COMMUNICATION, TRUST AND FLUENT RELATIONSHIPS: KEYS FOR MANAGING THE SOCIAL COMPLEXITY IN CONSTRUCTION PROJECTS. LEARNINGS FROM A CASE STUDY

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ABSTRACT

Complexity in construction projects and how to address it has been the subject of many recent studies. The nature of complexity, its social dimension and the current tools for managing it have been studied using a study case. The results show that, because of the large number of people involved in construction projects, a formal risk management system is not enough to achieve success. Social complexity should also be taken into account. The possible solutions for proper management of social complexity would include trust among all the parties, fluent relationships and communication.

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Introduction:

Project Management, as a discipline, has been going through a process of consolidation over the last few decades with a view to providing an answer to the need for effective project development.

A large number of tools, techniques, procedures and processes exist that should ensure that, with the correct application, every project finishes by achieving the objectives which were set at the beginning. However, to date, in spite of the technological developments of the last century, projects continue to fail in their objectives, quality, schedules and costs, especially in the construction sector (Ogunlana et al., 1996; Flyvbjerg et al., 2003; Sambasivan et al., 2007; González et al., 2013).

The size and the complexity of construction projects have increased significantly in the last few years, with new technical solutions becoming common. This means working in areas of innovation and therefore with uncertainty and risk (Leijten, 2009). Project Managers have to work with novel, ill-defined concepts in an unstable environment (Robledo et al., 2012).

At the same time, a large number of tools and processes have been developed for the management of these projects, almost always taking a Cartesian and linear approach to projects (corresponding to the pillars of project management related to structures, processes, systems, metrics, etc.) in the face of management which analyses the agents and the social realities of a project (personal relationships, motivation, communication, etc.).

It is also essential to consider the social variable in order to ensure success in project management. This variable becomes even more important when size, reach and complexity are greater. The way in which the people involved in project management establish their relationships is the main and the most volatile cause of project complexity (Syed et al.,...
In fact, the different members involved in a project usually identify strongly with their groups (Administration, Project Manager, Constructor etc.); showing themselves to be receptive to information sharing, coordinated action, or helping behaviour (Ashforth et al., 2008). However, when groups feel their identity is threatened they become defensive and even hostile toward other groups (Branscombe et al., 2001) to the detriment of intergroup cooperation and therefore, project success. Because project success largely depends on the quality of cooperation between groups (Klijn and Teisman, 2003), the concept of social complexity is highly relevant to project management.

The line of research which focuses on social complexity and its development is essential for a reformulation of the management of complex projects (Cicmil et al., 2006). It is one of the aspects which is most in-demand with project management researchers and professionals who are aware of the consequences which, as yet, have not been considered.

Taking all of this into account, the main aim of this piece of research is to analyse the importance of the social dimension in the degree of project complexity.

**Methodology:**

In order to achieve the aims of this piece of research, firstly an in-depth bibliographical review has been carried out. The concepts of complexity and their dimensions have been defined, focusing on the social dimension of complexity.

Next, a concrete case of study with a high degree of complexity has been analysed. The case selected is the “University Campus of Health Sciences”, which studies the different circumstances which have presented themselves during the life cycles of some of the project’s phases. The case study analysis method has been used frequently by researchers to analyse complexity in projects. In this field of research, the specificity of each case and the existence of substantial influences of the social and political contexts in which projects are developed make it difficult to undertake traditional quantitative analysis (Noor, 2008). Multiple qualitative methods, such as interviews, document analysis and field observation have been used by researchers (Dainty et al., 2007; Ling and Tran, 2012; Löwstedt and Räsänen, 2014) obtaining satisfactory results.

Next, an analysis of the results obtained through an approximation to the social dimension is carried out in which, both the different causes of complexity and the influence of the measures adopted in order to ensure the success of the project are analyzed and discussed. Finally, the main conclusions of the study and possible solutions are drawn.

**Literature Review:**

**Complexity:**

In order to carry out the proper management of a project, it is necessary to understand its degree of complexity to be able to plan the resources and processes which are really necessary.

Before being able to measure the complexity and its components or factors, it is essential to formulate a proper definition for complexity. Girmscheid and Brockmann (2008) highlighted that the notion of complexity is not used consistently. This notion needs to be defined. Many researchers have tried to find a useful definition as a starting point for the future development of management models on project complexity.

The first studies on complexity in project management, within the framework of complexity theory, appeared in the 90’s (Strogatz, 2004), and they were used as an attempt to solve complex problems in multiple disciplines. Payne (1995) associates the two concepts of complexity and project management, identifying complexity with the multiplicity of interfaces between projects, between projects and organization and with the role of managers and how much integration is desirable or practical in multiple projects. Subsequently, Baccarini (1996) argued that the management of complex projects is frequently associated with complexity management. This indicates that complexity is caused by the interrelationships of many parties, which are perfectly differentiated and interdependent. The non-linear character of the indicated relationships is claimed to be a distinguishing feature of complex projects by other authors (Dombkins, 2012).

The study of complexity addresses other issues from the perspective of necessary information and information which is available for the implementation of any project (Winch, 2000). This author states that uncertainty is the space between the two types of previously mentioned information and it basically comes from two sources: complexity, corresponding to the information which
is theoretically available but costly to obtain, and unpredictability, concerning information which is impossible to predict with the data available.

Specifically in construction projects, risk management is addressed by considering four concepts: uncertainty, risk, complexity and chaos (Lehtiranta et al., 2010). These distinctions allow risk management to be considered as a systematic and organized activity, while complexity management requires a much more flexible type of management, focused on the individual capacity for reorganization in cases of changing and interrelated reality (Van Eijnatten, 2004).

The impossibility of forming a clear and concise definition means that major projects are frequently confused with complex projects. It is the same when various authors talk about complicated projects in comparison with complex projects. The former ones have a multitude of agents, elements and conditions, as well as different forms of interaction, but all of these factors are knowable. In the case of complex projects, unpredictable circumstances, and even unpredictable elements and agents can be found (Bawden, 2007).

**Dimensions of complexity:**

There are many authors (Payne, 1995; Baccarini, 1996; Whitty et al., 2009; De los Rios-Carmenado et al., 2014) who claim the existence of three clearly differentiated complexity components: technical, organizational-structural and social.

*Technical complexity* can be defined on the basis of the technological proposals contained in a project which allow schedule, cost and quality objectives to be reached. Depending on the nature of the project, its level of innovation, the technological and process proposals, its degree of definition in the project phase and the coherence of the elements of which it is composed, projects can be both technically complicated and complex.

Product Orientation in the design phase, without considering the definition of the processes which are necessary, can later lead to complex situations which, when added to the boundary conditions (contracts, agents, institutions and legal framework), can make the objectives of the project difficult to achieve.

*Organizational and structural complexity* encompasses all the aspects related to the context in which the objectives of a project are formulated: owners, institutions, administration, legislation, social agents and economic situation, as well as all of the interrelationships that can appear.

Finally, *social complexity* corresponds to the network of interpersonal relationships which are present and necessary in order to achieve all of the objectives of the project. It is obvious that with a greater number of agents and institutions involved, more personal relationships will exist, which must be correctly developed in order to not hinder the development of the project.

It is important to highlight that this classification of project complexity as having three components is not exclusive; a certain amount of overlap exists between the different dimensions of complexity. This implies that problems in one area can accentuate the complexity of the remaining dimensions. This shows the paradox that the first two (technical and organizational-structural) always meet with additional social complexity which cannot be dealt with without new interpersonal relationships between the agents in each case.

This fact has been demonstrated by a variety of authors (Van Eijnatten, 2004; Yunluo, 2008; Senescu et al., 2013), who are absolutely convinced about presenting social values as essential items and the capacity of these values for interrelation in changing situations such as those which occur during the life cycle of a complex project.

**Social complexity:**

The studies on social complexity are more recent and focus on the interaction between the different stakeholders who work on and communicate in a project. (Girmscheid and Brockmann, 2008). Moreover, Hogue and Lord (2007) highlight that social complexity particularly appears in non-linear interactions, both formal and informal, between the numerous parts of a system. This means highly sensitive relationships and components.

By nature, projects have always been social. In fact, they exist in the social environment and typically involve a number of parties, such as clients, design teams or constructors. Therefore, for the development of a project, social relationships are just as important as technology, information systems and the tools which are used (Pryke and Smyth 2006).

The degree of social complexity is in relation to the number and diversity of stakeholders involved in a project and the structural relationships between the different parties. Therefore, the more parties that
are involved in a project, the more socially complex it will be. This level of social complexity is further heightened when the differences between these parties are increased. (Conklin, 2005).

Malach-Pines et al. (2007) highlighted that social complexity should be managed throughout the whole lifecycle of a project, aiming to anticipate social conflicts, achieve sustainable success and make sure that the results adapt to the demands of the project stakeholders.

The importance of the social dimension has also been highlighted by the International Project Management Association (IPMA, 2010), which defines successful project management as being the assessment that the different parties involved have in the results of the project. The social values of the different agents and parties involved also influence this assessment. This constitutes a relevant complexity factor which affects project management, making an impact on expectations, involvement and participation. (Crawford, 2006).

Specifically, construction is an industry based on a high heterogeneous composition of different professional groups and therefore particularly dependent on interpersonal relationships and collaboration between these groups (Nicolini, 2002; Fellows and Liu, 2012). This characteristic gives rise to the phenomenon that is social identity which emerges in this industry. Löwstedt and Räisänen (2014) indicated that there are a variety of ‘in-groups’ and ‘out-groups’, within and between which, processes of identification unfold on a daily basis.

Some pieces of research (Ashforth et al., 2008) highlighted that shared group identity contributes to information sharing, coordinated action, cooperation and helping behavior. However, the presence of outgroup members can lead to hostility and information hiding. Hornsey et al. (2002) indicated that people are more defensive against criticism from outgroup members and Wittenbaum et al. (2004) highlighted that people are less inclined to share information with outgroup members.

One of the main problems with social identity concerns attributing responsibility for project risks. The different groups involved in a project have differing views on risks, such as different perceptions of the responsibility for and the importance of risks (Andi, 2006; Rahman and Kumaraswamy, 2002a). In addition, responsibility attribution can also take place when individuals or groups want to divert attention away from their own actions; in this sense, the act can be opportunistic or strategic (Van Os et al., 2015).

When the members of a team unite to develop a project, they are not only thinking about project success, but also about their own interests (depending on their respective area of management in the organization). All the organizations commit to the same thing, but the objectives and programmes may be very fragmented. This is where problems become even more complicated, further increasing the need for collaboration in order to achieve success. (Conklin, 2005).

The importance of competence or social skills within the field of social complexity must also be highlighted. The different individuals involved in a project require competence, in both behaviour and context in order to adequately manage a project. (De los Ríos et al., 2010; Yongkui and Yujie, 2009). For leaders it is particularly important not only to show commitment to the project in their use of language (Burke et al., 2010; Ellemers et al., 2004), but also in their behaviour. If there is incongruence between words and actions, further deterioration of relationships becomes even more likely, making it essential for project leaders to “walk the talk” (Van Dyck et al., 2013).

In certain situations, the position of each interested party in relation to what a problem is can be completely different. This poses the question of how to go forward with a solution which is acceptable for all parties. Conklin (2005) suggests a solution which is to create a collective understanding of the problem. Interested parties understand each other’s positions and through entering into intelligent dialogue concerning the interpretation of the problem. Then, a collective commitment to possible solutions can be reached.

Social complexity requires new skills and behaviour orientated towards the social foundation of work. Some authors (Diallo, 2005; Girmscheid and Brockmann, 2007) claim that the bases for managing or reducing complexity are trust, commitment and communication. If mutual trust occurs, there tend to be no weak links among project participants (Chan et al., 2004), thereby helping to achieve a relationally integrated team.

The social aspect of projects creates a new framework for discussion in the search for an answer to how to tackle complex projects and
management. This is the reason why numerous organizations are working on competency standards to cope with this new dimension (Herrera-Reyes et al., 2011).

Case study:

The project “Campus Universitario de Ciencias de la Salud” (University Campus of Health Sciences) developed by the University of Granada and financed by the Junta de Andalucía (Autonomous Community Administration), is located in the Parque Tecnológico de Ciencias de la Salud (PTS) (Health Sciences Technology Park), a technology park located in the south of the city of Granada. In this park, areas of university teaching, healthcare and business research and development are being developed, making it a benchmark area for the creation, implementation and expansion of institutions and companies. It will transform knowledge into social and economic development, especially in the pharmaceutical, bio-sanitary, healthcare, and food sectors which will convert it into the first of its kind in Spain and one of the few technological parks specializing in health in the world.

The development of CUCS consists of the construction of 5 buildings for university teaching and investigative use on a site of 100,214 m² which will be designated for General Services (SSGG) of the campus and the faculties of Health Sciences, Medicine, Pharmacy and Orthodontology.

Due to the existing funding for this project, obtained through a grant from the Junta de Andalucía, and because of its implementation deadlines, the owner has needed to develop the project in three phases: in the first phase all the design projects were drafted and contracted through an international tendering process, with a total of four architectural studies that are responsible for both the drafting of the project and the management of the works, making sure that the general design of the CUCS, from both urban-planning and geometrical perspectives, corresponded with the study which had won the bid in the tendering process; in a second phase, urbanization works on the site and the General Service, Faculties of Medicine and Health Sciences buildings have been implemented (see figure 1).

![Figure 1: General Service, Faculties of Medicine and Health Sciences buildings](image)

In a third phase, which is still pending due to a lack of funding, the works for the Faculties of Pharmacy and Orthodontology will be developed.

The activities included in the second phase, had a contract budget of 110 million euros and were developed between November 2009 and February 2015, with an initial period of 30 months.

Analysis and discussion of the project from the perspective of social complexity:

One of the main factors which affects the social complexity of the project is the high number of stakeholders involved (Conklin, 2005). Within the management of the project, a great number of both internal and external agents have participated from private and public spheres.

The main internal agents are: the University of Granada as developer of the works, final users, the teaching body, administration and service personnel and students. Along with these agents there are also designers and site management of the urbanization works and the General Service and Faculty of Medicine buildings. There is a second study which is responsible for the project and the management of the works for the Faculty of Health Sciences; three main contractors, two of which are made up of temporary joint ventures of three companies; two organisms of quality control and an integrated management body which holds responsibility for all of the functions of Construction Manager (CM).

This figure, who was introduced by the University of Granada after a global analysis of the project and its associated risks, was contracted at the same time.
as the construction companies, but not in the earlier phase of drafting the projects.

Among the external agents, there are: the Autonomous Community Administration as a financing organism and developer of the channeling works implemented on the site; the local administration as the party responsible for the permits and licenses related to each works; the PTS Foundation, as the developer of the construction of its headquarters, and as the urbanising entity of all of the Partial Development Plan within which this campus is being developed. Supply and service companies are also present, to provide the various urban services needed on the site and other agents such as the media and even government teams from the different administrations involved (political agents).

As previously stated, the CUCS project has involved an extremely high number of stakeholders, whose objectives and interests have been in opposition on numerous occasions during the lifecycle of the project.

Throughout the project, including during the design and construction phases, a multitude of relationships between the different people involved, both directly and indirectly, have been formed. These relationships were developed within the framework of the specific contracts, applicable regulations and legislation and, in many other cases by the simple good will of the stakeholders. Rahman and Kumaraswamy (2002b) argued that an appropriate contracting method coupled with clear and equitable contract documents does not ensure project success because the attitudes of the contracting parties and the relationships among the project participants are also equally important. However they found that relational contracting may be useful in reducing transaction costs as well as fostering cooperative relationships and better teamwork. Thus, good contracts are absolutely necessary for the proper development of the project. However, one of the main problems which has arisen in the case study is that not all the contractual relationships which the project needs exist. For example, the existence of the contract between UGR and the DIP is not included in the contracts between the UGR and the technical management and the UGR and the constructors.

The political context has also been a key factor in increasing the social complexity of the project. Different administrative bodies exist, with different interests and political aims.

Van Os et al. (2015) identified the political context as a project risk which can be influenced by technical, planning and financial risk; in fact, when a complex project entails severe political risk, not only threaten the goals of a project, but also presents a threat to the social identity of the project team.

Trust has been identified as a fundamental element in the development of construction projects by a multitude of authors (Graafland et al., 2007; Wong et al., 2000; Emmitt et al., 2003) Similarly, trust, commitment and communication have been identified as key tools in order to reduce social complexity (Diallo, 2005; Girmscheid and Brockmann, 2007). While trust is not a control mechanism, it is a substitute for one, with reduced monitoring work being required when levels of trust are high (Rousseau, 1998; Lewicki, 2006).

The personal relationships which exist in the CUCS project have displayed all of the possible roles for the different agents (driver, facilitator, analyst, aggressor, evader, cooperator and manipulator). Roles have changed over the course of the project, mainly because of the interests and objectives of each of the parties and not solely because of the main objectives of the project (quality, schedule and cost), impeding the creation of collective understanding of the problems and making it difficult to reach a collective commitment to possible solutions (Conklin, 2005).

These roles have been conditioned by the different factors which are present in any negotiation process. These are: power, relationships, position, time and tactics. In the case which is being studied, the time factor conditioned all of the mentioned roles and factors because a deadline for the implementation of the project existed which was able to condition the funding of the investment, a circumstance which was used by the different stakeholders to set up the main project objectives to serve the interests of their own companies and institutions.

All these elements which make up the social complexity of the project presented themselves more intensely since practically all of the relationships were hitherto unknown. (Dainty et al., 2007).

This situation, along with the fact that conflicts over project ambiguity arose, as well as delays in the
payment of certifications. Finally, there were also problems with schedules and product quality. All of these factors caused trust levels to disappear completely, producing negative effects, as the possibilities to rebuild trust exceeded the time span of the project (see Figure 2). This made communication increasingly more complex between the parties involved. In this same figure, the evolution of qualitative trust levels throughout the project are shown in a schematic way, as the author puts forward, without this being a numerical quantification.

![Figure 2: Trust evolution over the project](image)

Concerning the levels of trust between all of the agents involved in the development of a project, it is important to highlight that communication is an essential element and the key to establishing not only different relationships, but also in being able to share common objectives and establish lines of work for the attainment of these (Diallo et al. 2005). Fryer (2002) highlighted that even when a well-organized network of communication exists, it can break down at a personal level for different reasons, people fail to keep their messages simple, they pass on too much information or too little, or the information given is inaccurate or misleading.

The sheer number of parties that require coordination to bring a project to completion is still a challenge, so traditional communication methods such as fax, face to face meetings and e-mail are used, producing chaos in communication and workflow (Matheu, 2005).

In Figure 3 all of the relationships are detailed as well as the lines of communication derived from these. As can be seen, given the nature of the project which has been developed, its magnitude, geographical reach and strategic importance for the developer (The University of Granada), the probability of malfunction in the communication process and therefore in the relationships of the intra-agents and inter-agents, was extremely high.

![Figure 3 Relationships & lines of communication derived from these](image)
non-existent, but non-regulated relationships were established in which the CM was not in charge, therefore not fulfilling their actual role.

Another source of project complexity is the relationships which arise with the end users, as shown in Figure 3. The end users are a part of the UGR but not developers of the project. They established non-regulated relationships with the CM and the other technical managers (PM1 and PM2) which complicate/complicated the communication process.

Analyzing Figure 3 and in the specific case of the developer, the specific relationships established with the different stakeholders are those which are shown in Table 1.

Table 1 Relationships between Owner and the different stakeholders.

<table>
<thead>
<tr>
<th>External agents</th>
<th>Function</th>
<th>Relationship</th>
<th>Regulated</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMASAGRA</td>
<td>Water Services supply</td>
<td>Mandatory</td>
<td>NO</td>
</tr>
<tr>
<td>ENDESA</td>
<td>Electricity</td>
<td>Mandatory</td>
<td>NO</td>
</tr>
<tr>
<td>J.A.</td>
<td>Finance</td>
<td>Mandatory</td>
<td>NO</td>
</tr>
<tr>
<td>AYTO. GRA</td>
<td>Permits and licences</td>
<td>Mandatory</td>
<td>NO</td>
</tr>
<tr>
<td>AYTO. ARM</td>
<td>Permits and licences</td>
<td>Mandatory</td>
<td>NO</td>
</tr>
<tr>
<td>FPTS</td>
<td>Urban Planning Developer</td>
<td>Mandatory</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal agents</td>
<td>Function</td>
<td>Relationship</td>
<td>Regulated</td>
</tr>
<tr>
<td>USERS</td>
<td>Final Client</td>
<td>Informs</td>
<td>NO</td>
</tr>
<tr>
<td>CM</td>
<td>Supervise</td>
<td>develops</td>
<td>SI</td>
</tr>
<tr>
<td>PM1</td>
<td>Manage</td>
<td>develops</td>
<td>YES</td>
</tr>
<tr>
<td>PM2</td>
<td>Manage</td>
<td>develops</td>
<td>YES</td>
</tr>
<tr>
<td>C1</td>
<td>Execute</td>
<td>develops</td>
<td>YES</td>
</tr>
<tr>
<td>C2</td>
<td>Execute</td>
<td>develops</td>
<td>YES</td>
</tr>
<tr>
<td>C3</td>
<td>Execute</td>
<td>develops</td>
<td>YES</td>
</tr>
</tbody>
</table>

The number of information channels was extremely high, all of which had very different natures and methods of operation. Taking into account the expression N (N-1)/2 (White et al, 2002), which determines the number of communication channels in a process in relation to the number of participants (N), the number of channels can be quantified (see Table 2).

Table 2 Number of communication channels depending on the number of interlocutors.

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Nº of Channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>28</td>
</tr>
<tr>
<td>35</td>
<td>595</td>
</tr>
<tr>
<td>15</td>
<td>105</td>
</tr>
<tr>
<td>50</td>
<td>1225</td>
</tr>
</tbody>
</table>

It is important to point out the exponential relationship which exists between the number of interlocutors who are present and the possible communication channels, many of which do not have a regulatory framework and as such, provide little to the success of the project and even, on many occasions, encumber it.

Information flows in construction are numerous, unstructured and very complex. The different stakeholders cannot perform effectively without an adequate, accurate and timely flow of information. For this reason, each participant in the construction process has responsibility for transmitting...
information and communication. Also, the nature, volume, direction, and timing of the flow of information vary considerably. This demands effective coordination, control and dissemination to ensure proper utilization (Matheu, 2005).

Likewise, during the communication process, noise exists which adds complexity to the process. This noise comes from:

- Internal agents. The nature of the noise was in response to the distraction and the lack of interest of those who receive the message, the excess amount of information, unnecessary information and/or asymmetric information and even because of the attitudes of the interlocutors who did not take the values and attitudes of the other parties into account (Domínguez, 2010).
- External agents. Given the public nature of the project, during the whole process, pronouncements, declarations and even pieces of news have existed that, coming from people or entities who initially are not involved in the process, do end up affecting the project, when they are received by the different agents who are directly involved.

Communication has even changed the base language, which started out with a technical and managerial focus and clearly finishing up in judicial terms, which anticipate the possible lack of agreements and judicial solutions. The nature of the language used clearly makes opportunities for understanding difficult.

The relation between complexity and communication has been demonstrated in many studies (Senescu et al. 2013). The use of asymmetric information changes the utility of communication, especially for owners. In addition, the gap between the information needed and the information available makes the decision-making process a very difficult task. It is clear that some projects are intrinsically more uncertain than others; this can be defined as the level of project mission uncertainty. As the sequence of decisions is made and more information is acquired about the project during its life cycle, the level of decision-making uncertainty falls; this can be defined as the level of project dynamic uncertainty on the project (Winch, 2010).

Furthermore, stakeholders base the attribution of responsibility not only on what the person has actually done, but also on the expectations derived from their social and team role (Van Os et al. 2015). This social and business context affects understanding, emotions and behaviour and individuals disappear into the group they belong to.

It has been proved that shared group identity can contribute to a good work environment (Ashforth et al., 2008). However, when social complexity in a project is high, the presence of outgroup members can lead to hostility and information hiding. Hornsey et al. (2002) indicated that people are more defensive against criticism from outgroup members and Wittenbaum et al. (2004) highlighted that people are less inclined to share information with outgroup members. This was shown on numerous occasions during the project being analysed here and between the stakeholders who participated in the development of the project.

Conclusions:

In this paper social complexity in construction projects has been analysed. Construction projects are increasingly ambitious, presenting technical and organizational challenges which, in many cases, can be considered to be complex systems, and that need to be managed with a modern vision of project management. The importance of the social dimension is evident, having to establish proper mechanisms and take appropriate decisions to enable proper management. Simplification, provided that it does not mean a loss of information of project contraints, is essential in order to avoid a situation where the degree of complexity makes the project unviable.

The specific case “University Campus of Health Sciences” has been studied. The social complexity of the case study has been a problem of such magnitude that objectives have not been achieved in areas of schedule, quality or cost. The deviations from the schedule have caused problems in project financing. These problems have been so great that the construction of the facilities of Pharmacy and Orthodontology (included in the original project) are still waiting to be started.

The type of client also has an effect on the degree of project complexity. Private clients can establish ongoing relationships that are favourable to the work environment, the involvement of different individuals and even the general success of the project. However public clients cannot offer any future relationships, since most projects must be procured through competitive bidding (Ling and Tran, 2012). Therefore, one-off relationships are established, in which each individual tries to get
maximum benefit for themselves. The type of client also has an effect on the degree of project complexity.

The existence of relationships between parties who are not contractually regulated makes the processes of communication and information transfer incredibly difficult, and these are activities which are key to the success of the project. This lack of regulation is shown in many circumstances in the transfer of asymmetric information which responds to the interests of the stakeholders and not those of the actual project. The development of new legal frameworks means it is necessary to focus on models of project management which include relationships based on trust, which has a direct influence on the levels of risk and uncertainty of the project.

Finally, it is important to highlight the need to carry out an evaluation of the complexity of the project in the first stages of its life cycle, before the implantation of any models or systems of management, as any one of the chosen management systems adds new components to the social complexity of the project, which has been clearly shown in the development of the successive stages of the project.

In order to achieve a successful project, having a formal risk management system in place is not enough; one must also pay attention to the way risk is discussed, specifically how different groups in a project talk about risks in relation to the other stakeholder groups. The time and energy spent on external attribution of responsibility, conflict, and withholding information, is likely to damage the efficiency of a project, which could add to the problems of delays and escalating costs that we touched upon in the introduction. It is therefore important to be aware of these processes and to act upon them whenever possible (Van-Os et al., 2015).

Some authors have put forward a solution to manage the social dimension of complex projects. They believe that the management of such projects should be approached as if they were social networks, proposing an integrated social network model (Yongkui and Yujie, 2009). The use of social network analysis suggests that it is necessary to conceptualize project coalitions as networks rather than as the hierarchies implied by the principal–agent relationship between the owner and its tier one supplier (Pryke, 2012). However, this approach might not be viable in the rigid, hierarchical structures which are usually found in Public Administration.

Some possible solutions which allow project complexity to be managed could be, increasing the expertise of the client organization, outsourcing and adjusting ambitions (Leijten, 2009). When the client does not have enough expertise, they can be the victims of intentional or unintentional influences from other stakeholders.

Outsourcing can be used to shift decision-making authority towards the information owner(s). Because the information owners are mostly private parties, usually hired to provide their expertise, this would require the ‘privatization’ of decision-making. This is only acceptable if the private decision-maker also takes responsibility for the risks associated with the decisions made. However, the implementation of this system is a form of privatization, something which is not possible for many public administration projects. The adjustment of ambition can be achieved by decreasing the information required or increasing the robustness.

It would be interesting to develop specific strategic for minimizing asymmetries information among project participants. Some of them could be increasing Corporate Culture, Reputation, Incentives and Trust (Schieg, 2008; Serva et al. 2005)

With all three solutions there are changes in the incentives of parties other than the client, in such a way that their divergent interests no longer cause unmanageability from the client’s point of view. If a solution is to be found in traditional contracting, the most important prerequisite would be to get the incentives right (Leijten, 2009).

Given the characteristics and conditions which surround project complexity, the authors of this research project identify that social complexity of projects can be faced from two different scopes: An individual scope and a global scope.

The individual scope, framed in the actual management of the project, in which the cases for management are trust, commitment and communication. This can create an atmosphere of collective understanding of the problems that could arise throughout the project. This could help the different stakeholders to involve themselves in the search for solutions which could lead to project
success. It is important to know about this complexity in advance, in order to demand certain skills from the manager. These include social skills (Buckle et al., 2003); they should be a good communicator (Mouchi et al., 2011), know how to choose forms of communication and which communication vehicles to use, the right moment to act, and even who should receive the message or the information that they wish to share. (PMI, 2013; IPMA, 2006).

The number of agents involved in the management of a complex project, as well as their filiation, interests, objectives and personalities make this capacity to communicate, essential. It is necessary to add to this, a flexibility of approach and well-developed emotional intelligence which allows for the understanding of the interests and conditions of each party. (Thamhain, 2004).

In the global sphere, the solutions are more complex and require long time in order to be applied. These solutions are focused on modification of legislative framework. In the case of public infrastructure projects, it is necessary to improve management conditions starting with the modification of the legal regulatory framework, characterized by an extreme rigidity which is incompatible with one of the primary requirements in the management of complexity: flexibility.

The current contracting models should also adapt to the new conditions and allow the changes which occur during the lifecycle of the project to be managed.

References


