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Project Risk Analysis: Adherence Between Investors and Managers Risk Management

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Abstract

This work presents a new perspective for analysing the risk management at infrastructure projects, focusing at the interface between risk management performed by managers and investors. As result it is presented a case study that apply a qualitative model of this interface which makes explicit the main elements acting at this activity. This work is the result of a deep research over the structures required to finance big projects at the infrastructure industry. The main themes explored are project and risk management; corporate governance; and investment in big infrastructure projects. The data was collected directly with companies and professionals acting at this kind of business and also secondary data from public websites, publications and other bibliography. It's an interesting overview for professionals acting on this subject and it is also interesting for outsiders to have a notion about how complex can be the development of countries infrastructures.

Keywords: risk analysis; infrastructure; project finance.

1 Introduction

The development of country's infra-structures, as power generation and supply; transport; water supply and waste treatment facilities, is a challenge all around the world. This is specially challenging because of technical, financial and political issues. Big and complex projects require and may generate large amounts of money and may also affect social communities, country development and the surrounding environment. It is a technical challenge because it may involve the use of complex technologies and management procedures, and a financial challenge because it requires finding sources for the projects once the State is no longer able to do it all by himself (GRIMSEY; LEWIS; 2002). This last characteristic open space for the participation of private investors aiming either to diversify their portfolios and/or venture themselves as specialized firms at one specific sector, as it will be dissertated during this article. The technical and managerial complexity of these projects gave impulsion to important developments on the project management field making available several techniques, tools and methods applied by specialized firms and professionals. So, these projects have been developed in a context where specialized firms make partnerships with or are contracted by different investors to explore opportunities at the infrastructure industry. These specialized firms can be, for instance, engineering companies contracted to execute and operate the project, acting as agents (JENSEN, 1976) taking many actions and decisions on behalf of investors. Conflicts may appear when investors want to make sure that the project managers are conducting the project to achieve the rewards expected by the investors. Related to that, among the many duties of project managers, the risk analysis and management are a special concern for sponsors and stakeholders because it identifies possible situations that may take the project from its expected results and than plan and execute actions to avoid, mitigate these situations and also keep investors up to date about the project's real circumstances.

This work has as main contribution to present a new way to represent elements that are directly related with the risk management done by infra-structure project managers and investors. These elements may be processes, organizational structures, financial system's institutions and tools, regulatory agencies, contracts, and also, social and cultural relationships acting at the boundaries of a company created

specifically for the project enhancing the adherence between the two different worlds of project managers and investors. This border is a virtual place where conflicts related to the risk management between these two actors are solved. It is also presented a case of a power generation plant developed at the very south of Brazil.

2 Projects

Projects can be present in different sectors like industrial projects (as product research and development), infrastructures projects (as mentioned before), and services (as software development, market analysis, etc). Here we are working with infrastructure projects that, in the Brazilian case, are more and more been handled by creating a specific company for then. This company is so called Specific Purpose Company (SPC) and it may be used when the project has many sponsors and it may represent an advantage to separate the projects organization and it's creditworthiness from sponsors. This is especially common in *Project Finance* structures that, according to Finnerty (1998), happen when a project is financed without or with limited recourse to sponsors, taking the predicted cash flow as main guarantees for lenders.

Projects usually have three main objectives that are product, price and term (CASAROTTO, 1999), these objectives are also known as the "Iron Triangle", cost, quality and time (ATKINSON, 2006); but big projects, like infrastructure projects may have other objectives according to the different aims of shareholders and stakeholders participating at the project. For instance, the objectives of sponsors would be dividends and products; for lenders it would be interest and amortization; suppliers would be interested in quantity and price; for costumers, quantity, price and quality; and for government it would be quality, price, quantity and taxes. Those objectives are related to opportunities and risks that each participant is ready to take.

Professionalism is a key to the project success; engineering contractors, business and their existence rests notably on developing their capabilities at project management. A project is naturally a planned thing, once someone aims a future objective, he must believe that there is a viable path to reach this objective. The tasks required for the project must be identified and the necessary resources must be quantified. Although planning is not the guarantee of success, not planning can determine the failure of a project (DEVIR, 2003). Also related with the planning activity is the fact that we have imperfect knowledge of the future as a consequence of changes (KNIGHT, 1921). This imperfection brings uncertainty as says Bussey (1978), that in the real world it is impossible to be sure about all the outcomes of a project. So project development and investment is directly related with taking risks, in other words, profits are, in part, the reward for successful risk taking in business (TURNBULL GUIDENCE, (2005), as it will be discussed at the next item.

3 Risk Analysis and Management

The risk management as stated by Kerzner (2003) is an organized way to identify and evaluate the risks and develops, selects and manages the alternatives to control them.

Concerning the different types of risks, the PMI (2004) uses four different categories to identify risks which are: Technical, quality and performance risks; Project management; Organizational risks; and External risks. This last risk is often considered as systemic risk (BONOMI, 2002). It is an important point of view that may link project management risks to the classical financial risks (MARKOWITZ, 1952), (SHARPE, 1964): systemic and diversifiable risks. The others three risks mentioned before would be diversifiable.

Smith (2003) mentions the key risks specific for *Project Finance* projects. This risks are: Construction and project development risks; Project planning and preparation risks; Implementation risks; Shareholder/joint venture risks; Site risks; Technology risks; Supply risks; Market risks; Operating and maintenance risks; Financing and foreign risks; Environmental compliance risks; Consents and approvals risks; Insurances risks and Loan syndication risks. Grimsey and Lewis (2006) have a similar classification.

These and other classifications are very important for the risk management once the activity of risk identification is present many risk management models. Assembling three models (PMI, 2004), (SMITH, 2003), (Picard; Thouvenin; 2005) from different lines, it is possible to have a summary of the main activities and stages of the risk management as presented at the table 1.

Table 1. Main stages of the risk management

Risk Management Planning
Risk Identification
Hierarchization of risks through quality and quantity analysis.
Treatment actions definition
Treatment actions following
Tableau de Board development

Source: Santa Catarina (2008)

Knowing the type of risks and the main project risk management stages is very important to identify the main elements that would be acting between managers and investors and also to analyze which function would they be playing. The next section analyses the investment and risk analysis at infrastructure projects.

4 Investment and risk analysis in Infrastructure Projects

This section explores the investment in infrastructure projects, reviewing concepts, showing the main investors and ways of investing in order to define the investment context where investors perform their risk analysis at this kind of projects.

Most of authors consider that the only possibility to invest in projects is by providing capital as a sponsor, participating at the project's equity. The present work considers as investment all capital sources for the project including equity and debt.

- Debt securities with recourse to sponsors – as these sorts of investments are usually rewarded by an interest rate over the principal with the possibility of recourse over sponsors, the risks lies over the projects payment capability and the sponsor's creditworthiness and debt level.
- Debt securities with limited or without recourse to sponsors – that are also rewarded by an interest rate over the principal, have their guarantees related to the projects capability of generating net cash flow, depending on projects operational and commercial performance, thus risks are related to these points. These kinds of securities are characteristics of Project Finance's structures. In this case is usually created a specific account, the Scroll Account, where project's revenues must arrive, instead of the SPE account. Investors may have recourse to this account in case of payment failure.
- Selling future contracts – that is a quite common way to finance infrastructure projects that happens when costumers pay when the project is under construction expecting to have projects outcome (like energy and water supply for instance) in the future. In this case, risks are related to projects operational performance and market future behaviour. Depends also on the guarantees that are given.
- Supplying future contracts – that happens when a partner supply the project with goods or services expecting future payment. Have its main risks at the project's capability of payment and the given guarantees in case of failure on payment.
- Equity securities – rewarded usually through the payment of dividends or by negotiating the securities at the stock markets. These investments depends on the company's capability of generating net cash flow for the payment of dividends or/and by the behaviour of the company's stock prices at the market and also the market systemic behaviour. This is a sort of investment that holds all the risks that were not assumed by any other project's participants, which is the residual project's risk.

All these investments possibilities also represent alternatives for investors with different non-engineering profiles like: commercial banks, leasing companies, insurance companies, pension funds, governmental bond authorities, finance companies, export credits, international financing agencies, private lenders, customers and suppliers as mentioned by Farrel (2003). This "non-engineering profiles" means that some investors are ignorant (not pejorative) on the engineering processes those are usually present in infra-structure projects. More than this, infra-structure projects represent investment alternatives for non institutional investors, which mean that they may do not even know about finance and investment. It is likely to have these kinds of investors once they increase the capital available for infra-structure projects that are so important for the countries development. Nevertheless, it is also a challenge for project sponsors and financial system's institutions and rulers to limit the risk assumed by those investors creating a trustful investment scenario. The return depends mainly on the project's force, which means the possibility of generating a future cash flow to pay operational costs, debt and finally equity. The risk depends on the projects characteristics as well on how the project society deals with them and that is why the risk management is so important to the investment. In the next section a discussion is developed about what is Corporate Governance and how it's related with project investment and risk management.

5 Corporate Governance and Risk Management

The Corporate Governance describes all the influences affecting the institutional processes, aiming to mitigate the agency problem (TURNBULL, 1996). It also develops methods and mechanisms to minimize this problem by assuming some important principles like disclosure, accountability, equity, and corporative responsibility, which should be taken in account when developing an attractive environment for investment, fomenting companies and countries development. The Sarbanes-Oxley act - SOX, assigned in 2002 by the United States Government aimed to apply some of these principles in response to the scandals involving some important US companies like Enron, Tyco International e WorldCom. These and other companies published untruth financial reports bringing loses for investors and, consequently, uncertainty to the investment markets. The act focused at the responsibility of the company and its directors on communicating truly accounting and financial information and at effective internal controls. Different methods are available to improve this internal controls, one of them is suggested by the *Committee of Sponsoring Organizations of the Treadway Commission* – COSO, considered by Deloitte (2003) as the most used one, and that has five components as shown bellow.

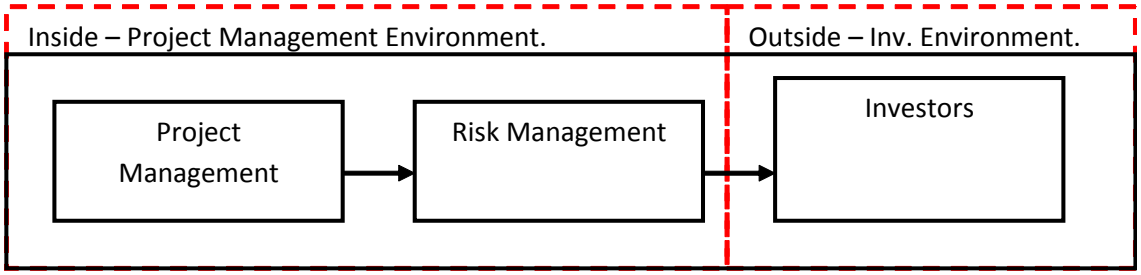
- **Control environment**
  That is the base for the control activities, including ethical values and competencies.
- **Risk Analysis**
  That includes the identification and analysis of the risks that can avoid the business to achieve its objectives.
- **Control activities**
  That means de definition of actions to deal with the identified risks.
- **Information and communication**
  This component is related to the information paths and tools used between the different layers of the company.
- **Internal control monitoring**
  That represents the ways that the firm has to evaluate and follows the performance of the controlling actions that were taken.

The second, the third and the last components showed at the list before are directly related to the internal risk management showing how related is the risk management with investment. This relation between risk management and the internal controls is also present at the Turnbull Guidance (TURNBULL GUIDENCE, 2005) that is also an important reference for internal control. At the next item, these Corporate Governance procedures and some others are assembled to characterize the interface between project managers and investors.

The governance is also a critical matter when projects must take in account stakeholders that, more and more get involved in infrastructure projects because of sustainability issues. Atkinson et al (2006) make a point when they say that the degree of stakeholder involvement and expectations in terms of interaction will affect the definition of strategies that must arrive from sense making and agreements with them. Santa Catarina and Stephano (2010) checked that by indenting the main actions taken by big infrastructure companies to cope with those sustainability issues. So, although investors and managers are the main actors, others participants should not be left apart. The next section discus the interface between investors and project managers.

6 Interface between Investors and Project Management risk management

This work is worried about the system formed by the project, the investors and the other players at the investment environment as illustrated below.



Source: Santa Catarina (2008).

Figure 1: System formed between project investors and managers.

When visualizing this illustration we must understand that there is a network that connect project's tasks, risk management and project following by the investors. This network across the boundaries of the project and reaches investors, but this interface is not only a line, it is made by all the processes, organizational structures, financial system's institutions, regulatory agencies, contracts, and also, social and cultural relationship's "sub-networks". From the Corporate Governance literature like Turnbull (1996) and also those internal control documents mentioned before (DELOITE, 2003);(TURNBULL GUIDENCE, (2005) it is possible to identify mechanisms, tools and organizational structures to mediate the relationships between agents and investors, integrating the interface between them. The next table summarizes the informations concerning the interface from five different Corporate Governance models.

Table 2. Corporate Governances mechanisms, tools and organizational structures at the interface between project management and investors from five Corporate Governance models.

From the Finance Model (TURNBULL, 1996).	Management agreements; bonding managers; providing reports to investors; Investors playing strategic roles at the project management, and board of directors.
From the Stakeholders Model (TURNBULL, 1996).	Supply agreement; selling agreements; concession contracts; shared planning; equity investment (bonding); and the participation of governments, society and others institutes.
From the Stewardship Model (TURNBULL, 1996).	Trust and executive directors.
From Political Model (TURNBULL, 1996)	Sector regulatory agencies; laws; financial systems institutions (SEC).
From SOX (DELOITE, 2003);(TURNBULL GUIDENCE, (2005)	Information Technology; non-executive members at the board of directors (like investors); independents external and internal auditors; Financial and Executive directors responsible for internal control and accounting information communication.

Source: Santa Catarina (2008).

The finance model is focused on developing constraints and rewards for managers, defining their roles and responsibilities by contracts, and by submitting important decisions to an administrative board formed also by non-executive members. The elements related with the stakeholder's model would serve to obtain stakeholders best efforts to the project accomplishments. Besides contracts and agreements that would define their technical and financial responsibilities, shared planning and bonding may be important tools to develop commitment and realistic planning. Almost in an opposite sense, the stewardship model considers agents, in this case, project managers, as the best "guardians" of the project. According to this model, they would be the most prepared professionals to take all decisions concerning the project's development, justifying the formation of boards of directors purely by executives, avoiding non-executive (non-technical, non-professional) participation. The political model considers the project governance is influenced by political issues like laws and other institutions related to the public policies and power as security exchange commissions and sector regulatory agencies that impose rules over the firms. What is considered here as a model of governance, the SOX act, as already mentioned before, brings some other quite important elements. Many authors may consider the analysis of all these models together a mistake, but in real cases is really hard, if not impossible, to find situations where the models are used isolated, without any influence by the others. All these models definitively cover a wide range of situations; nevertheless, it is still possible to find important elements not considered by these models as it is shown next (SANTA CATARINA, 2008).

- Risk Agencies: Risk evaluation agencies also play an important role once they are contracted by issuers to evaluate their securities so investors can use that evaluation as a reference about the risk that they would be taken when investing at some project. The risk evaluation agencies are important because they classify project's securities indicating the level that investors would be exposed when acquiring them.
- Derivatives for covering some specific risks. These are some financial "tools" that are used to deal with part of the financing and foreign exchange risks, like interest and exchange rates movement. The most common derivatives are hedges, swaps and options that are available with Trust Companies.
- Insurances. Insurances are really important tools to deal with some risks like: Site Risks (Unknown ground conditions, environmental disasters, whether conditions, etc); Market Risks, Country and political risks (WOERTHER, 2007); environmental risks; and compliance risks.
- Scroll Account: that is a specific account created for the cases where the project's revenues may be given as guarantee in case of failure of debt payment.
- Agent Bancs. Bancs responsible for some arrangements like the scroll account and the marketing of part of the securities like debentures and term contracts.
- Sponsors Agreement (BONOMI, 2002). That is an agreement where investors define how to deal with situations that involve shareholders that leave; additional members; conflicts of interest; failure on performing agreed roles and capital subscription; and other situations.
- Construction Contracts. For projects with technical and engineering complexities theses contracts are key to set who is going to bear those risks related with the construction like cost overrun; poor utility's performance and delays.
- Specific Contractual Clauses and Covenants: that are clauses that gives extra guaranties to lenders, like, for instance, a cash flow's lower limit to cover debt services.
- Technical advisors (evidences availability) (SMITH, 2003). Some risks are deeply related with the lack of knowledge in specific fields like laws complexities; the need of specific consents and approvals; engineering and technical procedures; and other technological issues.
- Meetings between project managers and investors at the planning stages of the project, to define objectives, procedures for risk management, and many other needs from investors on their risk management.

These elements are represented at the illustration presented at the next section. They are not applied to all investors and not either to all projects. Between investors, it depends a lot about their knowledge at the respective project field and it depends as well on the amount of resources available to follow and

control the project's development. Investors participating at the project as sponsors usually are engineering companies participating at the management, sharing responsibilities with other companies contracted to perform engineering services. This participation is usually defined at construction contracts. Non-engineering investors, while "powerful" institutions may have technical or/and professional advisors to mitigate the risks related to the lack of knowledge. Investors without resources available to cover these risks require the participation of the financial system to develop low risk securities and procedures to apply governance principles like those mentioned while disserting about SOX act model. At the illustration it is possible to identify some elements related with that, like independent auditors, executive and financial directors responsible for the preparation and communication of accounting reports, and yet the control performed by financial system. Among different projects, it may depend on how complex are de capital structures, the presence of important stakeholders, and about the types of risks identified. As it is possible to see at the illustration, the project may have different types of equity and debt participants with the respective structures and procedures to correctly treat the risks between them and the project society. These risk treatment can happen through the risk agencies and agreement between sponsors, but also by the usage of financial system structures as it is either presented at the illustration.

The interface elements related with stakeholders get importance when the stakeholders represent constraints for the project development or play important roles. Constraints may be related with social and environmental risks which are strong enough to delay the project or even turn it unviable to develop. The government is one of the most important stakeholders once infra-structure projects are frequently attached to concession contracts or playing public private partnerships.

7 Case Study – Lages Bioenergética Ltda.

Aiming to analyse the interface between the risk management done by managers and investors in a real situation, this section studies a power co-generation plant that have been developed in the city of Lages at the State of Santa Catarina in the south of Brazil. This and other cases were deeply studied by Santa Catarina (2008) that developed the model to perform this analysis. Lages Bioenergética Ltda. is a company successfully created some years ago with the specific purpose of building and operating the project that has some interesting features. It is a thermoelectric plant that uses wooden materials that would be wasted by wood companies (that process renewable wood) placed near to the plant's site and has as main outcomes electric energy and superheated vapour that is directly applied in to the processes of two wood companies placed close to the plant. By using this biomass that would be wasted, the company brings benefits for the environment, reducing the CO_2 and CH_4 emissions representing extra revenue by the selling of carbon credits. The total investment was around $ 55 million US dollars which had been financed with 45% equity, by the company Tractebel/Suez Energy International, and by a long term loan from de Brazilian National Development Bank – BNDES/BRDE. The electrical energy generated is sold mainly for one costumer, the CELESC, or *Centrais Eletricas de Santa Catarina S.A.*, that is the electricity utility for the southern Brazilian state of Santa Catarina. The Power Purchase Agreements (PPA) signed are the main guaranties given for the credit bank so the project can be considered a case of Project Finance, but there are many other elements in the security package designed for this operation.

This study has identified the main elements acting at the interface between the risk management done by investors and managers and representing them at the figure at the next page.

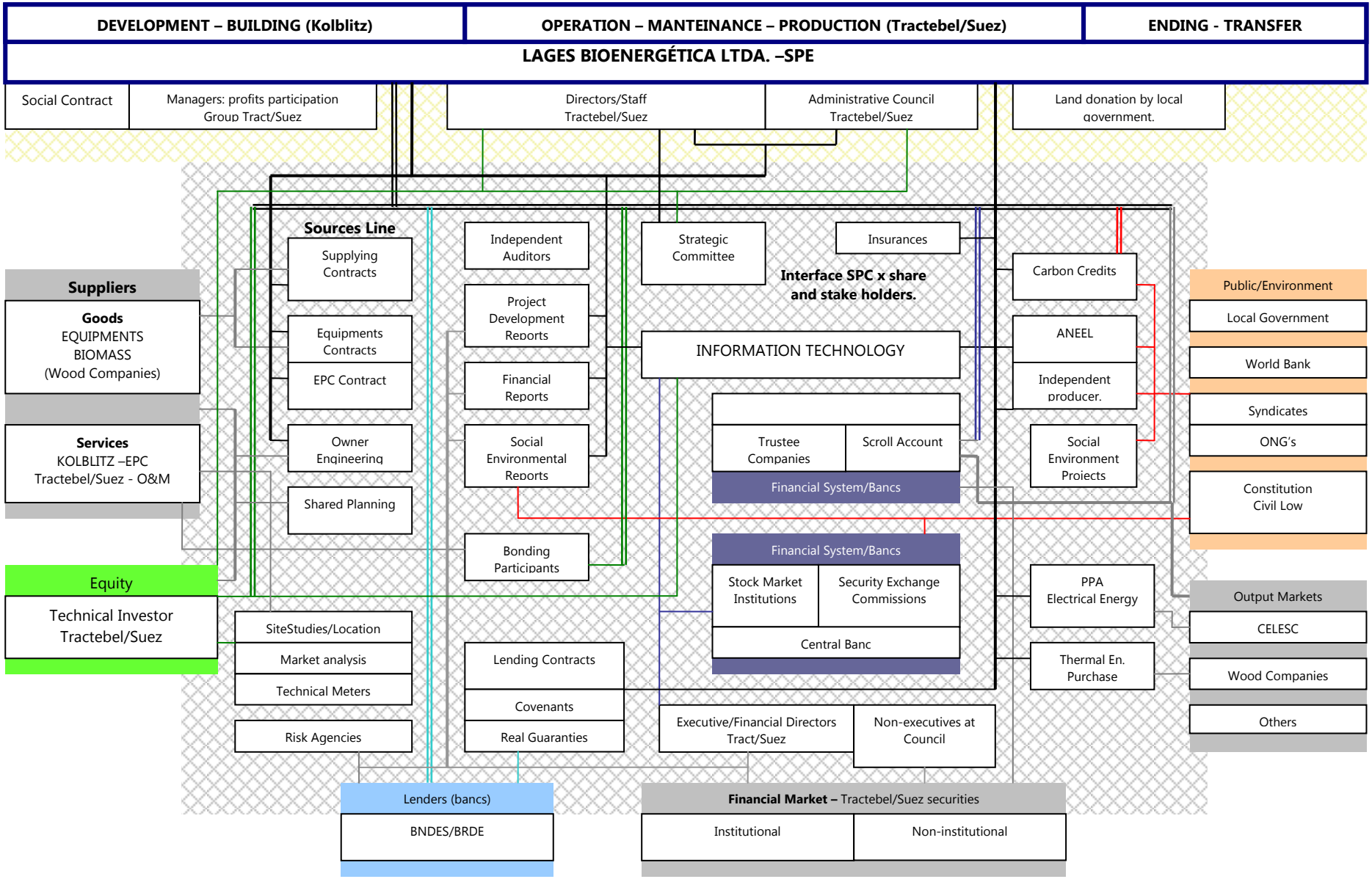


Figure 2. Graphic representation of the interface between Lages Bioenergética Ltda. and the main stakeholders. Source: Santa Catarina (2008).

This figure represents the interface between the special purpose company created for the project and the investors, represented by the Equity and Lenders boxes, and the stakeholders that also play an important role at this organization, like the local government, the markets where the products are sold, the suppliers, the financial systems institutions and the financial markets where the investor's securities are available for institutional and non institutional investors.

The little boxes within the grey and yellow patterns represent the elements that play some sort of role at the risk management of the project outside or within the SPC structure respectively. The roles played for each element are related with actions for risk treatment for avoiding and mitigating risk or transferring the risk's responsibilities to a third part. For instance, the supplying contracts that are place around the up left quadrant act at the risk management defining who's going to bear the supplying risks. The three boxes together placed at the left bottom named as site studies, market analysis and technical meters represents professionals and institutions hired to advise investors on this subjects, mitigating (reducing) risks. The lending contracts, covenants and the real guaranties, connected directly with the lenders boxes are elements with management risk functions related with then. At the right it is possible to see on the top, elements related with the public power like the national regulation agency for the electrical energy (ANEEL) and the national operator of the electrical system (ONS), those play important roles on defining operational rules and political issues mitigating operation, maintenance and political risks. At the right bottom there are elements related with the cash entries like the Power Purchase Agreements and the thermal selling agreements which are directly related with the commercial risks and also the scroll account that represent a risk mitigation tool for lenders. Right up the financial markets box there are two corporate governance elements with the functions of defending investors securities owners from the project's risks.

8 Conclusions

This article presented the interface between the risk management done by project managers and investors representing the main relations between then and also between the SPC and the main stakeholders. It is a systemic approach of the risk management, analysing its relations with external partners of the project focusing at the elements that turn the relations between all these partners possible and not at the SPC as some others representations do. The model was applied to the case studied representing graphically its main tools, contracts, organizational structures and institutions that exist to satisfy the investors expectancies about the risk treatment.

The contracts and insurances are the most important tools to transfer the risks between each partner while reports, the participation of investors at the SPE Organogram and the Financial System institutions work to mitigate the risks and to provide alternatives to control the project performance and development. Yet, it has became also clear the importance of the Corporate Governance, especially if regarded through different points of view (different models), to manage and organize the investment in infrastructure projects.

The systemic approach applied gives an overview of the community created around a big project like Lages Bioenergética Ltda. It also shows the complexity of the relationships that must be settled to create an investment at structure for financing projects that rely mainly over its cash flows as guarantee. The structure built must take in account not only investors e sponsors but also stakeholders that can have a big influence over the project as it is possible to see in big projects like, for instance, Belo Monte Hydroelectric plant (Norte Energia S/A) that have been facing big challenges because of the public opinion.

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