

# AN EXAMINATION OF THE RISK MANAGEMENT PROCESS IN VENEZUELAN CONSTRUCTION PROJECTS

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The construction industry has many sources of risk some of which can be attributed to the complexity of processes, the environment of construction projects, financial aspects, organizational structures and technology usage. In the success of construction projects, the importance of identifying and managing risks is widely acknowledged. Delays in time and cost overrun have become the most common risks facing the industry worldwide. However, they are particularly prevalent in developing countries where adversities such as shortage of materials, lack of management skills, unskilled labour as well as socio economic and political problems must be dealt with; all of which make construction projects more difficult to manage. Interviews with project managers responsible for projects in the public and private sectors were carried out in order to evaluate their perception of risks, how they manage these risks and the effects of the risks on their projects. The results of the investigation show the main sources of risk identified relate to: the risk management process; organizational structure; labour unions; and economic factors. For example, the Venezuelan construction companies face risks as a result of the current economic situation brought about by the currency exchange controls applied 10 years ago. This is causing a negative impact on the procurement and costs of construction projects. This paper explains how these factors are managed and their impact on time and cost. One of the recommendations proposed as a way of improving the risk management process in Venezuelan construction projects is to assess the internal processes and organizational structure of project management companies. This will aid advanced identification of the sources of risk in order to allow timely decision making.

Keywords: organizational structure, risk management, sources of risk, time delays.

## INTRODUCTION

The construction industry has to deal with constant change due to its dynamic environment and, as a consequence, has to face many risks (Ofori, 2000). A study by Baloi & Price, (2003) shows that risk factors are present in all construction projects everywhere. In fact, delays in time and cost overruns have become the most common risks facing the construction industry worldwide according to Raftery (1994), (as cited in Baloi & Price, 2003). It is important for the stakeholders involved such as clients, owners, contractors, project managers, etc., to deal with these apparent risks because the construction industry brings many benefits for the economies of countries and the value of the domestic construction enterprises (Ofori, 2000).

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This research aims to identify the key sources of risk faced by Venezuelan construction projects and explain how they were managed. Furthermore, the Venezuelan construction companies may have to face risks as a result of the current economic situation, especially with the currency exchange control applied 10 years ago which causes a negative impact in areas such as procurement and costs within construction projects (Bascaran, 2003).

This research is based on different kinds of construction projects developed in Venezuela for public and private clients. This study also reflects the current risk management doctrine adopted by Venezuelan companies, and shows the crucial role that such aspects as planning, scheduling and risk management have on construction projects. Finally this research attempts to find a framework for improving the risk management process in construction projects for this country.

## LITERATURE REVIEW

The concept of risk has been explained by researchers such as Baloi and Price (2003) who indicate that risk is the probability of occurrence of an event that affects projects' aims in terms of cost, time and quality. Authors such as Perry & Hayes (1985) and Porter (1981) indicated that risks are the economic losses or gains within the construction environment, while Manson (1973) and Moanvenzadeh (1979) argue that risk is just about loss (as cited in Akintoye & Macleod, 1997).

On the other hand, Winch (2010) explains the concept of risk is based on four schools of thought.

1. Objectivist school: the likelihood of an event happening can be predicted from previous occurrences of a similar event in the past.
2. Logical school: engineers use logic to identify risk sources and their likelihood because they do not have enough data or limited data do so, during the design and construction system.
3. Subjectivist school: based on the experience and expertise, or belief, of the decision makers who predict that some events can happen during the project's life cycle.
4. Behavioural school: the decisions are made based on human behaviours.

The fact that risk is very much related to the likelihood of an event happening, leads to the necessity of implementation of risk management processes by project managers. As a consequence, there is a very close relationship between the behaviour, experience, and education of project managers and the way they deal with risk factors.

## THE RISK MANAGEMENT PROCESS

The risk management process has become an important activity in the construction industry. According to Akintoye & Macleod (1997), it is important for minimising losses and increasing profits. At the same time, it can also be seen as a tool to reduce the chance of failure or to maximise opportunities in the projects (Loosemore *et al.* 2006). However, for a more practical understanding of this concept, this research uses a simple framework to explain the risk management process as: risk identification, risk analysis and risk response (Raftery, 1994).

**Risk Identification:** Through this stage the potential risks affecting construction projects can be identified. However, the careless way in which this process is undertaken in many construction companies is one of the causes of failure of construction projects (Loosemore *et al.* 2006). Moreover, the nature of risks could be

internal and/or external. Consequently, the identification process should be carried out by a professional with enough experience (Raftery, 1994), as if a risk is not identified in early stages, it will be handled in a reactive way, rather than a proactive manner (Loosemore *et al.* 2006).

**Risk Analysis:** Through the analysis it is possible to identify the scale of the risk, which areas of the project will be affected, what the possible responses could be and the necessary resources required to face the risks (Loosemore *et al.* 2006).

**Risk Response:** According to PMI, (2004, p. 260), "risk response is the process of developing options and determining actions to enhance opportunities and reduce threats to the project's objectives".

Nevertheless, risks cannot be eliminated; the challenge is identifying, assessing and managing them effectively (Loosemore *et al.* 2006). Therefore, Willians (1995) argues that the risk management process is based on the project manager's skills and knowledge to reach the project's objectives. This research explores the perception of risks as well as the manner in which project managers in Venezuelan companies carry out risk management processes. Thus, any inconsistency between the knowledge and the application of risk management skills by project managers and contractors can be determined. In some cases there is a lack of adequate knowledge in this field in the construction industry (Mulholland & Christian, 1999; Flanagan & Norman, 1993). This view is supported by Baloi & Price (2003) who argue that contractors in developing countries do not have enough experience and knowledge to deal with risk factors. They also identify the consequences of these factors through the outcomes in construction projects such as: delays in completion, deficient cost performance and bad quality.

A study by Bascaran (2003), found that just 4% of the civil engineers in Venezuela have got a masters degree in construction project management. As a consequence, there is a shortage of skilled staff in this field. It is important to highlight, that from the data gathered for this study, there is a lack of knowledge in Venezuelan companies, about how to carry out the risk analysis process which would account for the outcomes related to time and costs in construction projects.

## **SOURCES OF RISK AND CLASSIFICATION**

A study by Zou, Zhang, & Wang (2007) states that the primary sources of risk are two: internal, related to the type of project; and external, associated with the environment in which the project is developed. Zhi (1995) reinforces this assertion stating that external factors are those linked with the national and regional market or local construction industry, and the internal factors are those related to the behaviour of the companies and that intrinsic to the project. Zhi (1995) also identified that in developing countries, projects are significantly influenced by external factors such as economic, political and social issues, meaning that the risk management process is affected by several sources of risk at the same time.

Although it is true that there are different classifications of risks in developing countries, Bascaran (2003), who conducted a study in Venezuela in relation to risk in construction project management, reveals that the main risks in this country are: design changes, organizational structure, shortage of material and lack of knowledge in risk management.

### **Delays in construction projects**

Many studies have been undertaken in order to identify the causes of time delays in construction projects. Laufer & Tucker (1987), claim that time delays are the result of inadequate managerial actions. In contrast, other researchers (Assaf & Al-Hejji ,2006; Zou, Zhang, & Wang ,2007; and Odeh & Bataineh, 2002) state that the main causes of time delays originate from internal and external sources such as design variations, poor labour productivity, unpredictable weather conditions, shortage of skilled labour, inappropriate planning, project complexity, poor project scope definition and shortage of materials. A study by Gonzalez (2010) reveals that delays in Venezuelan construction projects are caused by internal factors, such as poor quality of the programme and project scheduling, shortage of skilled staff, lack of management skills and design changes.

### **Organizational structure**

The way in which the goals of a construction project are accomplished is linked to organizational structure; how people work together, the way that work flows and the line of decision making in an organization (Martin & Martin, 2010). However, the organizational target is addressed by humans, so human behaviour greatly influences the way in which risks are identified and dealt with. As a result of the close relationship between human behaviour and organizational structures, companies can face structural deficiencies such as: slow and poor quality decision making; conflict and lack of coordination; and rising costs. Moreover, according to Ogunlana & Olomalaiye (1989) the deficiencies of organizational structures of companies in developing countries happen because most of them are managed by entrepreneurs who are in the business of making money at the expense of good management.

According to Loosemore *et al.* (2006), there are two main organizational structures: mechanistic and organic. Mechanistic structure is characterized by centralise decision making, vertical communications, rigid rules and procedures, whilst, organic structure is characterized by decentralise decision making, lateral communication and few rigid rules and procedures.

Guerra (2006), who studied a construction company in Venezuela, found that organizational structure and human behaviour had an important influence on the risk management process. The organizational structure of companies would seem to be a significant factor and, therefore, it will be discussed in this research.

## **METHODOLOGY AND DATA COLLECTION**

As the aim of this research is to identify risks and explain how they are managed in Venezuelan construction projects, rather than test a hypothesis, an inductive approach was adopted. This was implemented using a case study strategy which was useful in gaining detailed information about a small number of cases (Robson, 2002). This strategy seeks to answer the questions "why" and "how", as well as, "what" in relation to issues behind the reality. Qualitative data was sought for this research in order to obtain different points of view of the subject studied (Saunders *et al.* 2003). This was important in this management research, not only because of the complex subject matter, analysing risk management, but also because the situation within different cases studies may be unique (Saunders *et al.* 2003).

Semi-structured interviews were also undertaken enabling the researcher to explore the interviewee's motives and feelings, and to explore other ideas that had not had a chance to surface using other methods (Saunders *et al.* 2003).

## Case studies

Three construction projects were selected each with different characteristics. Interviews were conducted with project managers from each case. The questions were divided into three sections. The first section sought to discover what risks were faced on a project and how they were identified. The second section was focused on the risk management process, the organizational structure of the companies involved and the decision making process. This was in order to obtain a general idea about how risks were managed. The last section was concerned with the effects of risks on the projects. For the development of this paper the real names of the projects as well as the names of the interviewees have been kept anonymous. The three case study projects are summarised in Table 1.

Table 1: Case studies

Project	Type of Project	Area	Description	Client	Date
Project 1	Hypermarket	11,600 m <sup>2</sup>	Mixed structure of reinforced concrete and steel	Private	2008 - 2010
Project 2	Bank Headquarters	30,000 m <sup>2</sup>	Mixed structure of reinforced concrete and steel	Private	2002 - 2004
Project 3	Housing Development	11,100 m <sup>2</sup>	Concrete reinforced structure. Block of flats were built using Tunnel Formwork system	Public	2007 - 2009

Tables 2 and 3 present a summary of the results obtained through semi-structured interviews of the relevant project managers.

Table 2: Main topics of the interviews and results

Theme	Research Questions	Results
Risk Identification	Definition of risk	PMs perceive risks as any event can affect the time, cost and quality of the projects.
	Tools and techniques used to identify risks	They did not apply any formal method to identify risks in advance. PMs mainly used their experience to solve problems as they arose.
Risk Management Process	Organizational structure of main contractors	Most main contractor companies did not have structured departments such as planning, budgets, procurement of material. Only one company had a departmental structure but they did not have skilled staff to manage them
	Risks management process undertaken	Mostly reactive or applied in an empirical way to face risks.
	Decision making process	The decision making was carried out by the owners of the companies.

Table 2: Main topics of the interviews and results

Theme	Research Questions	Results
Risk Management process	Tools and techniques applied for planning and tracking the activities of the projects	The planning process activity was developed using Microsoft project software.
Effects of risks	Effects of risks on time	Time delays (See Table 4).
	Other areas affected by risks	Costs overrun. Poor quality and low productivity in projects.

Table 3: Risks and sources identified

Source	Risks Identified	Source	Risks Identified
Designers	Projects incomplete	Main Contractors	Organizational structure problems
Political and economic situation	Labour union, foreign exchange control		Centralised decision making
Subcontractors	Shortage of materials		Deficiencies in risks management process
	Unskilled labours		Poor quality of planning and scheduling
Owners	Slow decision making		Deficiencies in internal process

The impact on time in the three cases is shown in Table 4.

Table 4: Time delays of case studies

Project	Estimated Time	Delivered Time	Exceeded Time	Date
Project 1	17 months	22 months	5 months	2008 -20120
Project 2	14 months	24 months	10 months	2002 – 2004
Project 3	9 months	24 months	15 months	2007 – 2009

## LIMITATION

It is important to highlight that the philosophy chosen for this research allowed only a small sample to be taken to meet the stated objectives. The interviews were carried out with key practitioners such as project managers, who provided the specific information to document this research. Furthermore, it can be stated that at least in these three case studies broadly similar sources of risks and risk management problems were found. However, it is not the intention of this research to generalize these factors to all the projects in Venezuela, as it is obvious that external factors like social, political and economic aspects have an important influence in the source of risks in Venezuela. These may have variations over time, and they can produce different effects in construction projects.

## DATA ANALYSIS

The analysis of this research report is focused on two main areas: source of risks and risk management process. Therefore, after identifying the risks in the data collection

section, they were classified using as a basis the studies developed by Zou *et al.* (2007) and Wang *et al.* (2004), which stated that the sources of risk can be classified as external and internal. Figure 1 shows the sources of risks obtained in this research and their effects.

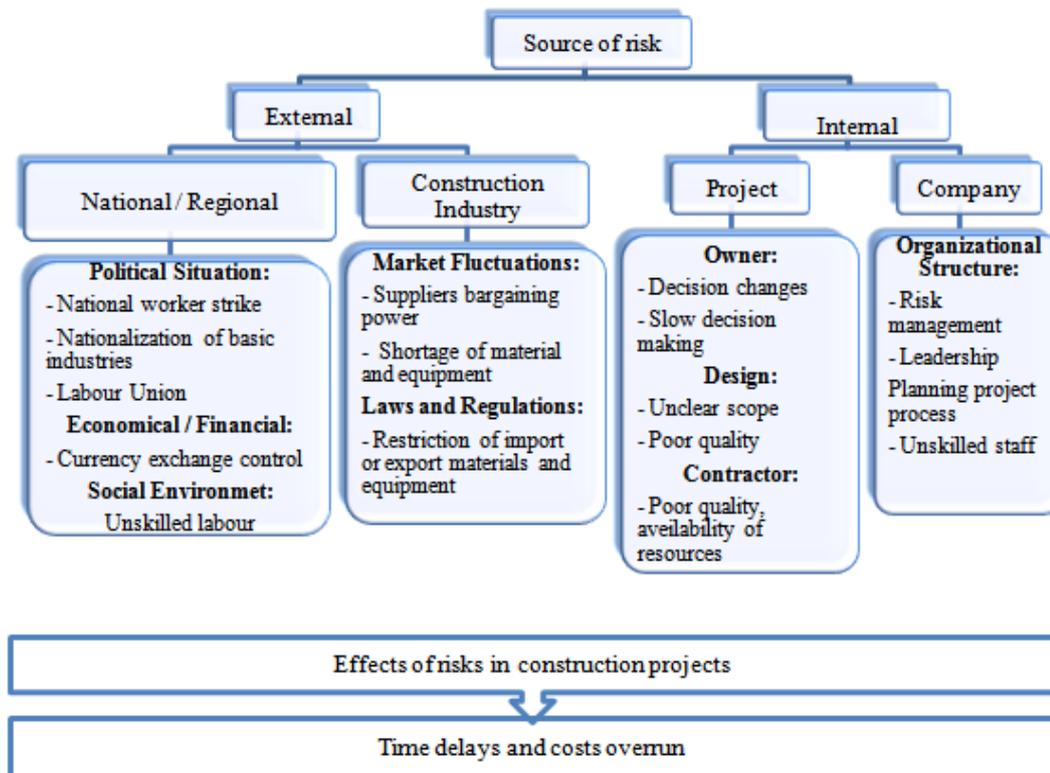


Figure 1: Sources of risks and their effects in Venezuelan construction projects

This classification is a result of the analysis based on the opinion of project managers on risks in each case study. There were risks which were the result of organizational structure or behaviour of the people linked to the projects, that is, internal source of risks, and there were other risks that affected the projects as a consequence of external factors.

Organizational structure and human behaviour have an important role in construction projects, because they are the basis of the risk management process (Williams, 1995); the success of the construction projects depends mainly on these factors. It was found that project management companies faced these internal problems in the three case studies presented in this research.

The project management companies studied can be identified as having a mechanistic organizational structure (Loosemore, *et al.* 2006) as they used a centralised decision-making process that relied on the project manager or the owner's company. They did not have structured departments with strong functional identities. This fact can be attributed to the size of the companies; Project 1 and Project 2 were carried out by small companies, whereas Project 3 was carried out by a medium size company.

Furthermore, it can be said, that organizational structure and human behavioural factors were important in these cases. This research stated that the perception of risk adopted by the project manager was from the subjectivist school. Consequently, risks were faced in a reactionary way rather than in an anticipatory manner. Therefore, risks were perceived according to the experience or beliefs of project managers (Loosemore

*et al.* 2006). What is more, the organization always managed the crisis rather than preventing them, and did not fully understand how human behaviour can affect perception of risks and therefore their impact on projects. These statements are supported by interviewed project managers, who agreed that they had not developed a risk management plan before the project execution phase. In addition to this, it was found that the project managers perceived a scheduling programme as a tool to predict and monitor risks. A scheduling programme can be classified as a good tool to monitor time and resources but it is not enough to manage risks. Essentially risks were managed in an empirical manner in these case studies.

All these case studies were affected by the foreign exchange currency control applied in Venezuela since 2003. Therefore, the main areas affected by this source of risk were procurement of material and equipment which increased the costs. In some cases the contractors had to buy the construction products through the parallel foreign exchange market, as a result of the inefficient exchange regulation applied by the national government.

Another external source of risk was the impact of the labour union on construction projects in Venezuela that has roots in political, social and economic factors. The construction industry has been impacted by this situation, as a result of the new labour legislation since 2007 which states that 75% of the workforce must be provided by the labour unions. Quality, time and costs have been negatively affected in construction projects because the majority of the workers are unskilled, resulting in low productivity. This last fact could be verified in the sample of cases studied, as the projects were constructed between 2002 and 2010.

As shown in Table 4, Project 2 finished in nearly double the time that had been originally estimated and Project 3 finished in more than double the time while Project 1 had the shortest delay on time. It can be argued that poor risk management processes, the lack of knowledge or the lack of effective tools and techniques to handle risk were the fundamental causes of delays in these construction projects. However, costs and quality were other areas which were also impacted as consequences of delays in construction projects, according to the results obtained in the interviews with project managers.

It can be argued that the time delays and cost overruns experienced by construction projects in Venezuela are linked, to the risk management process undertaken which has many technical deficiencies and is greatly influenced by human behaviours. Therefore, the final results are exceeded time and costs overruns.

## **CONCLUSION**

The main sources of risks that the three different case study projects faced were identified as internal and external. As was mentioned earlier, the significant internal sources identified include organizational structure, poor risk management process, unskilled staff, slow decision making, design changes, and poor quality of contractors.

External source of risk as stated by Zhi (1995) arise from political, economic and social environments in developing countries. As a consequence in Venezuela economic factors such as foreign currency exchange control and inflation have affected costs of projects due to the material and equipments prices. Social factors such as unskilled labour have had an impact on quality and productivity. Similarly political factors, such as nationalization of basic industries, have caused shortages of

materials, while the increasing influence of labour unions in Venezuela in the last 10 years have reduced productivity in construction.

These projects also show the empirical way in which risks were managed, how some factors, such as organization structure and human behaviour, have an important influence on a project's success, (as shown in Table 4).

According to the findings of this research, based on a qualitative analysis, it is important to improve areas such as risk management process and Organizational structure, which can be considered as the basis of a successful project. Adopting suitable organizational structures in the project management and contractor companies would be a good first step to achieving success. In this way, the organizations should assess their internal processes in order to improve procedures for decision making, which was one of the areas that showed clear deficiencies in this study. Also, organizations should provide their staff with training in the management field to underpin their strengths and minimise their weaknesses and thus get better results in terms of time, cost and quality of projects.

Human behaviour and its influence on projects is another important aspect to be analysed and improved within the organizations in Venezuela because it would allow project managers and owners to modify their judgements and their perception of risk and thus help them respond properly to risks, rather than in a reactive manner. The sources of risks can be predicted in advance and their impact assessed allowing project managers and clients to make timely decisions to reach the objectives of the project.

Finally, it can be said that with an adequate risk management process and a good organizational structure, both internal and external risks and their impact on projects can be mitigated.

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