cent general) and the “difference in perception concerning project priorities” (18 per cent general). To illustrate that the semantic gap was considered the most effective barrier to communication, two statements, one from an IT professional and one from a business professional, are cited:

It’s hard to explain to the people from the business area, “the process owners”, what can be done with the available technology, since they sometimes ask the impossible (report by PM_{IT1}).

We in the business area are connected to customer demands, but the systems personnel set up insurmountable difficulties and hide behind technical language, which makes it difficult to do business and to solve the problem (reported by PM_{B3}).

Additionally, these results indicated that both types of professional agreed with regard to the primary barriers to communication because no statistically significant differences between their responses were found (using χ^2 test).

Results for the four barrier categories reveal that the items related to “priorities” rank first (37 per cent), followed by the semantics category (33 per cent), the environment category (15 per cent) and the trust category (15 per cent). Moreover, an assessment of their statistical significance performed using the χ^2 test demonstrates that there are no differences between IT and business personnel. Thus, it is possible to conclude that the two types of professionals identify the same communication barriers and agree regarding the diagnosis of primary barriers.

A lack of commitment to the company’s PM methodology can be noted, particularly with regard to communication, because team members did not adhere to the standard processes, procedures and template documents developed for this area.

5. Discussion and conclusions

Despite the vast literature available, there is a lack of integration among distinct epistemological fields, but the CIF is expected help to fill this gap. Without venturing to describe a final theoretical picture of this field, this paper has outlined an overview of research in project communication management, a complex issue that constitutes a kaleidoscope of different coexisting streams, which should be integrated.

The contribution of the CIF to project communication management theory can be summarized as follows. First, the framework considers different perspectives, from the individual to the organisational, which affect communication during IT projects in the form of an integrated system approach, as has been suggested by Johannessen and Olsen (2011). The CIF is founded upon the organisational perspective, which focuses on communication processes and practices, the management of frontier projects by internal and external stakeholders, and the infrastructure that supports communication, combining organisational processes and resources in an integrated system. Individual behavioural and intangible aspects emerge at the top of the CIF, resulting in daily barriers to communication that should be understood and overcome. Second, the contingency perspective of different stakeholders are explored, particularly as regards the PMO, IT and business personnel.

The methodological approach adopted here, using case-based research and combining qualitative and quantitative data, proved to be appropriate to explore this research field due to the distinctive level of maturity of the main streams analysed.

Considering the both the individual and organisational perspectives of the CIF, the individual perspective plays a major role in conflicts that emerge from the contingency

perspective of different stakeholders in the company of this case study. Although the structure of the project is linked to the PMO, the organisation still exhibits a functional organisational culture revealed by conflicting evidence and several perceptual gaps between IT and business managers.

The isolated barriers to communication most often cited by the respondents were the semantic gap between IT and business personnel, which is stressed in the literature (DeBrabander and Edstrom, 1977; DeBrabander and Thiers, 1984; Kirsch *et al.*, 2002). The results also shed light on the lack importance of PM methodology in general, and on communication processes during IT projects in particular.

Despite the literature's emphasis on environment and trust barriers (Fox, 2001; Larkey, 1996; Thompson *et al.*, 2007; Johansen and Gillard, 2005), neither the qualitative nor the quantitative results emphasise these barriers.

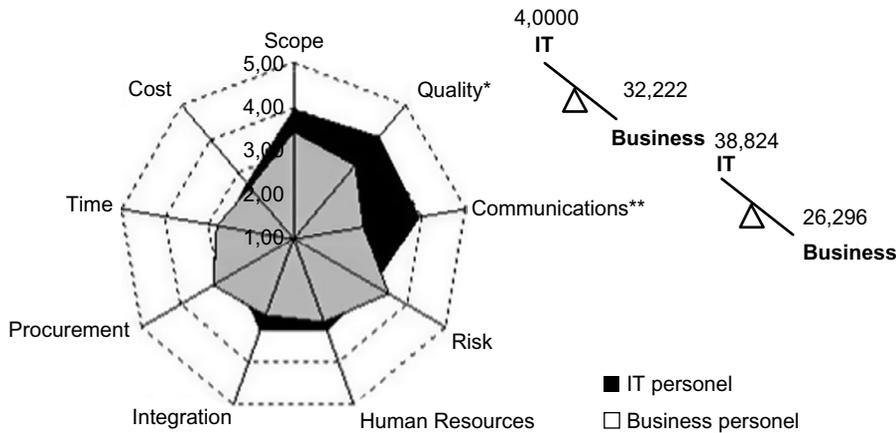
Among the categories most often cited by the respondents is that related to "project priorities", followed by semantics, environment and trust. Thus, the problem involves not only a semantic gap between IT and business personnel but also distinctive priorities, as previously discussed.

The organisational level of the CIF demonstrates that the adoption of a standardised PM framework is not sufficient for the elimination of the barriers to communication. The results of the field research indicate that although the importance of communication was recognised (Table V), the company studied does not perform a significant amount of work on the processes involved in project communication. A formal communication plan is developed for only a small percentage of the IT projects conducted in the company studied and neither performance reports nor control over lessons learned at project closure are frequently utilised. In line with observations by Thompson *et al.* (2007) a lack of quality IS project reporting in the organisation was emphasised by several project managers. Although communication processes are well defined in the PM framework adopted by the company, they were not well performed in practice.

The project role structure is also related to a lack of quality reporting because who is responsible for performance reporting is unclear. After all, critical analysis of the key stakeholders and appropriate communication channel design for each category of stakeholder are not performed, as indicated by several authors (Mitchell *et al.*, 1997; Atkinson, 1999; Barclay and Osei-Bryson, 2010).

The case under study revealed an inconsistency: on the one hand, the importance of communication is exalted by all the analysed stakeholders, and on the other hand, the communication processes and practices proposed by the PMO and formalised in the company's PM methodology are neither followed nor prioritised by project managers. This finding confirms the gap between the literature and current communication practices in organisations (Gillard, 2005; McChesneya and Gallagher, 2004; DeBrabander and Edstrom, 1977).

When analysing the importance of the nine knowledge areas according to the professional profiles, differences in PM priorities (Table V and Figure 2) were observed. Although IT personnel listed the key PM area as being quality, scope and communication (first, second and third place, respectively), business personnel considered the three key areas to be risk, scope, and quality (first, second and third place, respectively). Curiously, the two areas traditionally considered critical in the PM literature – time and cost (Pinto and Mantel, 1990; Pinto and Slevin, 1988) – remain in last place when considering the respondents' overall perception of importance,



Notes: Significant at: * $p < 0.05$ and ** $p < 0.01$; Levene's test for variances; $n = 61$

Figure 2. PM methodology priorities

which suggests the existence of a significant premium price with regard to the company's projects, as made evident by a project manager statement.

A lack of commitment to the PM methodology used at the studied company is apparent. The data demonstrate that the mean responses to the "Importance of the X-area" items do not exceeded the midpoint of the scale in several areas (Table V and Figure 2) for both professional profiles. In addition, the highest mean does not exceeded a score of 4 on a five-point scale.

Conversely, the commitment to PM methodology appears to be stronger among IT personnel than among business personnel. Although statistically significant differences between the IT and business personnel's perceptions were found in only two areas, communication and quality, the data demonstrate that for six of the nine PM areas, the perception of importance is higher among IT personnel. These results could be related to the presence of 12 PMPs (professional project management) certified through PMI among the IT respondents, who represent 34 per cent of the IT sample, in comparison with the business personnel, among which there was only one PMP employee.

Information distribution in the company studied is strongly based on informal conversation, with a higher incidence of internet (e-mail, chat and e-groups) than face-to-face communication, as observed during the literature review (Pearson and Ball, 1993; Johnson and Lederer, 2007; Kafouros, 2006). Moreover, the relationship between choice of media/genre and IS project performance should be the subject to empirical research, such as that conducted by Kafouros (2006) in the R&D project environment.

To conclude the analysis, the CIF was analysed according to the points of view of the three employee profiles (PMO staff, IT project manager and business project manager), representatives of which were interviewed during the first qualitative research step. Through content analysis and the use of the code provided by the primary portion of the CIF, the results were synthesised in Table IX. It is interesting to observe that with regard to the portion of the CIF relating to barriers to communication, IT and business project

	PMOs staff	IT project managers	Business project managers
<i>Organisational communication management (OCM)</i>			
Project communication methodology (PCM)	XXX	XX	X
Information sharing (IS)	XXX	XXX	X
Performance report (Pr)	XXX	XX	X
Stakeholder analysis (SA)	XXX	X	XXX
<i>Barriers to communication (BC)</i>			
Trust (Tr)	X	XX	XX
Priorities (Pr)	XXX	X	X
Semantics (Se)		XX	XXX
Environment (En)	X		
CIF Profile			

Table IX.
Synthesis of qualitative analysis

Notes: “In blanks” – none; X – weak; XX – average; XXX – strong

managers have similar perception profiles and differ from the PMO staff. Although IT and business project managers also emphasise the conflicts resulting from the semantic gap and lack of trust, the PMO staff simply report the differences in project priorities as the primary barriers. They also argue that the barriers to communication arise from the lack of commitment to PM methodology. In the organisational part of the CIF, the PMO staff and IT project managers have a similar profile, perhaps because the IT project managers interviewed were PMPs, as previously mentioned.

5.1 Implications for practice

The research insights are relevant to project communication management in practice, and the CIF may be useful as a protocol to help practical implementation by managers in project-oriented firms, as well as to gain an understanding of different perspectives in project communication. An important managerial implication of this study is the finding that the adoption of a standardised PM framework does not suffice for effective communication. The study suggests that firms focus and invest in the organisational perspective; but still only to a minor degree. There is lack of efficient use of performance reporting and communication planning. The individual perspective requires more attention on the part of managers to understand the main conflict and the underlying reasons for the lack of commitment to the PM methodology. Furthermore, managers should pay attention to the patterns of interaction among professional profiles, as well as the distinct objectives and priorities of different stakeholders. These findings have implications for top management trying to manage the link between communication and strategic alignment to mitigate conflicts (Prieto and Carvalho, 2011).

Furthermore, Jiang *et al.* (2004) argue that organisations may not be able to enjoy great benefits resulting from PM methodology until they reach maturity. Thus, the organisation should exhibit consistency during the implementation of PM methodology. Moreover, an effective PM methodology depends on customisation so that it can be adapted to company singularities and create a linkage with other related methodologies, as also suggested by Kess *et al.* (2010) with regard to ICT standards.

In consequence, the perception of a lack of importance of PM areas could be related to critiques concerning the lack of flexibility of the PM framework adopted. Several authors criticise the PM methodology's prescriptive emphasis and lack of project contingencies (Shenhar, 2001; Highsmith, 2002; Williams, 2005; Cicmil *et al.*, 2006), particularly with regard to the area of software development, in which the agile approach emerged. Thus, PMO executives should encourage the adoption of communication processes but also attempt to review the framework adopted.

The commitment to PM methodology could also be related to individual skills in a PM area because, on average, the IT personnel, who receive more project management instruction, consider the PM areas more important than business personnel do. PMO executives should encourage the adoption of communication procedures but also customise the current PM methodology. In addition, PMO should provide PM training to enhance individual skills (Dai and Wells, 2004).

CIF assessment also allows for the attainment of a fine-grained understanding of the individual perspective of project communication in relation to the conflict between IT and business personnel and the contingent perspective of different stakeholder. The respondents' statements suggest that there are also issues concerning the role structure that should be addressed. The study findings suggest that the lack of commitment to performance reporting could lead to poor communication processes, resulting in barriers to communication among project stakeholders and a source of conflict between IT and business personnel.

5.2 Limitations and future research agenda

Some aspects of the methodological approach could limit the generalisation of the study findings. First, this study was dependent on self-reported perceptions. Second, it embraced IT projects, and new studies should be conducted for other types of projects because the importance of project contingencies should not be ignored (Shenhar, 2001). Third, the focus is on a specific organisation, and its characteristics conditioned the findings (Lee, 1989).

An interesting area for future research may be an examination of how communication management, communication barriers and project performance are correlated. In addition, the relationship between the main variables in CIF should be investigated in depth through new case study and survey. Several contingency variables should be explored in future agendas, in addition to types of projects, such as different industries, different types of stakeholders, and company size. The CIF may be helpful in such future researches because some of the key variables of communication management were operationalised in the research protocol.

Communication barriers and differences between professional profiles should be more investigated, moving beyond the semantic gap and the lack of trust highlighted in the literature (Fox, 2001; Larkey, 1996; Thompson *et al.*, 2007; Johansen and Gillard, 2005) to encompass patterns of interaction and team building issues.

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Further reading

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(The Appendix follows overleaf.)

Table AI.
Aligning CIF research
questions with data
collection methods

CIF	Research question	Data collection method	Characteristic/data analysis
Organisational communication management Project communication methodology	Does the PMO follow a specific PM framework? Why did the organisation choose this framework? Did PMO customize the original framework according to the organisational culture? Describe the framework processes, PM portal and templates Did you encounter resistance during the implementation process? What type of personnel profile showed resistance (IT or business)? How do IT project communication processes occur within this company? Describe the processes, PM portal and templates. Do you believe this area adds value to the IT project?	Semi-structured interviews (PMO staff) Semi-structured interviews of key participants (PMO, IT and business personnel) Structured and unstructured interviews (PMO, IT and business personnel) Structured and unstructured interviews (PMO, IT and business personnel)	Qualitative (content analysis) Qualitative (content analysis) Qualitative (content analysis) Quantitative (ordinal first to ninth) survey – statistic tests Qualitative (content analysis) Quantitative (Likert scale – five points) survey – statistic tests
Stakeholder analysis	Which of the PM areas appear to be the most significant determinants of project success? Rank them How often do you use IT communication processes and templates? How is the PMO communication framework used or not used by IT and business personnel? How important is the communication area to you? Does communication appear to be the most significant area for the success of the IT project? Does the team/project manager perform the stakeholder analysis? Does this analysis have an impact on communication planning and decision processes? Does it influence on the choice of media and genre for information sharing? Are there conflicting objectives among project stakeholders? How does the team deal with this issue during the project? Does it have a significant impact on the perception of the project's success? Is there significant power asymmetry among the project's stakeholders? How does the team deal with this issue during the project? Is there a lack of communication with the client/user?	Structured and unstructured interviews (PMO, IT and business personnel)	Qualitative (content analysis) Quantitative (Likert scale – five points) survey – statistic tests

(continued)

CIF	Research question	Data collection method	Characteristic/data analysis	
Performance report	Is there a lack of communication between the team member and project manager?			
	Is there a lack of communication among team members?			
	Is there a lack of communication with other stakeholders?			
Performance report	How often are project performance report written?	Structured and unstructured interviews (PMO, IT and business personnel)	Qualitative (content analysis)	
	Are they formal or informal?		Quantitative (Likert scale – five points) survey – statistic tests	
	How is the project performance report used?			
Performance report	How important is the project performance report to you?			
	Is there a formal allocation of someone in charge of producing the performance report and for which stakeholders is it prepared?			
	Is there a formal meeting in which stakeholders formally approve project deliverables and discuss the action plans for each issue?			
Information sharing	How is information shared in IT projects?	Structured and unstructured interviews (PMO, IT and business personnel)	Qualitative (content analysis)	
	What are the most common genres and media used? Why?		Quantitative (Likert scale – five points) survey – statistic tests	
	How often do you use the following media? In which project phase/processes?			
Information sharing	How often do you use the following genre? In which project phase/processes?			
	How satisfied are you with the PM portal? How often do you use it?			
	What criteria do you use to select media and genre during project development?			
Barriers to communication	What are the primary barriers to communication in IT projects? How does the PMO deal with these barriers?	Structured and unstructured interviews (PMO, IT and business personnel)	Qualitative (content analysis)	
	Which of the following barriers appear to be the most significant ones to communication? Why do these barriers appear? How do these barriers affect personnel behaviour (IT or business)?			Quantitative (Likert scale – five points) survey – statistic tests

(continued)

Table AI.

CIF	Research question	Data collection method	Characteristic/data analysis
Trust	Is there a lack of trust between IT and business professionals during project development? What are the reasons for this lack of trust? How does it affect project development?	Structured and unstructured interviews (PMO, IT and business personnel)	Qualitative (content analysis) Quantitative (Likert scale – five points) survey – statistic tests
Priorities	Do business and IT personnel have different perceptions about project priorities? Do business and IT personnel have different perceptions about the importance of project stakeholders? Do business and IT personnel have different perceptions about the value of PM framework in general and communication processes in particular?	Structured and unstructured interviews (PMO, IT and business personnel)	Qualitative (content analysis) Quantitative (Likert scale – five points) survey – statistic tests
Semantics	Is there a semantic gap between IT professionals and business professionals? Why did it occur? Is there a semantic gap between team members and clients? What is the reason for this gap? How does the project manager deal with the semantic gap?	Structured and unstructured interviews (PMO, IT and business personnel)	Qualitative (content analysis) Quantitative (Likert scale – five points) survey – statistic tests
Environment	Are the communications systems/technology infrastructure appropriate? Are these systems compatible with the experience of the project team? Are the characteristics of the physical environment favourable for team-building? Do the team members work in the same physical location or in a virtual environment?	Structured and unstructured interviews (PMO, IT and business personnel)	Qualitative (content analysis) Quantitative (Likert scale – five points) survey – statistic tests

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